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The Nature of the Japanese Transnational Corporation and the Real Effects of Transnational Activity Upon Japan's Machinery Industries

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A Thesis Submitted for the Degree of Doctor of Philosophy (PhD) in Economics

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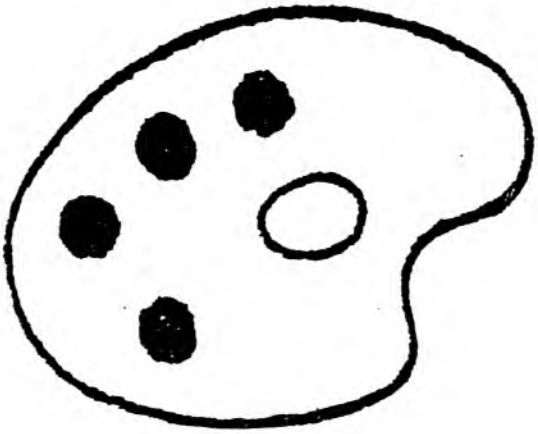

Table of Contents

Table of Contents (Cont.)

Table of Contents (Cont.)

Table of Contents (Cont.)

Table of Contents (Cont.)

Table of Contents (Cont.)

List of Tables

List of Tables (Cont.)

List of Figures and Illustrations

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Finally, I would like to thank my family, particularly my parents, my sister Nicola, and my grandparents. They have always been there for me and have offered continual encouragement and support over the years. This thesis is dedicated to all of them.

Declaration and Inclusion of Material from a Prior Thesis

I hereby declare that the research contained in this thesis is my own original work and has not before been submitted for examination for a degree, either at the University of Warwick or elsewhere. The thesis does contain both published papers and forthcoming publications, which have arisen from my PhD research (see below).

Inclusion of Published Work

This thesis contains both published papers and forthcoming publications, which have been produced in my four years as a PhD student. In this respect, I acknowledge three joint collaborations with my supervisor, Professor Keith Cowling. The first of these collaborations was Cowling and Tomlinson (2000), which appeared in *The Economic Journal*. This paper espouses many of the arguments that appear in this thesis, although the paper itself does not appear as a single Chapter. In Chapter (2), we draw upon some of the arguments that are considered in Cowling and Tomlinson (2001), which has been provisionally accepted for publication at *The International Review of Applied Economics*. In addition, Chapter (7) pursues arguments in Cowling and Tomlinson (2002, forthcoming), which is to appear in an edited volume by Roger Sugden, entitled *Urban and Regional Prosperity in a Globalised Economy* to be published in 2002.

Finally, Chapter (6) uses econometric evidence from Tomlinson (2002, forthcoming), which has been formally accepted for publication by *The International Review of Applied Economics* and will appear in 2002 (either April or July). Appropriate references to all of these publications are made in the text.

Summary

This thesis is concerned with exploring the nature of the Japanese transnational corporation and analysing the real effects of their transnational activities within Japan's machinery industries. The machinery industries are the most important of Japan's manufacturing sectors. The sector is also the most open of all Japanese manufacturing industry to the forces of globalisation and has seen the global emergence of Japan's so-called "national champions", such as Toyota, Hitachi and Sony.

Japan's transnationals have been pursuing global strategies to compete with their international rivals. In particular, they have been strategically developing their own transnational production networks, consisting of their core *keiretsu* partners and suppliers, to facilitate the use of global outsourcing. These transnational activities are changing the nature of Japan's domestic industrial structure. In this respect, there have been concerns that the global expansion of Corporate Japan has had real consequences for domestic Japanese manufacturing. In particular, there have been concerns that the growth in Japanese transnational production will lead to a "hollowing out" of Japanese manufacturing industry (Fujita and Hill 1989; Cowling and Tomlinson, 2000).

These important issues form the subject matter of this thesis. We begin by tracing the emergence of Japan's transnational corporations - *within the machinery sector* - and the growth in Japanese transnational production. Using a Case Study of the Japanese automobile industry, we then highlight the growth in Japanese transnational production networks, known as the *new keiretsu*. This *new keiretsu* provides Japan's transnational corporations with an inside option to "divide and rule" both their suppliers and their global labour force. We uncover direct evidence of this strategy from interviews and a questionnaire with Managing Directors and Senior Managers of Japanese auto-suppliers, based in the UK. We argue that such activities create interdependent linkages between the Japanese transnationals' affiliates around the globe. Consequently, the transnationals' *strategic decisions*, which determine the level of production, investment and employment at their domestic and foreign affiliates will then have a real effect upon the performance of domestic Japanese manufacturing. We provide both econometric and survey evidence to show that this is indeed the case. Finally, in the light of our conclusions we suggest possible ways forward for Japanese industrial policy.

Chapter 1

Japan's Transnationals and Globalisation: An Overview

1.1 Introduction

Over the last 25 years, Japan's transnational corporations have emerged on the global scale. Companies such as Toyota and Sony have become household names around the world through both their export success and, increasingly, their global production activities. These corporations are typical examples of Japan's "national champions": Japanese corporations that have emerged to successfully compete in the global market place with their international rivals. Increasingly, however, there have been concerns that the global expansion of Corporate Japan has had real consequences for domestic Japanese manufacturing.

This thesis is concerned with exploring the nature of the Japanese transnational corporation and analysing the real effects of their transnational activities within Japan's machinery industries. The central hypothesis is that *the emergence of Japan's transnational corporations and their global activities has had real effects upon the structure and performance of Japan's domestic machinery sector.* In particular, the growth in Japanese transnational production networks has led to a new (global) structure of production for Japan's larger corporations. For instance, access to global production sites has allowed Japan's large corporations to attain greater bargaining power (and control) vis-à-vis their traditional *keiretsu* partners. This is because overseas sites offer Japan's transnationals with a credible, alternative option for industrial production, if

contract negotiations with their domestic *keiretsu* suppliers become unfavourable. Increasingly, Japanese transnationals have been diverting their investment and outsourcing their production at the expense of Japan's domestic industry. This has left the majority of Japan's small *keirestu* firms - who are reliant upon subcontracting orders from the larger Japanese corporations - isolated and has raised the spectre of a "hollowing out" (or *kūdoka*) of Japanese manufacturing (Fujita and Hill, 1989; Cowling and Tomlinson, 2000).

These are real concerns and reflect the prominent role that transnational corporations now play in the Japanese economy. According to Cowling and Sugden (1994), data provided by UNCTAD (1993) - based upon equity arrangements – suggests that Japan's transnationals own 37.3% of the economy's manufacturing capacity and account for 32.1% of sales[1]. Although this is significant, these calculations are likely to underestimate the true position, since they do not account for the assets and sales of Japan's *keiretsu* networks which fall under the control of the economy's large firms. From this perspective, it seems reasonable to conclude that Japanese transnationals have considerable influence over the growth of production, investment and employment within Japan and that, in particular, decisions taken to expand their offshore activities may then have a real effect upon the behaviour of these variables and hitherto, the performance of the Japanese economy.

In this introductory Chapter, we provide a brief overview of the main issues that are explored in this thesis. We begin by highlighting the extent to which

[1] This compares with the 2.4% of Japan's industrial capacity, which is owned by foreign transnationals, which account for 2.8% of sales (Cowling and Sugden, 1994).

Corporate Japan has expanded its global activities (Section (1.2)). In Section (1.3), we note the increasing concerns of the real effects of these activities upon domestic Japanese manufacturing. Section (1.4) provides an overview of the main arguments and ideas that are pursued in Chapters (2) to (7). Finally, Section (1.5) provides a description of the main research methodologies employed.

1.2 Corporate Japan's Global FDI Position

Figure (1.1) shows the growth in real Japanese Foreign Direct Investment (FDI) flows since 1970. There has been a significant growth in outward Japanese FDI since the late 1970's. Indeed, between 1981 and 1998, Corporate Japan has recorded the highest average growth rate in FDI of any G7 industrial country. In monetary terms, total Japanese FDI flows were in excess of $500 billion, which has contributed to a four-fold increase in the real value of Corporate Japan's overseas capital stock (Ministry of Finance, 2000). Consequently, Corporate Japan's cumulative share of global FDI flows has risen from a marginal 3%, in 1980, to over 12% in 1998. In absolute terms, only US transnationals have undertaken greater FDI (UNCTAD, 2000). Perhaps, significantly, given that the majority of global FDI flows represent mergers and acquisitions, it is noticeable that it is Japanese transnationals that now have the highest rate of overseas physical investment in the world (Lawrence, 1993; Yamawaki, 1994).

These trends have occurred in a more liberalised era for Japanese transnational corporations. Until 1971, all Japanese FDI had to be validated by Japan's Ministry of International Trade and Industry (MITI) and few FDI proposals were actually authorised (see Chapter (2), for further details). However, the ending of

the restrictions has allowed Corporate Japan to pursue strategies towards a greater transnationalisation of its production, allowing them to compete with their US and European rivals on the global stage (see Chapter (3)). In this respect, the most significant increase in Japanese FDI occurred after the Plaza Accord in 1985, which resulted in an appreciation of the Yen thus raising production costs in Japan relative to other countries (see Figure (1.1)). Although transnational corporations base their investment decisions upon fundamental factors – as opposed to short-term exchange rate fluctuations – it is likely that the Yen's appreciation may have encouraged Japan's transnationals to bring forward their planned overseas investments to take advantage of lower foreign asset prices. During the early 1990's, Japanese FDI fell, as Corporate Japan experienced liquidity constraints in the midst of domestic economic stagnation. The mid-1990's saw a recovery in Japanese FDI flows, although these have fallen back slightly after the Asian financial crisis in 1997 (see Figure (1.1)).

Table (1.1) provides information on the cumulative dispersion of Japanese FDI as at 31/12/1997. The USA has been the largest recipient of Japanese FDI followed by the UK. The most important global economic regions for Japanese FDI are North and Central America, Asia and Europe, which collectively account for 84.8% of all Japanese FDI flows. These economies offer Japanese transnationals both "market-seeking" opportunities (Dunning, 1993) and access to lower labour costs (Tomlinson, 2002; Chapter (6)). We will return to these factors in later Chapters. More fundamentally, within and between these economies, Japan's transnationals have been successful in establishing their own transnational production networks. These are networks of the transnationals' own

affiliates and suppliers and they provide Corporate Japan with an integrated global production chain. The nature of these networks is discussed in further detail in Chapters (4) and (5), where we analyse the globalisation of the Japanese automobile industry.

1.3 Fears for Japan's Domestic Economy and Industrial "Hollowing out"

The extraordinary growth in Japanese FDI has enabled Japan's large corporations or so called "national champions", such as Toyota and Sony, to emerge on the global scale and pursue their own corporate interests. However, while Corporate Japan has expanded globally, concerns have arisen about the real effects of this increased transnational activity upon the performance of Japan's domestic economy. In particular, there are concerns that Japanese manufacturing - the foundation of Japan's post-war economic growth - has become increasingly peripheral, as Japan's large transnationals have sought to substitute foreign for domestic production. As this trend continues, there is a serious risk that Japanese manufacturing will experience a relative economic decline and a "hollowing out" (*kūdoka*) of its industrial base (Fujita and Hill, 1989; Cowling and Tomlinson, 2000). These concerns have gained particular credence during the 1990's, which was a period of unprecedented economic stagnation for the Japanese economy.

The "hollowing out" of Japan's industrial base is a serious possibility, given Japan's low inward stock of FDI. According to the OECD (1999), Japan's outward to inward stock of FDI is 12:1. This means that while outward FDI diverts investment expenditures away from Japan's industrial regions, inward flows of FDI have been insufficient to replenish Japan's domestic capital stock.

Furthermore, the majority of these inward flows relate to foreign mergers and acquisitions of Japanese companies, rather than new physical capital investment. In many of these cases, such as Renault's acquisition of Nissan, inward FDI flows have actually led to a further rationalisation of domestic Japanese industry (see Chapter (7)).

A further consideration is the growth in Japanese transnational production networks, which have facilitated a new (global) structure of industrial production for the Japanese corporations. In particular, access to an integrated global production chain has allowed Japan's large transnationals to increase their bargaining power vis-à-vis their global network of suppliers and workers. Overseas sites provide the transnational with - in the parlance of game theory - an "inside option" to switch or threaten to switch their production, if contract negotiations with their suppliers or labour unions, at a particular site, become unfavourable. This is effectively a "divide and rule" strategy, which raises the transnationals' share of the production surplus at the expense of either their suppliers or workers, or both (Cowling and Sugden, 1994). In Chapter (5), we provide direct evidence of Japanese automotive transnationals using their transnational networks to pursue such "divide and rule" strategies in order to generate a form of intra-firm competition.

The transnationals' use of "divide and rule" strategies has particularly placed Japan's domestic small firm sector in a vulnerable position and it has become increasingly apparent that Japan's large corporations have been using these networks to out-source production at the expense of domestic industry. In this

respect, it is important to note that Japan's small firms have traditionally operated in so-called *keiretsu* networks, providing intermediate goods and services to their main contractors. These clusters of small-firm subcontractors were once regarded as important contributors to productivity growth in Japanese manufacturing (JSBRI, 1996; see also Chapter (2)). However, the transnationals' greater access to global supply chains and the use of "divide and rule" strategies has resulted in a significant reduction in demand for the *keiretsu* firms' products. In addition to their falling order books, Japan's *keiretsu* firms have also had to accept lower prices for their output; a consequence of their weaker bargaining position (JSBRI, 1996). In effect, the *keiretsu* firms have been left "isolated", as their main contractors have become global players.

As the *keiretsu* firms' revenues have fallen, Japan's small firm sector has struggled to repay its long-term loan commitments, thus contributing to the substantial rise in small firm business failures and the high bankruptcy rates seen in Japan during the 1990's (Nikkei Weekly, 19/10/98). These trends were occurring when other industrialised nations – particularly the USA and the UK – were experiencing a noted resurgence in small firm vibrancy (Whittaker, 1997). Moreover, the "isolation" of Japan's small firm sector has adversely affected Japan's industrial regions, many of which now face the prospect of long-term industrial decline (see Chapter (6)). For Japanese manufacturing as a whole, the wider consequences of these trends have been clearly visible during the past decade. Japanese industrial productivity has barely risen since 1990, while the manufacturing sector lost over a million jobs between 1992 and 1996 and was forecast to lose a further 1.25 million jobs by 2001 (Katz, 1998).

1.4 Outline of Chapters (2) to (7)

In order to understand why these trends have occurred and how Japan may nullify the adverse consequences of the globalisation of its industries, it is important to focus our attention upon the nature of the Japanese transnational corporation and to consider the real effects of their activities upon Japanese industry. This is the subject matter of this thesis. We will first consider the evolution of Japanese transnationals, their emergence on the global scale, their global activities and the real effects of these activities upon Japanese manufacturing. These issues are investigated using a mixed methodological approach as outlined in Section (1.5), below.

In conducting this study, we concentrate exclusively upon Japan's machinery sector. The machinery industries are the most important of all Japan's manufacturing sectors and - before 1990 - they were the foundation of Japan's extraordinarily high post Second World War economic growth (Johnson, 1982). In this respect, the machinery sector has particularly benefited from MITI's interventionist industrial policy and the adoption of "lean" production processes (see Chapter (2)). The sector is also the most open of all Japanese industries to the forces of globalisation, and has seen the global emergence of Japan's "national champions", such as Toyota, Hitachi and Sony. However, during the 1990's the sector has been severely affected by problems of "hollowing out". The sector therefore represents an ideal Case Study to consider the nature of Japanese transnationals and the real effects of their global activities.

Our study begins in Chapter (2), with an overview of the role and characteristics of the traditional *keiretsu* networks in Japan's machinery sector, particularly those in the automobile industry. The origins of Japanese transnationals and the nature of their global operations evolve from Japan's domestic structure of production. As we mentioned earlier, Japan's industrial structure is based upon a multitude of subcontracting relationships in so-called *keiretsu* networks. These *keiretsu* relations are often purported to embody "close ties", "co-operation" and "mutual trust" between the various parties involved (Smitka, 1991). Such characteristics have led Aoki (1990) to view Japanese firms as being "non-hierarchical entities" that embrace a wide set of interests, which includes suppliers, financial interests, management and workers. In summary, Aoki (1990) regards the Japanese firm as a *nexus of treaties*.

Chapter (2) reviews Aoki's (1990) position in some detail, but takes an opposing view of the Japanese firm, based upon a strategic decision-making approach as outlined in Zeitlin (1974) and developed further in the work of Cowling and Sugden (1994, 1998). Drawing upon alternative evidence and observations - primarily from Ruigrok and Van Tulder (1995) – it is apparent that a few large corporate firms dominate Japan's *keiretsu* networks, through the exploitation of various control mechanisms. In effect, these control mechanisms facilitate a hierarchical structure of production, with *keiretsu* firms often subordinate to the demands of their main contractors. This leads us to view Japanese corporations as being controlled from a centre of strategic decision-making. Interestingly, a re-appraisal of Japanese industrial policy would also appear to suggest that this structure was actively encouraged by MITI, in an attempt to cultivate Japan's

"national champions". These are important insights, which aid our understanding of the nature of industrial relationships and the degree of control and oligopolistic behaviour in Corporate Japan.

Chapter (3) utilises this framework to analyse the reasons for the emergence of Japan's transnationals. The main argument is that transnationality is, itself, endogenous and is a result of both demand constraints and supply side factors in Japan's domestic economy. It is conceivable that Japan's oligopolistic environment may have led to a climate of deficient domestic demand, which may have encouraged larger Japanese corporations to undertake FDI in order to secure and expand new overseas markets. Following Pitelis (1996, 2000), a simple econometrics test is undertaken, which provides some statistical evidence that domestic demand deficiencies are related to outward Japanese FDI. However, while demand-side factors are important, it is, fundamentally, supply side factors, which affect a firm's strategic decision to become a transnational corporation - as opposed to servicing foreign markets through exporting and/or licensing/subcontracting. In this respect, the analysis returns to Hymer (1976) and the argument that transnationality reflects a determination, on the part of oligopolistic (Japanese) corporations, to protect a specific (competitive) advantage and to remove conflict in international markets. For Japanese firms, these specific (competitive) advantages may relate to their technological competence and the organisational efficiencies of their *keiretsu* networks. In the international market, transnationality allows Japanese corporations to directly control and protect these specific advantages, while the development of

transnational production networks raises the corporation's bargaining leverage with both international labour and world governments (see Chapter (3)).

These supply side issues are explored further in Chapters (4) and (5), where the analysis focuses upon the Japanese automobile industry. The automobile industry is Japan's leading manufacturing industry and is the most global of Japanese industries. Chapter (4) provides *new evidence* on the *scale* and *pattern* of globalisation within the industry, using data carefully collated from the Dodwell Marketing Consultants' Directory (1997). In Chapter (4), we reveal the extent of the various Japanese automobile assemblers' (or Original Equipment Manufacturers (OEMs)) global operations, including details of the globalisation of their supply chain, the *new keiretsu*. The *new keiretsu* pre-dominantly consists of the Japanese OEMs' core suppliers, which is a strategic attempt, by the industry's corporate hierarchy, to replicate domestic *keiretsu* relations at the global level. In effect, the industry's hierarchy have been deliberately creating a transnational production network to protect and maintain their specific (competitive) advantages - *which are related to the nature to domestic keiretsu relations* - and also to control their international operations.

Although the nucleus of the *new keiretsu* involves Japanese suppliers, the *new keiretsu* also includes a mix of Japanese and indigenous actors, such as managerial staff and personnel, and other suppliers of raw materials and intermediate inputs. These involve the establishment of new relations, between parties of different cultures. In Chapter (5), we investigate the nature of these *new keiretsu* relationships, using a Case Study of Japanese auto-suppliers based

in the UK. We are careful not to generalise our results, given that they are based upon specific evidence from the UK. Nevertheless, given that the UK is the major European centre for Japanese automotive production, the results in Chapter (5) maybe considered a good representation of *new keiretsu* relations elsewhere.

As mentioned in Section (1.3), the *new keiretsu* alters the nature of traditional *keiretsu* relations, in that it provides Japan's automotive transnationals with an "inside option" to switch production to an alternative global site. This facilitates the use of a "divide and rule" strategy, with both labour and world governments. In the former case, Chapter (5) uncovers direct evidence that Japanese UK affiliates are involved in this form of intra-firm competition. However, while such a strategy appears to allow Japan's OEMs to resolve conflict with their own global labour force, such strategies may raise conflicts at the executive level when the Japanese affiliate is involved in a joint venture with an indigenous firm and disputes arise over the level of affiliate profitability. This issue is investigated in further detail in Chapter (5).

In Chapter (6), we provide empirical evidence of the real effects of transnational activity upon Japan's domestic machinery sector. We first concentrate upon the real effects of transnational activity upon the behaviour of investment and labour demand in these industries. Through the *new keiretsu*, Japanese transnationals have created interdependent linkages between their transplants around the globe in order to control their (international) costs, via a "divide and rule" strategy. The

result is that both investment and employment, at domestic Japanese transplants, are now increasingly sensitive to the behaviour of changes in global wage costs.

Following Hollingsworth (1997), the real effects of this transnational activity can be captured empirically, by augmenting foreign wage variables into the domestic production function. A partial equilibrium model is formulated and the estimated equations suggest that both investment and employment, in Japan's machinery sector, are sensitive to international wage effects. These results, along with further qualitative evidence, are then discussed in the context of concerns about the "hollowing out" of the Japanese economy. Finally, given these concerns about the future of Japanese manufacturing, Chapter (7) considers the possibilities for the direction of future industrial policy.

1.5 Research Methodology

In investigating the above issues, this thesis has employed a mixed methodological approach. This has involved a comprehensive literature review, data collation from various primary and secondary sources and the use of a variety of statistical techniques, including cross-tabulation, correlation and econometrics.

The secondary data has been collated from established sources such as the Japanese Statistical Yearbook, the Japanese Ministry of International Trade and Industry (MITI), the United Nations (UN), the Organisation for Economic Co-operation and Development (OECD) and the International Labour Office (ILO). This data is presented in relevant tables and graphs through Chapters (1) to (7).

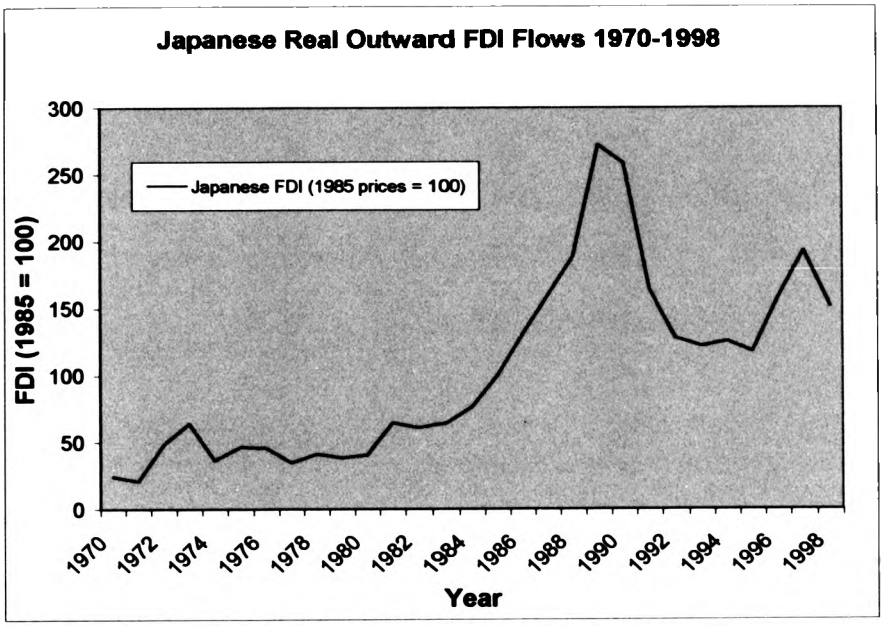
Secondary data is also used to conduct econometric testing of hypotheses in Chapters (3) and (6) and, in these cases, the appropriate data sources are quoted at the end of each Chapter.

In addition, data and information on specific Japanese machinery industries were obtained from the various industry bodies. However, for the Case Study, on the Japanese automobile industry (Chapters (4) and (5)), data was collated from three sources: the Dodwell Report (1997), interviews and a questionnaire. The interviews were conducted with 7 Managing Directors and the questionnaire was completed by 27 Managing Directors/Senior Managers of UK based Japanese auto-suppliers (a response rate of 71.1%). The interviews and questionnaire were based upon guidelines set out in Moser and Kalton (1971). Further details of the Dodwell data and the approaches taken with regards to the interviews and the questionnaire are provided in Appendices (A) and (B). In analysing the Case Study data, cross-tabulations and correlations were primarily employed and further details of these statistical techniques are provided in Appendix (C).

The mixed methodologies employed reflect the *holistic* approach that is taken in collating appropriate evidence for this thesis. It was felt that such an approach was warranted since it provides for a wider and deeper understanding of the key issues as opposed to relying solely upon the standard economist's toolkit, where the emphasis is upon formal modelling and econometric testing. We would argue that to understand the emergence of Japan's transnationals and to gauge the real effects of their activities upon Japan's domestic machinery sector, a sense of historical perspective is required, along with an appreciation of the Japanese polity, culture and industrial organisation. These are important considerations,

which cannot easily be encompassed within a standard neoclassical framework. Rather it is important that they are addressed through a wider, perhaps more scientific approach, which then allows for the formulation of a valid argument. This thesis has tried to adhere to this latter doctrine, with the literature reviews providing the basis of our argument and the automotive Case Study providing direct and deeper insights into the nature of Japanese (transnational) industrial organisation. These insights have then allowed us to formulate and estimate appropriate econometric models to provide further empirical support for the hypotheses under consideration.

Figure (1.1)



Source: Financial Statistics of Japan (Various Issues), Ministry of Finance, Japan.

Table (1.1)

Main Country Location of Japanese FDI by Cumulative Outward FDI Stock as at 31/12/1997 (in Millions of Yen)

Country	Yen	Component Ratio %
USA	13295500	37.6
Canada	613800	1.7
Subtotal	13909300	39.3
France	388700	1.1
Germany	578900	1.6
Italy	72000	0.2
Netherlands	1383200	3.9
Spain	120600	0.3
UK	2862100	8.1
Subtotal	5405500	15.2
China	2760600	7.8
Hong Kong	1077800	3.1
Indonesia	1027300	2.9
Korea	1147300	3.3
Malaysia	611800	1.7
Philippines	273700	0.8
Singapore	1429100	4.0
Thailand	743500	2.1
Subtotal	9071100	25.7
North & Central America	14041400	39.7
Europe	5894300	16.7
Asia	10037300	28.4
Rest of World	5361000	15.2
World	35334000	100

Source: OECD (1999), International Direct Investment Statistics Yearbook (Paris: OECD).

Chapter 2

The Japanese Firm and Japan's Domestic Machinery Industries[1]

2.1 Introduction

Our analysis of the Japanese transnational corporation and the machinery sector begins with an (historical) overview of Japan's domestic industrial structure. This is important since, in Chapter (3), it will be argued that the roots of transnationality and the industry's globalisation stem from Japan's domestic business environment. Furthermore, as will be seen in Chapters (4) and (5), the nature of this globalisation reflects an attempt by Japan's large transnationals to replicate important characteristics of their domestic activities in various locations, around the globe. This is clearly evident in the automobile industry (see Chapter (4)). The overview in this Chapter, therefore, provides key insights into the nature of Japanese *keiretsu* relationships within the machinery sector and also how activities are organised. An understanding of these *keiretsu* relationships is also important, for considering the wider real effects of globalisation within the sector in Chapter (6).

Through an analysis of Japan's machinery sector and industrial structure, this Chapter also reappraises the literature on the Japanese firm. This is important since one of the central tenets in this thesis, is that the Japanese transnational corporation is a hierarchical organisation, controlled by a corporate elite, which is in control of its global operations. Furthermore, this thesis maintains that

[1] Some of the arguments in this Chapter - which relate to the nature of the Japanese Firm - are considered further in Cowling and Tomlinson (2001).

Japan's transnationals are a replication of their domestic entities. However, an influential literature, initiated by Aoki (1984, 1988, 1989, 1990, 1994), argues that Japanese firms are "non-hierarchical entities", which embody a wide range of interests within the organisation (e.g. workers, financial and managerial). Aoki's argument is anathema to the view(s) espoused in this thesis. In confronting Aoki's position, we focus upon the concentration of strategic decision-making within the typical Japanese firm and draw upon particular examples of the various control mechanisms used by Japan's large automotive firms. The automobile industry examples are particularly relevant, since Aoki (1990) and others (see, for instance, Smitka, 1991) have referred to the industry as a clear example of Japanese industrial co-operation, and the "close ties" and "mutual trust" that exist between firms. From our perspective, the discussion also provides a useful precursor to the analysis in Chapters (4) and (5).

The remainder of this Chapter is as follows. In Section (2.2), we present data on the main characteristics of the machinery sector and identify the major agglomerations of industrial activity within Japan. We also consider the important role of industrial policy in the machinery sector's economic development. Section (2.3) outlines the key aspects of the machinery sector's industrial structure, drawing upon particular examples from the automobile industry. In Section (2.4), we reappraise Aoki's (1990) view of the Japanese firm and offer an alternative interpretation through a strategic decision-making approach (Zeitlin, 1974; Cowling and Sugden, 1994, 1998). Finally, Section (2.5) concludes.

2.2 Japan's Machinery Industries

2.2.1 Industry Characteristics

Japan's machinery sector consists of five broad industries: Fabricated Metal Products (ISIC 381), Agricultural and Industrial Machinery (ISIC 382), Electrical Machinery and Electric Goods (ISIC 383), Transport Equipment (ISIC 384) and Precision Tools (ISIC 385). These industries have traditionally played a significant role within the Japanese economy and have long been regarded as the engine of the country's economic growth and international competitiveness (see Johnson, 1982). The machinery sector collectively accounts for 43.7% of all manufacturing employment and, on average, contributes 42.8% to Japan's total output (see Table (2.1)). It also provides 75% of the economy's exports (see Whittaker, 1997).

The statistics in Table (2.1) provide further information on the characteristics of Japan's machinery sector for the period 1968 to 1994. It appears that the sector's largest industries are Agricultural and Industrial Machinery (ISIC 382), Electrical Machinery and Electric goods (ISIC 383) and Transport Equipment (ISIC 384). The output of these industries has been quite similar and collectively accounts for approximately 83% of production in the machinery sector. In terms of capital employed, Transport Equipment accounts for almost a third of the sector's real capital stock, while the Electrical Machinery and Electric Goods industry is the largest employer. Furthermore, these relative positions have remained stable over the 1968 –1994 period as indicated by the small variance in the sample means of the reported data (see Table (2.1)).

The final column in Table (2.1) is the average labour/capital ratio (L/K), which is calculated as the proportion of total hours worked to the real capital stock in each industry. For all industries in Japan, this ratio has fallen since 1968, as firms have moved towards more automated production processes (see Baba, 1997). From Table (2.1), it appears that the L/K ratio is higher in the machinery sector than in other manufacturing industries. This indicates that the machinery sector is more labour intensive, which implies that labour costs will be relatively more important in the firm's cost function. A particular case is the Electrical Machinery and Electric Goods industry, which is dominated by the production of semi-conductors, electronics, computer hardware and other consumer appliances. These are industries that rely upon a large workforce to assemble items such as circuit boards, microprocessors and other electronic devices. In contrast, the L/K ratio is much lower in Transport Equipment where over two-thirds of the output is in automobiles, an industry that is said to rely upon highly automated "lean" production processes (see Womack et.al, 1990; Fujimoto and Takeishi, 1997).

2.2.2 Japan's Industrial Districts

The data in Table (2.2) and the map in Figure (2.1) provide some information on the geographical location of domestic Japanese manufacturing and, in particular, the machinery sector. As Table (2.2) shows, over 73% of output and 68% of employment in the machinery industries are concentrated within 15 of Japan's 47 prefectures. In addition, these 15 prefectures also account for 63% of total manufacturing output and employment. Since the Meiji Restoration of 1968, these regions have emerged to become the hub of Japanese manufacturing, benefiting from being close to major ports and a large labour force. The most

important of these prefectures are the large industrial belts of Aichi, Kanagawa, Sizuoka and Tokyo (see Table (2.2)), where the major industries are Transport Equipment, Electrical Machinery and Electronics.

It is within these prefectures that we find Japan's main industrial districts. Marshall (1919) defines an industrial district as an area where there is a cluster of industrial activity, which enables firms to benefit from external scale economies that are a result of their direct interdependence. These agglomeration economies include not only "technological factors", such as labour market pooling and the sharing of local infrastructure, but also the diffusion of information such as new technology, advances in knowledge and changes in organisation. By generating these agglomeration effects, local industries reduce their costs and achieve increasing returns to scale. The cluster's economic vibrancy, in turn, attracts new firms and industrial activity - the so-called centripetal forces of agglomeration - which generates even further externalities and enhances the network's competitive advantages (Krugman, 1995).

These clusters are often characterised by a propagation of small firm activity, with firms establishing horizontal linkages between themselves, such as those evident in Emilia-Romagna - the "Third Italy" - and Baden Württemburg, in Germany. There are also a large number of small firms in Japan's industrial districts. Indeed, small and medium sized businesses play an important role in Japanese manufacturing and regularly account for over 99% of private business establishments, employ over 78% of the labour force and produce approximately 70% of domestic output (JSBC, 1998). However, unlike in Europe, Japan's small

firms primarily operate in so-called vertical *keiretsu* networks, acting as subcontractors to larger firms within a Corporate Group (*the kigyo shudan).* Nevertheless, a number of Japan's smaller firms have developed other income sources and do not rely solely upon sub-contracting.

In this respect, Whittaker (1997) has identified three types of industrial district that exist within Japan. The first type of district is known as the *sanchi,* which comprise of agglomerations of small independent firms, operating in small workshops. In the machinery sector, these firms primarily specialise in the low volume production of high-tech goods. They can be found in the metropolitan centres of Tokyo and Osaka. Whittaker (1997) identifies the small-scale nature of production within the *sanchi,* as being Japan's closest example of a Marshallian industrial district. The largest industrial districts are the so-called "company castle towns" (*kigyo joka machi*), where there are a large number of small firms, but the dominant players are Japan's large corporations. Examples of these "company castle towns" include Toyota City, in Aichi prefecture, where Toyota and their core suppliers (for instance, Denso and Aisin Seiki) have established their major domestic operations. Nissan have developed similar clusters within Kanagawa, Tokyo and Tochigi, while Honda's operations are primarily within the prefectures of Shizuoka, Saitama and Mie. In addition, the large electronics firms, such as Hitachi, Sony, Toshiba and NEC have also created their own *keiretsu* networks within these prefectures. Finally, there are also districts where the main firms are medium-sized firms, who manufacture under their own label, but who combine local contracting out with in-house production (see Whittaker, 1997).

2.2.3 Industrial Policy and Industrial Development

According to Johnson (1982), the growth of Japan's machinery sector, its relative importance in Japanese manufacturing and its post-war international competitiveness are the result of MITI's active industrial policy and Japan's institutional style of capitalism[2]. In this respect, the immediate post-war period saw the Japanese Ministry of International Trade and Industry (MITI) designate the machinery industries as being "strategic". This meant that MITI identified the sector as being one that would play a pivotal role in Japan's future economic and industrial development. As a result, over the last fifty years, the sector has, at various times, benefited from measures such as direct subsidies, discriminatory tariffs, preferential commodity taxes, import restrictions and favourable industry regulation. Initially, during the 1950's and early 1960's, the machinery sector's "strategic industries" consisted of the heavy industries, iron and steel, shipbuilding and electrical equipment. By the 1970's and 1980's the emphasis had shifted to industries producing consumer durables, namely automobiles and semi-conductors, while in the 1990's, MITI has tried to encourage higher technology industries such as advanced electronics and computer equipment (JSMA, 1993).

For Johnson (1982), the most important tenet of Japan's industrial policy was the regulation of foreign trade. In the early post-war period, MITI shielded Japan's infant machinery industries from foreign competition, by imposing extensive import quotas on cheaper foreign imports. The quotas were implemented under

[2] The economic rationale for the State to encourage industrial development through an institutional style of capitalism and an active industrial policy is associated with the literature on "development traps" (see Rosenstein-Rodan, 1943; Gershenkron, 1962; Murphy et.al, 1989).

the 1949 Foreign Exchange and Foreign Trade Control Law, which authorised MITI to allocate Japan's limited foreign exchange reserves to importers. However, by the mid-1960's, the quota system was under pressure from new GATT guidelines, while Japan's rising trade surpluses effectively restricted MITI's ability to ration foreign exchange (Katz, 1998). MITI responded by raising tariff levels, particularly in its designated "strategic industries". For instance, in 1963, the highest Effective Tariff Protection Rate (ETPR) was applied in Transport Equipment (61%), Electrical Machinery (31%) and Precision instruments (35%). As the machinery sector developed and became internationally competitive, the tariffs were gradually reduced and by 1978, the ETPR in these industries were 3%, 7% and 6% respectively (Itoh and Kiyono, 1988).

While protecting domestic infant industries, MITI's trade policies were supplemented with positive support to Japan's exporters. This included specific tax breaks; such as tax deductions on export earnings (1953-1963) and accelerated depreciation allowances for exports (1964-1971). These subsidies sometimes amounted to as much as 25% of profits (Itoh and Kiyono, 1988; Katz, 1998). An important institutional development was the establishment of the Japanese External Trade Organisation (JETRO), which was given the directive to promote Japanese trading interests abroad. The overseas JETRO offices expanded upon the role played by Japan's general trading companies (*the sogo shosha)*, by conducting extensive market research and aiding Japanese exporters to secure contracts in new and existing markets (see Johnson, 1982).

In addition to trade protection, MITI imposed strict controls upon Foreign Direct Investment (FDI). The controls over FDI were operational under the 1949 Foreign Exchange and Foreign Trade Control Law and the 1950 Foreign Investment Law. These laws were strict and all FDI proposals were subject to approval by a MITI appointed, governmental liaison committee. The overwhelming majority of these proposals were rejected and few official reasons were given[3]. Bailey et.al (1994a) argue that by allowing MITI to sanction all inward and outward FDI proposals, the laws allowed Japan to insulate infant industries from the pressures of global competition[4]. However, while FDI was subjected to restrictions, MITI did positively encourage machinery firms to enter into suitable licensing and joint venture agreements with foreign competitors. These arrangements usually required MITI's approval, but they enabled Japanese industry to gain access to the latest international technologies. Ozawa (1973) has argued that a critical factor in Japan's post-war international success was the remarkable ability of Japanese manufacturers to successfully adopt and improve upon these foreign technologies.

Finally, in addition to MITI, the post-war Japanese State also established institutions that have provided long-term finance for manufacturers at preferential rates of interest. The Bank of Japan encouraged the development of the *banking keiretsu*, whereby groups of enterprises could collectively borrow

[3] FDI proposals that were permitted were those MITI regarded as being conducive to the long term interests of the Japanese economy (see Chapter (3)).

[4] The concerns over Foreign Direct Investment were two-fold. MITI was concerned that inward flows of FDI would lead to foreign competitors (mainly from the USA) entering and monopolising Japanese markets, at the expense of indigenous industry. There were also fears that outward FDI would lead to "reverse exports", which would also harm less efficient domestic infant industries (see Bailey et.al, 1994a).

funds, in excess of their net worth from city banks. The city banks, in turn, borrowed funds from the central bank, which guaranteed the system. The Ministry of Finance also set up the Japanese Development Bank, enabling funds to be directed from the postal savings system to MITI's designated "strategic industries" in the machinery sector (Johnson, 1982).

2.3 Japanese Industrial Organisation

2.3.1 Japan's Keiretsu Networks: The Case of Japan's Automobile Industry

In Japan, approximately 56% of small firms are involved in some form of subcontracting. However, in the machinery sector, over 70% of small firms are subcontractors and this figure is higher than 80% in Electrical Machinery and Transport Equipment (Whittaker, 1997). These are the *keiretsu* firms that operate in the "company castle towns", where they predominantly supply intermediate goods and services to the larger Corporate Group firms. The Corporate Group(s) or *"kigyo shudan"* consist of Japan's larger firms and they represent a horizontal conglomerate of financial and industrial interests (Scher, 1997).

As we have already noted, the typical Japanese firm is a vertically de-integrated entity. Industrial activity is generally organised through *keiretsu* networks, where intermediate goods and services are supplied through an extensive set of (vertical) sub-contracting arrangements. This may be described as a pyramidal structure of production, but the literature emphasises the long-standing close relationships, co-operation and the mutual trust that exist between *keiretsu* firms and their main contractors. Indeed, firms are often encouraged to co-operate and innovate through the sharing of technology and personnel exchanges (see

Gerlach, 1992, Scher, 1997). These close relations also include the practice of large corporations guaranteeing the *keiretsu* firms' income streams, particularly in periods of fluctuating demand. Furthermore, larger corporations may also offer a "free consultancy service", providing their sub-contractors with advice and information about manufacturing operations, financial matters and foreign markets. In return, some sub-contractors may be given responsibility for the design and manufacture of complete sub-assemblies.

The most prominent examples of these *keiretsu* relations are those observed in Japan's automobile industry (see Smitka, 1991). The industry has the largest and widest number of *keiretsu* linkages within Japanese manufacturing. These linkages involve Japan's 11 main assemblers (hereafter referred to as Original Equipment Manufacturers (OEMs)) and approximately 1,400 auto-components suppliers (Dodwell, 1997). In addition, the automobile industry also has linkages with more than 10,000 materials producers and subcontractors, which span the whole of the machinery sector. The scale of these linkages are reflected in the fact that Japanese OEMs outsource 70% of their components in terms of value and 90% of actual components (Fujimoto and Takeishi, 1994, Dodwell, 1997).

The automobile industry is a web of "high dependency relationships", with a high degree of interdependence between the activities of *keiretsu* firms. A supplier's profitability ultimately depends upon the competitiveness of the OEM and the success of the final product(s). The OEM's competitiveness, in turn, reflects the performance and technology of its supply chain. A key facet of the industry's corporate success is the close, long-term, bilateral relationships that

have evolved between the OEMs and their suppliers (Smitka, 1991). The "close ties" and "mutual trust" are reflected in the fact that OEMs often designate responsibility for the design and production of complete component systems to their First Tier suppliers. Over time, these suppliers have accumulated relation-specific skills and this would appear to place them in a favourable bargaining position vis-à-vis their OEMs. However, by owning a significant proportion of equity in their key suppliers, Japan's large OEMs are able to reduce the potential for any conflict over contracts. In this respect, contract prices are usually set through a process of "open book accounting", where the price and cost structure of each component is analysed by the OEM in detail, before a "target price" is agreed upon. There is a general expectation that the "target price" will fall over time, with the OEM providing the supplier with assistance to reduce costs (Aoki, 1988). Furthermore, to reduce potential agency problems, particularly at the lower end of the supply chain, the OEM also maintains internal rankings of all its suppliers. Those suppliers that do not meet the required standards - on price, quality and delivery - often lose their position within a transactional hierarchy and they also lose future business opportunities (Aoki, 1988, 1990). This prospect is more likely where the components are small, standard units and the OEM can easily find an alternative supplier (Asanuma, 1989).

A particular feature of Japan's automotive ***keiretsu*** relationships are the supplier associations or *"kyoryoku-kai"*, which exist at 10 of the 11 Japanese OEMs[5]. The supplier associations facilitate a wider communication of the OEM's production plans, and encourage mutual learning amongst participants. They also provide a

[5] The exception is Honda Motor Corporation.

forum for members to solicit new suggestions for common problems, such as parts standardisation. According to Sako (1996, p.669), the associations encourage a *"network of innovators"*, providing important net benefits to both OEMs and suppliers while also assisting the diffusion of knowledge throughout the sector.

2.3.2 Japanese Production Processes

In addition to MITI's industrial policy and the co-operative nature of the *keiretsu* networks, the international competitiveness of Japan's machinery sector has also been attributed to the efficiency of Japanese production processes (see, for instance, Kenny and Florida, 1988, 1993). These processes revolve around a so-called *Just-In-Time (JIT)* production system, based upon time economy, and an emphasis upon *kaizen* quality control at each stage of production. The successful implementation of these processes requires long-term co-operation by all *keiretsu* firms. The processes were first introduced in the Japanese automobile industry, during the 1950's and 1960's, by, ironically, Western engineers, such as the American, William Deming, whose ideas had largely been ignored in the West (Dicken, 1998). The principles of these processes have subsequently been adopted throughout Japan's machinery sector (Abegglen and Stalk, 1985). Since the mid-1980's, they have also been increasingly adopted by Western corporations (Sabel, 1988).

After conducting a major study into Toyota's production processes, Womack et.al (1990, p.13), describe the Japanese production processes as "lean" since "*it uses less of everything compared with (traditional) mass production - half the*

human effort in the factory, half the manufacturing space, half the investment in tools, half the engineering hours to develop a new product in half the time. Also it requires keeping far less than half of the needed inventory on site, results in many fewer defects, and produces a greater and ever growing variety of products". Womack et.al (1990) argue that the description of "lean" is merited because Japanese production processes are highly flexible, in terms of both the use of the labour force and machinery. Production is said to be organised so that there is frequent job-rotation, which facilitates learning by doing and job flexibility, while the use of information technologies allows flexibility in the use of machinery so that it can easily, and quickly, be switched to different processes.

The use of *kaizen* or total quality control is believed to develop a particular emphasis upon quality throughout the system, which reduces waste and, therefore, increases efficiency. In addition, Womack et.al (1990) also argue that, through their close *keiretsu* relationships, Toyota and other Japanese automotive OEMs have perfected the *Just-In-Time (JIT)* production system, which allows production to "flow", with components being delivered and assembled, exactly when required - through the use of quick machinery changeover - to meet projected individual demand(s). It is then argued that *JIT* and "flow" leads to a significant reduction in inventory holdings, throughout the system, while production runs are flexible, and can be tailored to manufacture a diverse range of output. This is said to compare favourably with the traditional batch system, where there are long production runs, producing a narrow range of outputs - a system, which also requires large stock holdings to avoid a disruption in supply.

2.3.3 Labour Relations

In the workplace, Aoki (1990) has observed that the Japanese firm encourages a wide degree of job rotation, which allows workers variety in their daily tasks and promotes flexibility in the production process. Workers are said to be regarded as an integral part of the firm and develop firm-specific skills. They are rewarded through incentive devices based upon a rank hierarchy that primarily provides financial rewards (e.g. salary and bonuses) for length of service and good performance. The nature of the Japanese incentive system is said to allow for a greater delegation of decision-making, which encourages wider on-site information and problem solving and horizontal co-ordination across departments. Aoki (1988, 1990) argues that this facilitates positive learning externalities throughout the Japanese firm. In addition, by relating incentives to long service, Japanese firms are able to retain employees with firm specific skills. This helps to explain the long-standing tenure of Japanese employment (Aoki 1988, 1990).

Japanese firms have also established close relationships with labour unions. These unions are company sponsored, are not associated with any national federation and include only company workers. In Japan, nearly one in every six executives has held a position in the labour union. This has led Abbeglen and Stalk (1985, p.205) to conclude that *"the (Japanese) labour union does not exist as an entity separate from, or with an adversarial relationship to, the company"*.

2.3.4 Financial Relationships

The Japanese firm's prime financial relationship is with its main bank, which provides cheap access to long-term funds, advice on investment projects and assistance in financial and foreign markets. The main bank usually has an equity stake in the Japanese firm, although it is unlikely to intervene in the business affairs of the company, unless the firm is in financial distress. In effect, Japanese firms are given a corporate ranking, which is related to their profitability (Aoki, 1990). Smaller *keiretsu* firms can also gain access to low-cost funds through the *banking keiretsu*, with their main contractor often acting as guarantor.

An additional feature of Japan's capital markets is the prevalence of cross-shareholdings between companies, the reciprocity of which encourage a remarkable stability in equity holdings (Sheard, 1994). The financial system thus shields the Japanese firm from the (short-term) threat of take-over, which is a particular feature of Anglo-American capital markets. It is argued that these arrangements extend the "close ties" between Japanese firms, allowing Japanese industry to make long-term investment decisions, particularly with respect to Research and Development.

2.4. Strategic Decision-Making within Japan's Machinery Sector

2.4.1 Aoki's Non-Hierarchical Hypothesis

Japan's industrial structure described in Section (2.3) is unique and consequently, it has attracted a considerable economic and business literature. The major emphasis of this literature has been upon the embodiment of long-term co-operation, mutual trust and flexibility - between the various actors - that appears

to exist within Japanese manufacturing. This co-operation allows for the implementation of Japanese production processes that are said to compare favourably with Western modes of industrial organisation and provide a competitive advantage for Japanese firms (see, for instance, Kenny and Florida, 1988, 1993).

One of the main proponents of this view is Aoki (1984, 1988, 1989, 1990, 1994), who argues that there are clear differences between the Japanese firm, which he labels the J-mode, and the hierarchical Anglo-American firm, which he refers to as the H-mode. In the H-mode, there is a hierarchical separation between planning and manufacturing operations, where "*planning, such as production scheduling, manufacturing process control, and commodity development is entrusted to an office at the top level of each function, which is supposed to have prior knowledge on markets, engineering know how etc*" (Aoki, 1990, p.8). This contrasts with the J-mode's emphasis upon horizontal co-ordination between workers and firms to achieve flexibility and time economy in production (see Section (2.3)).

The H-mode also has a hierarchical labour market, with an incentive structure based upon job classification and status, whereas the J-mode relies upon rewarding good performance through salary and bonuses (see Section 2.3.3). Aoki (1990) argues that, consequently, Western firms have created an employment structure with layers of specific tasks. This lessens the opportunities for workers to gain wide-ranging work experience and also reduces the flow of information throughout the firm. Furthermore, Western managers are thought to

be less likely to delegate decision-making, since it may undermine their own autonomy. Finally, in the H-mode, Western corporations are subjected to the hierarchal control of the capital markets, which are purported to use the takeover threat to generate increases in (short-term) profitability. In contrast, such threats are rarely encountered in J-mode firms, where cross-shareholdings exist and the emphasis is upon long-term objectives, with dividends being paid at an agreed set rate and are not related to profitability (Abegglen and Stalk, 1985).

For Aoki (1990), the Japanese firm is a *nexus of treaties* with *keiretsu* relationships, employee relations and the financial structure all inter-related. The economic rationale behind their sustainability can be explained in terms of each party recognising their joint responsibilities and the mutual benefit of co-operation. Aoki (1990) believes that because of these mutual interdependencies, the Japanese firm represents a wider set of interests than the typical profit-maximising Western corporation. Other writers have gone further and have suggested that the arrangements within the Japanese firm favour employees, who are rewarded with lifetime employment assurances and generous salary schemes. In this respect, J-mode employees can be considered as the firm's most important stakeholders (see Abegglen and Stalk, 1985, Miwa, 1996).

2.4.2 The Strategic Decision-Making Approach

At this point, we should note that Aoki's (1990) non-hierarchical hypothesis would appear to conflict with one of the central tenets in this thesis - that the Japanese (transnational) corporation is a hierarchical organisation, tightly controlled by a corporate elite. In this and later Chapters, it will be argued that

this control extends beyond the Japanese firm's legal boundaries, to also include its (global) network of sub-contractors. It is through the use of their various control mechanisms that Japan's transnationals can determine their international production strategies. This in turn, will affect the behaviour of their various (global) *keiretsu* partners and will have real effects upon Japan's domestic manufacturing industry. It is, therefore, important to confront Aoki's (1990) non-hierarchical position.

The position taken in this thesis follows a strategic decision-making approach as outlined in Zeitlin (1974) and developed further by Cowling and Sugden (1994, 1998). According to Cowling and Sugden (1998, p.64) a strategic decision is *"one that determines the broad direction of a firm, such as its geographical orientation, its relationship with rivals (and sub-contractors), with governments, and its labour force"*. Those who have the power to make strategic decisions, thus effectively control the firm (Zeitlin, 1974). Furthermore, a concentration of strategic decisions may have wide implications for all those involved along the value chain. This would infer that the boundaries of the firm could extend beyond their legal frontier, to include not only in-house activities, but also all subcontracting arrangements. In this context, a firm can be regarded as *"the means of coordinating production from one centre of strategic decision-making"* (Cowling and Sugden, 1998, p67).

The strategic decision-making approach implies that all Japanese *keiretsu* relationships fall under the ambit of the core firm within the Corporate Group. Similarly, the boundaries of a Western corporation also include activities

conducted both in-house and through the market. If activities in each type of organisation are co-ordinated and controlled from the centre, then there are clear parallels between the command structures in both Western and Japanese firms. This insight will be a consistent theme within this thesis - that the Japanese (transnational) corporation is a hierarchical entity and that strategic decisions are concentrated within the controlling groups of Corporate Japan. It also implies that the hierarchical differences highlighted by Aoki (1990) are somewhat superficial.

2.4.3 Control within Japanese manufacturing

Before we can reject Aoki's (1990) non-hierarchical approach, some further exploration of the command structures and control mechanisms that exist within Japanese industrial organisation is required. These are now discussed, in the context of the evolution of Japan's industrial command structures and drawing upon particular examples of corporate control in production, finance and the workplace from the Japanese automobile industry.

The first observation is that the development of Japan's industrial structure has been based upon the cultivation of large-scale firms and, in particular, the core firms within the Corporate Group(s). In this respect, it is interesting to review Japanese industrial policy, which shows a particular policy bias towards Japan's larger corporations. This bias began during the 1930's under the Ministry of Commerce and Industry (MCI) - the predecessor to MITI. The MCI's officials had studied the (Taylorist) scientific management and mass production systems of the United States and the German model, which promoted big business cartels,

technological innovation and efficiency. These models were very influential upon Japanese industrial policy-making and their major characteristics - in particular the adoption of large-scale production technologies - were incorporated under the MCI's "industrial rationalisation plan" (see Johnson, 1982, Piore and Sabel, 1984)[6].

During the post-war period, the MCI's prejudice in favour of promoting the interests of the larger corporations continued under MITI's industrial strategy. Failing firms were encouraged to merge under a cartelisation programme, raising the level of industrial concentration. With some modifications, Japan's production system was also one of mass production, and the activities of smaller *keiretsu* firms were specifically geared towards the requirements of the large corporations. The large corporations were effectively regarded as Japan's "national champions", whom MITI later encouraged to compete on the international stage with their Western rivals (see Piore and Sabel, 1984).

The combination of MITI's policy bias and the evolving nature of Japan's industrial structure has provided Japan's large firms with effective control in production decisions. In many cases, this has enabled the Corporate Group firms to dictate contract conditions and impose technologies and processes upon their

[6] The apparent attraction of Western industrial organisation and the multi-divisional firm was that large-scale production, of a standardised product, could achieve greater (internal) economies of scale, higher productivity and lower prices than traditional small-scale craft production. This possibility encouraged a number of countries, including Japan, to adopt a mass production system for industrial development (see Piore and Sabel, 1984). Chandler (1962, 1990) regarded *"the business enterprise, through the development of organizational capabilities, as playing the central role in industrial development in the USA, Britain and Germany"* (see Teece (1993, p.211). For a critique of the Western corporation and the system of mass production, see Piore and Sabel (1984).

keiretsu partners. Consequently, the majority of the smaller *keiretsu* firms are often allocated specialised tasks and they rely heavily upon the Corporate Group firms for new orders (Scher, 1997). In effect, the *keiretsu* firms are "locked in" to a vertical relationship with their main contractor; indeed, such is the nature of these relationships that MITI (1999b, p.71) report that 81.6% of keiretsu firms have never changed their main contractor. In their study of international control mechanisms, Ruigrok and Van Tulder (1995, p.53) have described Japan's vertical *keiretsu* relationships as creating a *"one-way dependency of suppliers on the end producers"*.

2.4.4 Control in Production: The Japanese Automobile Industry Reconsidered

The automobile industry probably best illustrates the various control mechanisms that are exercised by Japan's Corporate Groups. As we have already noted, the industry has the largest number of *keiretsu* linkages, with "close ties" and mutual trust being regarded as important components within these relationships. However, while such attributes may be a common feature of *keiretsu* relations, in terms of corporate governance, neither mutuality nor trust should be equated with equal power in decision-making processes (Sachetti and Sugden, 2000). Indeed, the industry's pyramidal structure and the nature of interdependency amongst firms, suggests that, in order to further their own objectives, the larger, more dominant players - within the production network - will exploit their position to exert control over their trading partners. In the automobile industry it is the large OEMs that dominate the *keiretsu* relationships through a "formal command structure", where they often exert direct control over their suppliers (see also Ruigrok and Van Tulder, 1995).

In this respect, equity participation is one mechanism through which Japan's OEMs can exert direct control over their supply base. The large OEMs typically own substantial shareholdings in their core, First Tier suppliers. For instance, Toyota holds the largest shareholdings in their large suppliers, Denso (23.3%) and Koyo Seiko (21.9%), while Nissan has also, traditionally, held similar shareholdings in their large Group suppliers (e.g. in Calsonic (33.4%) and Unisea Jecs (29.6%)). These core suppliers, themselves, also hold controlling equity stakes in lower tiered suppliers. Reciprocal shareholding arrangements do exist, with some Group suppliers even holding small stakes in their main OEM. However, those firms and sub-contractors lower down the industry's pyramidal structure have smaller equity stakes in their trading partners (Dodwell, 1997, Ruigrok and Van Tulder 1995)[7].

These ownership details are significant since, by holding significant shareholdings within their supply base, Japan's OEMs and their core suppliers, have been able to exert direct control over the industry. For instance, it has become common practice for the large Japanese OEMs to appoint their former executives into key positions within their supply chains. This has the effect of establishing direct lines of communication and allows for the dissemination of corporate strategy from the OEMs' hierarchies to core suppliers. Personnel exchanges, supplier associations, and technology sharing are also spheres of influence. In this respect, Piore and Sabel (1984) give the example of how

[7] This pattern is also observed in Japan's other machinery industries, where although numerous interlocking share-holding arrangements exist, with reciprocal cross-shareholdings, and equity ownership is relatively dispersed, the major shareholdings are typically concentrated amongst a few large corporate shareholders (Sheard, 1994).

Nissan, in the early post-war period, were able to use such channels to control the rationalisation and re-organisation of automobile production.

Control and influence are also exerted through long-term contractual ties, particularly where suppliers are "locked in" to vertical relationships. In these cases, an OEM's insistence upon a *JIT* delivery system may increase a supplier's dependence, and raise the OEM's degree of control. It is argued that, in effect, a *JIT* delivery system forces the supplier to subordinate their production schedules entirely to suit the OEM's requirements. It also shifts the burden of inventories from the OEM to the supplier (Ruigrok and Van Tulder, 1995). A further consideration is that, for efficiency, the *JIT* delivery system favours a close proximity between the OEM and the supplier, which effectively limits the latter's choice of prime location (Dicken, 1998; see also Chapter (4))[8]. An insistence upon *kaizen* quality control and the use of internal rankings also enhances the OEM's position, since if the supplier does not comply then there is a potential loss of custom. A related issue is the practice of open-book accounting where, as we have already noted, the OEM scrutinises the supplier's costs and imposes a "target price" for components. This "target price" allows the supplier a profit margin, but there is an expectation that the price will fall over time, which forces the supplier to continually reduce costs. The OEM will then accrue most of these productivity gains, while maintaining supplier profit margins above a minimal level - to enable the supplier to re-invest in new capital as directed by the OEM (Ruigrok and Van Tulder, 1995). Ruigrok and Van Tulder (1995, p83) have described open-book accounting as a process where negotiations are such that

[8] For instance, in Japan, many of Toyota's suppliers are located within a 70-mile radius of Toyota City.

"the supplier is required to bargain with the assembler, literally with all its cards open on the table".

It may be argued that institutions, such as the state funded Public Testing and Research Centres (PTRs), or *"kosetu shiken kenkyu kikan"*, could offer smaller suppliers the opportunity to diversify, innovate and become more independent from their main OEM. However, even these institutions - which are exclusively designed to encourage independence and innovation amongst Japan's small firms - are manipulated to suit the OEMs' strategic interests. Toyota's involvement, at the Aichi PTR centre, is a particular example. Rather than being used as a centre for Toyota's smaller suppliers to advance their own research programs, the Aichi PTR centre has, in the words of Ruigrok and Tate (1996, p.397), become *"a tool to help subcontractors meet Toyota's stiff demands"*. The authors' find that activities at the centre are heavily weighted towards test inspections, with suppliers' processes and components being subject to close scrutiny. Ruigrok and Tate (1996), argue that Toyota have been able to direct the PTR centre's activities to the extent, that certification by the PTR centre is now an integral part of the company's domestic production system. They conclude that the Aichi PTR centre has played a major role in sustaining Toyota's ability to exert control over its domestic supply chain.

The degree of control over suppliers does vary between the different Japanese automobile manufacturers. According to Ruigrok and Tate (1996, p.398), the concentration of Toyota's domestic production in the Aichi prefecture, has allowed the company to establish unrivalled control over its large supply base.

Similarly, the authors point out that Nissan also rely upon a large supply chain, and have also secured a high degree of control over their suppliers. Indeed, according to Adio Kodani, a former Nissan executive who was appointed, in 1990, as the President of Nissan's core First Tier supplier Ikeda Bussan, the *"keiretsu has served to create a comfortable vertical supply structure for Nissan, rather than as a structure to make affiliates stronger"* (Nikkei Weekly, 21/8/2000). In contrast, to both Toyota and Nissan, Ruigrok and Tate (1996, p.395-396) note that Honda have only *"limited control"* over their domestic suppliers. This partially reflects the fact that Honda was a late entrant to automobile production and has consequently found it difficult to establish a large, exclusive domestic supply network.

It is important to appreciate that control is an important factor and a significant competitive advantage for Japan's OEMs. Through their various control mechanisms, Japan's OEMs have been able to direct operations and reduce costs to an internationally competitive level. This is obviously important, since the OEMs produce the final product and are primarily responsible for the industry's profitability. It should be noted that the Japanese situation contrasts sharply with that of the OEM-supplier relations that existed - in the 1970's and 1980's - between the then (loss-making) State owned, UK manufacturer, British Leyland (BL), and its core UK suppliers. According to Cowling (1981), BL was in a vulnerable position, in relation to its UK transnational suppliers, such as Lucas and GKN. The latter dominated the UK components industry and were able to

exploit their market position, to the detriment of the heavily subsidised BL (and the tax-payer)[9].

Finally, in addition to exercising control over their suppliers, it is also argued that Japan's large (automotive) firms exert control over their workforce. For instance, Ruigrok and Van Tulder (1995) point out that the Japanese corporation's involvement in labour unions, as exemplified by Toyota, reduces the union's independence and effectively nullifies its bargaining power. In addition, corporate management may also use the individual incentive system as a strategy to discourage worker collectivisation (Dicken, 1998). Naruse (1991) has also argued that the Japanese production process, with its emphasis upon continuous improvement and allegiance, is also designed to place great pressure and co-operation from the workforce. Furthermore, the Japanese notion of "lifetime employment" and long-term contracts only appear to apply to core workers in the major companies; the remaining workforce, who are employed by sub-contractors, are often regarded as peripheral and have no job security (Naruse, 1991, Ruigrok and Van Tulder, 1995).

Drawing upon these perspectives, the suggestion that the Japanese firm is *"run in the interests of the workforce"* and that employees participate in corporate decision-making appears to be misplaced. In terms of decision-making, it is probable that the Japanese firm may accommodate a greater delegation of decision-making. However, it is likely that these refer to operational decisions;

[9] Cowling (1981, p.10) argues that in effect, these highly profitable suppliers *"were being supplied with assembly services at or below competitive rates by an independent downstream supplier (BL)"*.

decisions that concern the daily operations of the firm. These are not strategic decisions, which affect the firm's broad direction. Furthermore, the nature of the incentive schemes discussed by Aoki (1990, p.11-13), would also suggest that employees are subordinated to comply with management authority. The management themselves are also monitored through the main bank system, and poor corporate performance can lead to their removal (Aoki, 1990, p.15-16).

2.5 Concluding Comments

Japanese industry is generally organised through *keiretsu* networks, where vertical layers of subcontractors provide intermediate goods and services to Japan's larger corporations. This Chapter has provided an overview of the evolution and organisation of *keiretsu* networks within Japan's machinery sector, where sub-contracting is the norm - particularly in the "company castle towns" within Japan's main industrial districts. These *keiretsu* relationships are said to embody long-term co-operation and "mutual trust", and are epitomised within the Japanese automobile industry (Smitka, 1991).

While such attributes are features of *keiretsu* relations, this Chapter has argued that production activities are centred upon Japan's large corporate firms. The result is that Japan's machinery industries are oligopolistic and dominated by a few large firms, such as Toyota, Nissan, Sony and Fujitsu. It is argued that these large corporations are controlled by an elite hierarchy, whose strategic-decisions determine the broad direction of the firm and ultimately the industry. In order to enforce these strategic-decisions, Japan's Corporate Groups have developed various control mechanisms to exert direct control over both their suppliers and

labour force. The automobile industry appears to provide the clearest examples of such hierarchical actions. The analysis in this Chapter, of course, contrasts sharply with that expressed by an influential body of literature, initiated by Aoki (1984, 1988, 1989, 1990, 1994), which regards the Japanese firm to be a "non-hierarchical" organisation or a *nexus of treaties*. Indeed, we argue, that the strategic-decision-making approach might suggest that Aoki's (1990) "non-hierarchical" view is somewhat superficial.

The reappraisal of the Japanese firm is important since it is the firm's strategic decisions that play a key role in globalisation. Furthermore, the hierarchical nature of the Japanese (transnational) corporation will become apparent in the following Chapters. Finally, an understanding of the nature of the machinery sector is also important, for three reasons. First, as we will argue in Chapter (3), transnationality is an endogenous outcome that reflects the domestic environment in which (Japanese) firms operate. Second, the nature of *keiretsu* relations is a specific, competitive advantage to Japanese (machinery) firms and they provide a reason for the attempted replication of such activities overseas. Third, it is only through an understanding of Japanese industrial organisation that we are able to consider the wider effects of globalisation within Japan's machinery sector.

Table (2.1)

Japan's Machinery Sector: Descriptive Statistics 1968-1994

Industry (3 digit)	Mean % Share of Capital Employed (K)	Mean % Share of Labour Employed (L)	Mean % Share of Output (Y)	Mean Labour/ Capital Ratio (L/K)
Fabricated Metal Products (381) (Structural metal products, hand tools, cutlery, foundry products, office furniture)	5.29 (0.7)	7.8 (0.3)	5.8 (0.5)	6.1 (4.4)
Agricultural & Industrial Machinery (382) (Machine tools for industry/agriculture, manufacture of engines/turbines, specialist office/industrial (non-electrical) machinery)	7.71 (0.3)	11.5 (0.7)	10.7 (1.5)	5.6 (3.2)
Electric Machinery & Electric Goods (383) (Electric motors & equipment, semi-conductors, electronics, consumer appliances)	6.9 (1.5)	14 (2.1)	12.4 (2.2)	7.4 (3.9)
Transport Equipment (384) (Manufacture of automobiles, motorcycles and bicycles, aircraft, ship building and railroad equipment)	10.2 (0.7)	8.4 (0.3)	12.5 (1.4)	3.2 (1.9)
Precision Tools (385) (Professional and scientific instruments, medical equipment, optical goods, watches and clocks)	1.4 (0.4)	2.0 (0.2)	1.3 (0.2)	6.2 (4.5)
Sub -Total Machinery Sector (ISIC 38) (Aggregate of capital, employment and output from industries with ISIC codes 381 to 385 inclusive)	31.5 (3.5)	43.7 (2.8)	42.8 (5.1)	5.2 (3.1)
Other Manufacturing Industry (ISIC 31-39; excluding 38) (Aggregate of capital, employment and output from all other manufacturing sectors in Japan).	68.5 (3.5)	56.3 (2.8)	57.2 (5.1)	3.0 (1.8)
Total Manufacturing Industry (ISIC 3) (Aggregate of capital, employment and output from all manufacturing sectors in Japan)	100	100	100	3.7 (2.1)

Sources: OECD (1997), UNIDO (1998).

Notes: The first three columns provide the average share of capital, labour and output over the period 1968 to 1994. Figures in brackets are the standard deviation of the respective sample means, which indicate the stability of these statistics. The L/K ratio is the proportion of total hours worked to the real capital stock in each industry.

Table (2.2)

The Geographical Concentration of Japan's Machinery Sector and Manufacturing Industry (By Prefecture) 1998

	Total Manufacturing Industry			Total Machinery Sector		
Prefecture[1]	Number of Establishments (1998)	Share of Japan's Manufacturing Output (1998)	Share of Japan's Manufacturing Employment (1998)	Number of Establishments (1998)	Share of Japan's Machinery Output (1998)	Share of Japan's Machinery Employment (1998)
Aichi (1)	30301	11.4	8.8	13050	15.3	10.8
Kanagawa (19)	15115	7.5	5.8	8940	9.1	7.8
Shizuoka (38)	17098	5.3	4.9	7431	5.9	5.5
Tokyo (41)	33945	6.4	6.6	12794	5.8	5.6
Osaka (33)	36045	6.4	7.1	14944	5.5	6.8
Saitama (35)	20803	4.8	5.1	9496	5.0	5.5
Hyogo (13)	15433	4.7	4.4	5682	4.4	4.4
Gumma (10)	8753	2.6	2.5	4151	3.5	3.2
Nagano (26)	8902	2.2	2.5	4652	3.2	3.6
Tochigi (39)	7664	2.6	2.3	2905	2.8	2.7
Mie (23)	6648	2.5	2.1	2525	2.9	2.4
Hiroshima (11)	8333	2.4	2.5	3261	2.7	2.6
Ibaraki (14)	8904	3.6	3.0	3468	2.6	3.1
Chiba (4)	9074	3.8	2.8	3253	2.4	2.3
Fukuoka (7)	9308	2.6	2.7	2687	2.3	2.1
Rest of Japan	137387	37.0	37.0	38403	26.8	31.6
Japan	731765	100	100	137642	100	100

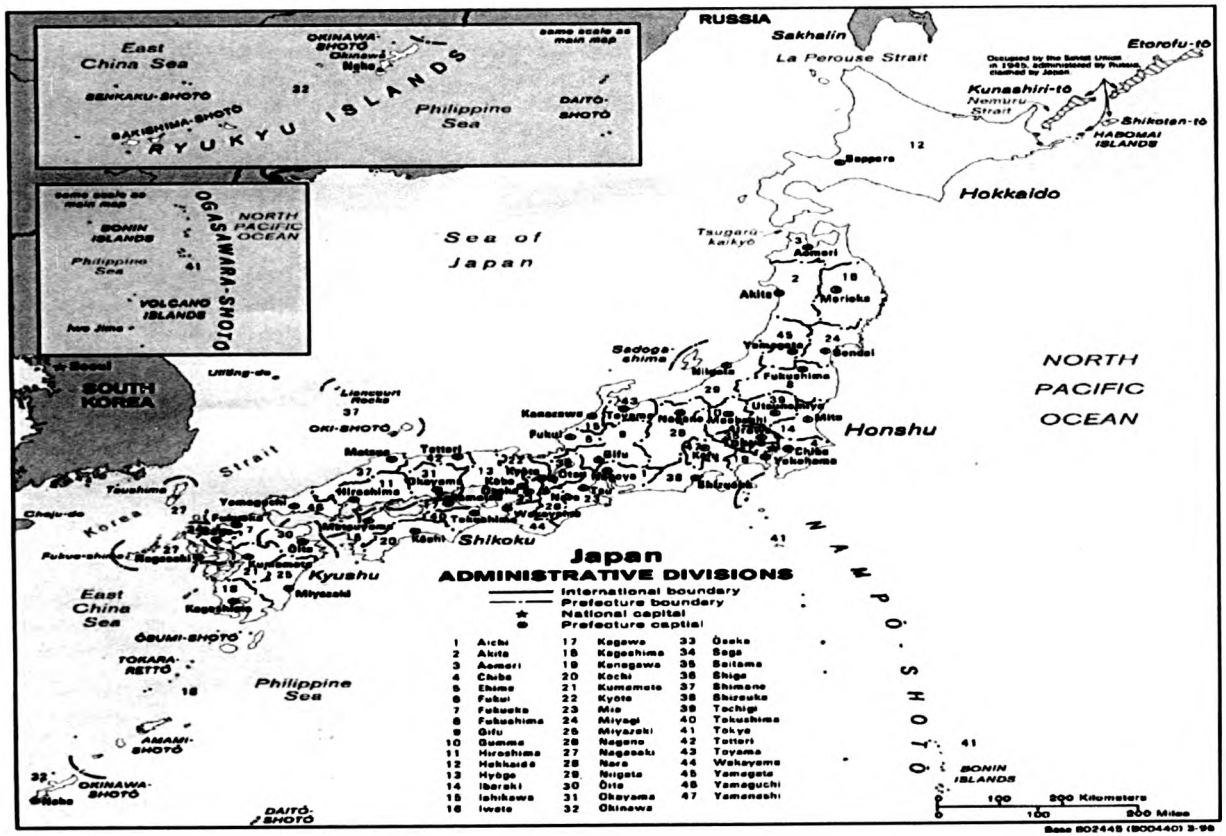
Source: Japanese Statistical Yearbook (2001)

Notes:

1) The Administrative Division is listed in parenthesis (see the map in Figure (2.1)).
2) The Table shows the 15 main Japanese Prefectures, where the machinery sector is concentrated.

Figure (2.1)

Japan's Administrative Prefectures



Chapter 3

The Global Emergence of Corporate Japan: The Globalisation of Japan's Machinery Sector

3.1 Introduction

This Chapter considers the factors behind the globalisation of Japanese manufacturing industry and the emergence of Corporate Japan, in the global economy. The position taken in this Chapter is that, fundamentally, transnationalism is an endogenous outcome, which reflects the degree of monopolistic and oligopolistic behaviour in the home country. In the case of Japan, we have argued - in Chapter (2) - that Japan's industrial economy is highly concentrated and dominated by a few large corporations. We also noted that the development of this industrial structure appears to have occurred through a consensus of MITI's industrial policy-making, with its focus upon developing "national champions", and the interests of Corporate Japan.

Highly concentrated economies may encourage domestic firms to undertake transnational production for two reasons. First, in the aggregate, oligopolistic and collusive behaviour by firms, may lead to a reduction in domestic aggregate demand and profitability, providing a general incentive for firms to seek new markets overseas (demand-side factors). Second, it is conceivable that, under oligopoly, firms will have acquired a degree of market power in labour and product markets, which, as Hymer (1976) first noted, they can exploit internationally (supply-side factors). These demand and supply side factors have

each contributed to a wide and rich literature on the theories of international production (see Cantwell (2000), for a recent survey). However, both should be regarded as being complementary, rather than competing theories in explaining the conditions that pre-empt globalisation (Pitelis, 1996, 2000).

In this Chapter, we review some of the main theories of international production and discuss them in the light of the Japanese experience, drawing upon - where possible - particular examples from the machinery sector. The literature review is not meant to be exhaustive, but it does allow us to gain an understanding of the factors behind the globalisation of Japan's machinery sector and the nature of the Japanese transnational corporation. The remainder of this Chapter is as follows. In Section (3.2), we highlight the global emergence of Corporate Japan and the growth in their transnational activities. Section (3.3) considers how demand side explanations of transnationalism apply to the Japanese economy. Following Pitelis (1996, 2000), a simple econometrics test is conducted, with the result that there is some evidence to suggest that domestic demand deficiencies are related to the growth in Japanese FDI. In Section (3.4), we draw primarily upon Hymer's (1976) insights and consider the application of supply side theories to Japan's transnationals. There are no direct tests of these supply-side hypotheses in this section. However, some of the main issues raised are subject to direct and empirical investigation in later Chapters. For instance, the Knickerbocker (1973) hypothesis is examined in Chapter (4), while "divide and rule" strategies are observed in Chapter (5). Finally, Section (3.5) concludes.

3.2 The Global Emergence of Corporate Japan

3.2.1 The Relaxation of MITI's FDI Restrictions

The first point to recall is that, during the immediate post-war period, Japanese FDI was strictly regulated by MITI (see Chapter (2)). These regulations appeared to be conducive to the successful nurturing of Japan's infant industries. Indeed, the pace of Japan's post-war industrial development was such that, by the early 1960's, Japan's larger corporations had attained a strong technological position, from which they were able to compete in the global market, with their rivals from the USA and Europe.

However, despite Japanese corporations appearing internationally competitive, the combination of domestic demand constraints, supply factors (see Sections (3.3) and (3.4)) and the restrictive FDI regulations appeared to inhibit their future development. Corporate Japan's foreign rivals, for instance, were major transnational corporations, who could use their global facilities to access both new and mature markets, and also to take advantage of lower production costs. Consequently, Japan's large corporate firms felt required to compete on equal terms and so they began to pressurise MITI into relaxing the FDI restrictions (Mason, 1994). In this respect, MITI became increasingly enthusiastic about developing Japan's own "national champions" in the global economy (Piore and Sabel, 1984). Eventually, in 1971, MITI revised the FDI laws and all outward FDI proposals were automatically validated without financial limit. The abolition of exchange controls in 1980, which liberalised international capital flows,

completed the de-regulation programme[1].

3.2.2 Japan's Global Actors

The relaxation of the FDI restrictions has allowed Japan's large corporations to pursue their own strategic interests at the global level. We have already noted, in Chapter (1), the significant increase in Japanese FDI, particularly since the late 1970's: a trend which has have enabled Japan's large transnationals to emerge as dominant players in the global economy. In this respect, Japan is now the home of 17 of the world's top 100 transnational corporations who, collectively, own approximately 16% of the global economy's foreign assets. Only the corporate sector of the USA owns a greater proportion of foreign assets (see UNCTAD, 2000). Table (3.1) provides some recent details about these 17 transnational corporations, ranking them in terms of their ownership of foreign assets.

The machinery sector accounts for over 60% of all Japanese FDI flows (OECD, 1999). As result, over two-thirds of the transnationals listed in Table (3.1) operate in the machinery sector; the others are Japan's large trading companies (see Table (3.1)). The largest Japanese transnational is Toyota, which is ranked as the sixth largest transnational in the world, and the third largest in the automobile sector. However, the degree of transnationality is greater in companies such as Honda, Sony and Bridgestone, which own a greater proportion of their assets outside Japan (see Table (3.1)).

[1] In this respect, it is interesting to note the degree of influence that Corporate Japan could exert upon MITI's economic policy-making. Since the Second World War, Japanese corporations and MITI had developed a close working relationship. These relations extended to the common practice of retired MITI officials being offered prominent positions within large Japanese corporations. It is conceivable that such channels allowed Corporate Japan to influence economic policy (Johnson, 1982). Certainly, these lines of communication were very effective in Corporate Japan's campaign to convince MITI to liberalise the policy on FDI (Mason, 1994).

In terms of global market shares, Japan's transnationals have made significant advances since the late 1960's. For instance, in 1966, Toyota was the only Japanese automobile manufacturer amongst the world's top ten producers, with a marginal 2.4% share of the global car market. By the mid-1990's, the company had almost quadrupled its global market share to 9.4% and was joined in the top ten, by Nissan (5.4%), Honda (4.0%) and Mitsubishi (3.3%). In the case of Honda, its global market share has increased 20 fold since 1966 and it is now also the world's leading manufacturer of motorcycles. Furthermore, in the production of rubber tyres, Bridgestone is second only to Michelin. In electronics, Sony is now the world's largest company in audio and video equipment, while Fujitsu is in the top three of the world's mainframe computer manufacturers (Toyo Keizai, 2001).

3.2.3 Global Sourcing

The increase in Japanese FDI has contributed to the significant rise in the proportion of Japan's total corporate output produced offshore and in overseas employment. This is reflected in Japan's overseas production ratios, which have been rising at both the sector and aggregate manufacturing level (see Table (3.2))[2]. Since 1985, there has been a four-fold increase in Japan's aggregate overseas production ratio and, between 1985 and 1995, the growth rate in Japan's overseas production was twice that of its main competitors: the USA or Germany (see Table (3.2)). Furthermore, in 1997, outsourcing also accounted for 31.1% of the total corporate output of Japan's transnational corporations - a 350% increase

[2] It is wise to treat these statistics with caution, given that the data is collated from annual surveys of Japanese transnationals. These surveys are vulnerable to variance in both coverage and response rates (Ramstetter, 1996). This qualification aside and, in the absence of any alternative data, Table (3.2) still provides us with some useful indicators.

on the 1985 level. In addition, between 1992 and 1996, the number of employees, employed by Japanese transnationals doubled to 2.2 million - over 17% of Japan's domestic labour force (see Table (3.2)).

Over the same period, at the industry level, Japanese overseas production also more than doubled in Chemicals, Industrial Machinery, Iron and Steel and Precision Tools. However, the highest overseas production ratios are recorded in the machinery sector: Electrical Machinery and Electrical Goods (19.7%), and Transport Equipment (24.9%). Within these industry sub-sectors, the level of overseas production is even higher. In the Japanese electronics industry, for instance, the Electronic Industries Association of Japan (EIAJ, 1997, p. 6) claims, "*offshore production, by Japanese affiliates, has now surpassed the domestic totals for almost every consumer electronics product*". The EIAJ have attributed this trend as being the prime reason for the decline of Japan's domestic consumer electronics industry. In this respect, the EIAJ note that although Corporate Japanese output - total production at home and abroad - in the sector is currently at an historical high, domestic production runs are now at less than half the levels they were during their peak in the mid-1980's (EIAJ, 1997)[3].

The data in Table (3.2) illustrates the growing extent to which Japan's large firms have become involved in their own transnational production networks. These networks primarily involve production linkages both within and between the

[3] The case of the Japanese television industry provides an illustrative example. In 1978, Japan's overseas affiliates produced 3.2 million television sets, almost a third of Japan's total corporate production. By 1988, the ratio was 50:50. In 1996, Japanese overseas affiliates produced a record 40.5 million colour television sets, over 6 times the domestic figure. In 1996, Japan's of domestic output of television sets was a mere 40% of its 1985 level. Japanese production of video tape recorders (VTRs) follow a similar pattern (EIAJ, 1997).

economies of Asia, North America and Europe. The linkages are created through the co-ordinated operations of Japanese subsidiaries, *keiretsu* group companies and other non-affiliated suppliers. According to MITI (2001), 48.7% of all Japanese transnational's trade-flows are now intra-firm; a statistic, which, to some extent, reflects the importance of these networks in Corporate Japan's international operations. The Japanese automobile industry provides the most prominent example of these transnational networks and, as such, they are considered in further detail, in Chapters (4) and (5).

In summary, since the early 1970's, Japan's large corporations have emerged to compete on the global scale. They have enhanced their global market shares, through producing reputable branded goods and have become increasing involved in transnational production networks. We will now consider the fundamental factors that lie behind the growth of these transnational activities.

3.3 Demand-Side Theories of Internationalisation

3.3.1 Deficient Domestic Demand

Demand-side theories of FDI highlight a country's rising industrial concentration as the source of domestic demand deficiency, which, in turn, precipitates outward FDI (Pitelis, 1996, 2000). The analysis is rooted in the early works of Steindl (1952) and Baran and Sweezy (1966) and Cowling (1982). These authors argued that economies dominated by large corporations were likely to be characterised by oligopoly and collusive behaviour, as firms sought to secure the joint maximisation of industry profits and avoid the competitive outcome. The result is that prices are greater than marginal cost, leading to a distribution effect in

consumption, since firms are extracting a surplus (income) from consumers. There is also a corresponding distributional effect in the labour market, since firms pay the nominal wage and then -in the aggregate - determine its real value by colluding over the level of their prices and consequently their own price-cost margins (see Kalecki, 1971). In the aggregate, the collusive pricing strategy leads to a reduction in domestic consumption, creating a deficiency in domestic demand. A further source of demand side deficiencies is the emergence of the joint stock companies, which are now a feature of modern industrial economies. In this respect, Pitelis (1987) has argued that these firms typically obtain finance for internal growth by encouraging the *socialisation of ownership*, through the use of equity issues and occupational pension funds. This leads to "excess liquidity" in the corporate sector, with higher corporate retentions and pension fund surpluses but less disposable income for consumers, which reduces effective demand. Finally, the adoption of mass production technologies, by large-scale firms, can also lead to domestic market saturation and problems of under-consumption (Piore and Sabel, 1984).

Eventually, these demand deficiencies induce firms to turn to overseas markets to sell their output. Initially, surplus production can be sold through the export market, but a combination of retaliatory trade barriers and an appreciating currency may limit this possibility. It then becomes optimal for firms to consider overseas production to relieve the pressures upon their profitability (Pitelis, 1996, 2000). At this point, we should note that the demand deficiency hypothesis has similarities with Vernon's (1966) product life cycle model where, in the first phase, production takes place at home, allowing firms to directly control both

product design and development. In the second stage, the product becomes standardised and the firm benefits from scale economies. The product is exported, primarily to countries with similar income levels and tastes. Eventually, FDI becomes inevitable, as scale economies are exhausted at home and rising tariff barriers ensure that servicing foreign markets becomes very difficult. At the micro level, Vernon's (1966) theory has been subjected to the criticism that it is an inadequate account of post-war transnational activities[4]. Nevertheless, Pitelis (1996, 2000) maintains that, at the aggregate level, deficient domestic demand considerations are important since they apply to all firms, at all stages of product life cycles. In summary, Pitelis (1996, 2000) argues that a nation's tendency towards monopolisation leads to an environment where firms find that FDI becomes an attractive option.

There is some anecdotal evidence to suggest that the demand deficiency hypothesis may be relevant to Japan's experience. As was pointed out in Chapter (2), Japan's industrial economy, particularly in the machinery sector, is highly concentrated and dominated by a few large corporations. It is quite probable that, in the aggregate, the activities of Corporate Japan and the adoption of mass production technologies, may have led to domestic demand deficiencies within the Japanese economy. In this respect, it is interesting to note that since 1955, Japanese consumption relative to GDP has barely risen above 60%, and has been significantly lower than other major industrial nations (Katz, 1998). Between

[4] The main criticisms are from Buckley and Casson (1976), who point out that the theory is unable to explain non-export substitution investments, the appearance of non-standardised products produced offshore and cases of differentiated products to suit local markets. A further criticism is that firms can avoid the decline in the rate of growth in demand during the maturity phase, through product diversification at different stages in their cycle (see Pitelis, 1996, 2000).

1955 and 1970, this ratio actually declined from 62% to 54%, while the labour share of national income also fell by 18%. Conversely, over the same period, corporate profits tripled their share of national income from only 5 to 16%. The relative decline in consumption and disposable income, combined with the "excess liquidity" held by the corporate sector would thus appear to fit the demand deficiency hypothesis outlined above. It could be that Japan's general climate of deficient domestic demand, may have precipitated the large outflow of Japanese FDI - primarily from the machinery sector - that has occurred since the late 1970's.

Furthermore, rising external demand constraints, during the mid to late 1980's, may have exacerbated the effects of Japan's domestic demand deficiencies. These external constraints included higher effective tariff barriers, due to the emergence of official regional trading blocs, such as the North American Free Trade Area (NAFTA) and the European Union (EU). In addition, the imposition of Voluntary Export Restraints (VERs), particularly in automobiles, also restricted Japanese export growth, while 1985 Plaza Accord and the subsequent appreciation of the Yen, combined with higher transport and insurance costs ensured that Japanese exports were less attractive on world markets. To overcome these trade barriers, Japanese transnationals began to invest significantly in the larger, more sophisticated, consumer markets of Europe and North America (see Mackinnon, 1990). Dunning (1993) has described such investments as "market seeking" since Japanese transnationals undertake them to protect and expand both their regional and global market shares. Barrell and Pain (1999), provide econometric evidence for these types of investment. Their panel

data study shows that, during the 1980's, the direction of outward Japanese FDI was positively correlated with the number of trade restraints, in both Europe and the USA.

A potential criticism of applying the demand deficiency hypothesis to Japan is that the majority of Japanese FDI is primarily located in developed countries, where industrial structures are similar (see Chapter (1), Table (1.1)). If the demand deficiency hypothesis is correct, then these countries may have experienced, or could also potentially suffer similar problems of under-consumption. In this case it would appear irrational for Japanese firms to invest in such economies. This maybe a valid criticism, but can be answered in a number of ways. First, developed countries have similar tastes, which provides an obvious outlet for Japanese goods. Over 60% of Japanese FDI is in the machinery sector, where Japanese firms have a comparative advantage. Through product differentiation and their reputation for quality, Japan's machinery firms may be able to nullify the effects of any downward spiral in the host country. Second, as we have already noted, locating in a developed country may provide the Japanese firm with access to a regional trading bloc and the avoidance of trade barriers. Third, the timing and/or severity of demand-side problems may differ among developed countries. In this latter respect, the significant increase of Japanese FDI into both Europe and the USA has coincided with periods of strong economic growth in these economies (for instance, 1985-89 and 1995-1997). Finally, supply side factors are likely to play an important role in the location of Japanese FDI. These will be discussed further in Section (3.4).

3.3.2 An Econometric Test of the Demand Deficiency Hypothesis

Pitelis (1996, 2000) has proposed a simple direct test of the demand deficiency hypothesis. This involves regressing FDI upon Aggregate Demand and the domestic profit rate. If the demand deficient hypothesis is valid then there should be a negative relationship between Aggregate Demand (AD) and outward FDI. In addition, a lower domestic profit rate should also instigate outward FDI, since firms will seek to locate in overseas markets where the profit rate is higher. Using aggregated annual UK data, for 1963 to 1992, Pitelis (1996, 2000) finds strong statistical evidence that these negative relationships hold. He concludes that aggregate demand deficiencies provide a stimulus to outward FDI.

Following Pitelis (1996, 2000) we now conduct a similar test of the demand deficiency hypothesis for the Japanese economy, using annual data for the period 1973-1998. Although the prime focus of this thesis is Japan's machinery sector, the results reported in this section are those using aggregated data for the whole of Japanese manufacturing. This is because the earlier data on Japanese FDI flows, by sector, is incomplete and it, therefore, provides an inadequate number of degrees of freedom, for estimation. Nevertheless, the aggregated equation should capture the general business climate that affects the decision-making of Japan's machinery firms, who contribute to over 60% of Japanese FDI.

The general specification of the equation is:

$$FDI_t = \alpha_0 + \sum_{j=0}^{2}\alpha_1 AD_{t-j} + \sum_{j=0}^{2}\alpha_2 \textit{Relative Profit}_{t-j} + \sum_{j=0}^{2}\alpha_3 FDI_{t-j} + U_t \qquad (1)$$

where FDI represents Foreign Direct Investment by all Japanese manufacturing firms and Aggregate Demand is defined as the sum of Aggregate Consumption (C), Investment Expenditure (I), the Export surplus (ES) and the Budget Deficit (BD)). The data is taken from the Japanese Statistical Yearbook (various issues). The specification differs from Pitelis (1996, 2000) in that we include a Relative Profit measure, as opposed to including just domestic (Japanese) profitability. It was felt that a measure of Japanese profitability relative to the rest of the world was the more appropriate variable to include, given that Japanese transnationals will compare their own domestic profitability rates with those that they can reasonably attain elsewhere. In this respect, Relative Profits are defined as aggregate manufacturing Japanese profit margins relative to a weighted average of aggregate manufacturing profit margins for the USA, UK and Germany[5]. This data is taken from the United Nations Industrial Statistics Yearbook (various issues). Finally, the lag structure captures the possibility that past values of both the independent and dependent variables have a role in explaining Japanese FDI.

All the variables were tested for unit roots, and all the variables were found to be I(1). It was, therefore, decided to estimate a first difference equation to avoid the common time series problem of spurious regression, which can occur with non-stationary data (Greene, 1993). Equation (1) is, therefore, re-written as:

$$\Delta FDI_t = \sum_{j=0}^{2} \alpha_1 \Delta\, AD_{t-j} + \sum_{j=0}^{2} \alpha_2 \Delta\, Relative\ Profit_{t-j} + \sum_{j=0}^{2} \alpha_3 \Delta\, FDI_{t-j} + U_t \qquad (2)$$

[5] In the construction of the profitability variable, data availability restricted us to using a measure of the Gross Profit Margin as opposed to a Return on Capital. In this respect, numerous methods have been used to construct profit margins (see Conyon and Machin, 1991). We use a standard measure, for which comparable data was available: Gross Profit Margin = (Value Added – Total Wage Bill)/Sales (Hart and Morgan, 1977). Finally, the average profitability margin for the USA, UK and Germany was weighted by output at purchasing power parity.

A general to specific methodology was applied, with Wald tests used to justify parameter restrictions imposed when simplifying the lag structure. The results are shown in Columns (1) and (2) in Table (3.3). The results were disappointing, with, in the "preferred" equation (Column (2)), only the Relative Profit variable being statistically significant. The estimated equation also appeared to suffer from problems of heteroscadisticity, while the R-Bar Squared was a disappointing, 0.35.

It was felt that the disappointing results in Columns (1) and (2) of Table (3.3) could have been due to endogeneity problems. These may have been caused by the inclusion of consumption in the composition of the AD variable. In the simple Keynesian model, consumption is regarded as the endogenous component in aggregate demand: an increase in C leads to a rise in AD, while a rise in AD induces a further rise in C. All other factors (I, BD, and ES) are regarded as exogenous. If consumption comprises a significant proportion of AD, then current AD is unlikely to be pre-determined and this may lead to endogeneity in estimation. Aggregate Demand was, therefore, re-defined (denoted as AD_2), to include only the exogenous components (I, BD, and ES) and Equation (2) was re-estimated.

The results are shown in Columns (3) and (4) of Table (3.3). These estimated equations do not appear to suffer any serious misspecification and all diagnostic tests are passed. In the "preferred" model (Column (4)), the R-Bar-Squared improves to 0.44, but its "low value" suggests that the model has only moderate explanatory power. Nevertheless, the AD variable is negative and is now

statistically significant (see Column (4)), with an estimated coefficient of –0.31. This suggests that the relationship between Japanese FDI and AD is fairly inelastic: a 100 yen decrease in Japanese Aggregate Demand induces a corresponding 31 yen increase in the outflow of FDI. Both current and lagged relative profits are statistically significant and negative: a 1% fall in Japanese profit margins relative to the rest of the world increases Japanese FDI by approximately 72,727 yen, while a 1% fall in lagged relative profitability raises current FDI by 50,387 yen. Between 1970 and 1990, Corporate Japan's profit margins fell by approximately 20% relative to the average of those in the USA, the UK and Germany. The econometric evidence would suggest that declining domestic profit margins might have precipitated the significant outflow of Japanese FDI during this period.

In summary then, there appears some evidence to suggest that the demand deficiency hypothesis may be applicable to Japan. It would appear that deficient domestic demand, within Japan's general business climate, combined with declines in Japanese profitability, relative to other major industrialised economies, may have been a stimulus to outward FDI by Japanese firms - particularly those from the machinery sector. However, the low R-Bar-Squared in our results would suggest that other (supply-side) factors are also important. Furthermore, the relative profitability measure may also have been capturing supply side effects, such as lower wage costs elsewhere. These will now be considered in further detail.

3.4 Supply-Side Theories of Internationalisation

3.4.1 Hymer and the Market Power Hypothesis

While the demand deficiency hypothesis may explain the general incentive for (Japanese) firms to internationalise, it does not provide sufficient detail on why firms choose the transnational option, as opposed to serving foreign markets through exporting, licensing and/or subcontracting. To explore these micro level choices, it is necessary to consider the supply-side theories of international production.

In this respect, the discussion begins with Hymer (1976), whose 1960 doctoral dissertation provides the first detailed analysis of the theory of the transnational corporation. For Hymer (1976), the concept of control was the fundamental feature of FDI. In particular, Hymer (1976) argued that the decision to become a transnational corporation revolves around the possession of a firm-specific (oligopolistic) advantage and the removal of conflict between (international) firms. Both explanations for control are based upon the assumption that international markets are imperfect and oligopolistic.

The main point in Hymer's (1976) argument is that transnationals require a specific (oligopolistic) advantage over indigenous firms, to enable them to successfully set up operations in overseas markets. This is to enable them to overcome the natural disadvantage associated with foreign production, such as language, cultural and other related factors. For Japan's machinery firms, these specific advantages could be related to their technological flexibility and organisational efficiency vis-à-vis their Western rivals (Kenny and Florida, 1988,

1993). However, the possession of such an advantage need not necessarily lead to FDI. It is possible that the firm could license the advantage to an indigenous firm and receive an appropriate rent through an arm's-length transaction. Alternatively, the firm could control operations through subcontracting arrangements with indigenous firms.

Hymer (1976) suggested that both possibilities might be impractical when there is a degree of interdependence between firms in international markets. For instance, it may be difficult to arrange a licensing agreement when there are only a few potential buyers of such an advantage. This situation may create a "conflict of evaluation" as both parties bargain over the contract's worth. Furthermore, such contractual arrangements may also fail to protect the property rights of the licensor. As Hymer (1976, p.51) points out, *"a reluctance to license may arise from the inherent danger of losing the advantage"*. Given these possibilities, FDI is used to remove the potential for such conflicts and provide the transnational with direct control over its international operations.

For Japan's machinery firms, retaining control over international operations, through FDI, appears to be very important, particularly in both the European and North American markets. In this respect, Dunning's (1986) survey of Japanese participation in British industry highlighted that Japanese businessmen were not enthusiastic about alternative entry modes such as licensing. Typically, respondents cited concerns about entrusting their technology and reputation with (major) foreign rivals and the diffusion of strategic information. Perhaps these concerns are well founded, given the post-war history of Japan's machinery

sector, which succeeded in overturning Western technological supremacy through the assistance of licensing agreements with US and German transnationals (Ozawa, 1973).

In equilibrium, Hymer (1976) saw the growth of transnationals as leading to a process of monopolisation abroad, which can potentially reduce the host country's welfare. This process may occur, since transnational firms can use their specific advantages to raise entry barriers in their industry and restrict competition in the foreign market(s). Alternatively, given the global oligopolistic environment, it is argued that transnationals will recognise their interdependence and will seek out international collusive agreements - such as joint ventures - to obtain monopoly profits. Both possibilities involve the removal of conflict, but are potentially Pareto inefficient, as compared to the competitive outcome. It may be that the prevalence of joint ventures and the recent spate of international mergers, involving major Japanese automobile firms, are a reflection of rising collusion and the process of monopolisation within the global industry (see also Chapter (4)).

It is the focus upon monopolisation that has led Hymer's (1976) analysis to become associated with the "market power" school of internationalisation. An extension of Hymer's (1976) framework is the possibility that transnationals will imitate the behaviour of their major (domestic) rivals and follow each other overseas, so as to avoid "being left behind" (Knickerbocker, 1973). This strategic interaction, in international FDI, is also believed to increase the level of industrial concentration at the global level. Dunning (1994) has observed this

type of "herd behaviour" in the entry patterns of Japanese machinery firms into Europe. In Chapter (4), we provide statistical evidence of this Knickerbocker (1973) effect, for Japan's automobile industry at the global level.

3.4.2 The Internalisation School

In contrast to Hymer (1976) and the "market power" school, "internalisation" theorists offer a more sympathetic account of the transnational corporation. The main proponents of this approach are Buckley and Casson (1976), Rugman (1981) and Caves (1982). These authors draw upon the work of Coase (1937) and Williamson (1975), where the firm is seen as an institutional device to raise efficiency by replacing markets. Williamson (1975) argued that using the market mechanism could incur high transaction costs, which result from bounded rationality, opportunism and asset specificity. Examples include the cost of search, contract negotiation, monitoring costs and the danger of "lock in", when there are a small number of firms bargaining over the use of specific assets. These costs may be internalised when firms conduct their activities in-house. Similarly, in an international setting, FDI is undertaken when the costs of overseas production are seen as lower than the use of market alternatives, such as licensing and sub-contracting.

In the latter respect, it is argued that conducting market transactions, across national boundaries, may involve greater uncertainty and high monitoring costs. Furthermore, as we have already noted, the use of the market may lead to appropriability problems and the loss of a firm's competitive advantage(s). This is because of the "public goods" nature of the firm's intangible assets, such as

technological knowledge and managerial skills. It is argued that, by internalising such transaction costs, the transnational corporation can minimise its production costs and will be more likely to undertake efficiency enhancing activities such as Research and Development. In short, the "internalisation" school, regard the transnational corporation as a more efficient institution than the market mechanism (Buckley and Casson, 1976).

3.4.3 Distributional Issues - Divide and Rule

The efficiency property of the "internalisation" position has attracted particular criticism, since there are possible distributional effects of transnational activity. Distributional effects can occur because of the global mobility of capital, which provides the transnational corporation with greater leverage in its bargaining relations with an international division of labour. The argument is that, by locating production in a number of different countries, the transnational corporation can pursue so-called "divide and rule" strategies (Cowling and Sugden, 1994). By credibly threatening to switch production to an alternative, overseas site, the transnational generates intra-firm competition, by playing off its workers around the globe. Since workers value their employment, the "divide and rule" strategy allows the transnational to reduce its real labour costs and nullify potential labour militancy at each location (see also Hollingsworth, 1997; Peoples and Sugden, 2000). The transnational's bargaining position will be further strengthened, because of the inability of its global workforce to co-ordinate a collective (international) response to such threats. The lack of an international, co-ordinated response, from the corporation's labour force, reflects problems with organising international trade unions, along with deep-rooted

cultural factors that exist between workers of different nations, such as language, xenophobia and religious denominations (Helfgott, 1983)[6]. In essence, the "divide and rule" hypothesis can be associated with the Hymer (1976) tradition, mainly because the strategy enables the transnational to exert tighter control over its workers and remove conflict in international labour relations. Also, since "divide and rule" strategies involve extracting distributional gains from the workforce there is, by definition, a Pareto in-efficiency[7].

The "divide and rule" strategy is important for our understanding of the activities of Japanese transnationals. James (1989), for instance, has argued that Japanese transnationals have successfully been able to play the international wage game both within and across continents. He cites the example of Sanyo, which, in 1988, switched the production of its television sets from Arkansas, in the USA, to Maquiladoras, in Mexico, after its US workers refused to accept pay-cuts. In Chapters (4) and (5), our fieldwork research will also reveal how Japan's automobile manufacturers have been using their transnational production networks to pursue a "divide and rule" strategy and generate intra-firm competition within the Japanese automobile industry.

Finally, it should be noted that transnationals might also use "divide and rule" strategies to bargain with world governments. This may be particularly effective with those governments that place a political premium upon attracting inward

[6] The "divide and rule" position has been developed further in a model of international wage bargaining by Hollingsworth (1997). This is examined further in Chapter (6).
[7] Labour, for instance, may not consider the transnational corporation as a Pareto improving institution, if transnational production reduces their real wages. This result contrasts with the efficiency claims of the "internalisation" school.

investment. The transnational's threat to re-locate production elsewhere may entice governments to offer more lucrative grants and subsidies, or a less regulated business environment. Furthermore, since transnationals may use their global transplants for intra-firm trade, it is likely that such transactions will involve transfer pricing. This occurs when intermediate goods are sold - between transplants - at a *pseudo* price, so as to minimise the corporation's tax liabilities in different locations. The "divide and rule" game was demonstrated by Toyota, in 1997, when it successfully used the strategy to play-off both the UK and French governments in its bid to secure a favourable investment package for a second assembly transplant in Europe - the new site eventually being located in Lens, France (Business Week, 15/6/1997). Nissan have also used a similar strategy to acquire £40 million of state funds, to aid the finance of the future development of its Sunderland transplant. It was also claimed that Nissan received guarantees over UK government policy towards the EU (The Guardian, 25/1/2001).

3.4.4 Dunning's Eclectic Paradigm

Dunning's (1988a) Ownership Location and Internalisation (OLI) paradigm offers an eclectic synthesis of both the "market power" and "internalisation" approaches to internationalisation. The synthesis is not, in itself, a new theory but, as Cantwell (2000, p.20) notes, *"is an overall analytical framework for empirical investigations, which would draw the attention of the analyst to the most important theories (of international production)"*. For Dunning (1988a), transnational corporations have O*wnership* (O) advantages vis-à-vis their major rivals, which they can exploit by establishing production in countries that have

favourable *Locational* (L) attributes. These ownership advantages can relate to intangible assets (such as firm-specific technology) or they may be complementary assets that are jointly owned (such as the firm's organisational abilities, the capabilities and expertise of its personnel, its supply network). Transnationals retain direct control over the use of such assets because of the *Internalisation* (I) advantages in doing so (see above).

The locational attributes of the host country may be resource-based, such as the abundance of raw materials and/or the availability of a cheap labour force or there may be cultural advantages, such as the use of a common language. Alternatively, locational factors may reflect demand side considerations, such as greater market opportunities (Dunning, 1988a, 1993). We should note that locational attributes are a major consideration, particularly where the transnational's home country has a lack of natural resources or is experiencing rising domestic labour costs. In the case of Japan, a country that is lacking in natural resources, these supply-side factors have been very important. Before the lifting of FDI restrictions, MITI validated certain overseas investments in mining and textiles because they appeared conducive to the long-term interests of the Japanese economy (Mason, 1994). The mining investments enabled Japanese firms to secure direct control over a key source of raw materials, while Japan's textile firms could use their offshore affiliates as export platforms to specifically overcome the rising trade barriers, which were being imposed by the USA (Dicken, 1998). In recent years, these export platforms have become a major source of cheap labour for Japanese manufacturers (Wells, 1993).

3.5 Concluding Comments

This Chapter has introduced Japan's major transnational corporations and considered the fundamental factors behind their emergence on the global scale. It was argued that these factors relate to both the demand and supply-side, and that the reasons for the growth in transnational activity, fundamentally, reflect the nature of Japan's highly concentrated industrial structure - in short, transnationalism is endogenous. The combination of domestic demand constraints and supply-side pressures, led Corporate Japan to successfully lobby MITI to relax the post-war restrictions on FDI. Since liberalisation, Japan's transnationals have emerged to compete on the global scale, increasing their market shares and their overseas production ratios.

On the demand side, this Chapter has found some evidence to suggest that a climate of deficient domestic demand may have precipitated the increase in outward FDI, since the early 1970's, by Japanese manufacturing firms. This result was consistent with Pitelis's (1996, 2000) evidence for the UK. The main factor on the supply side appears to be the determination of Japanese corporations to retain direct control over their international operations. In this respect, Hymer's (1976) approach appears most applicable here. By internalising activities, rather than relying upon licensing or sub-contracting arrangements with indigenous firms, FDI allows Japanese transnationals to control and protect their "specific advantages" in international production. Furthermore, through "divide and rule" strategies, Japanese transnationals are able to reduce their international labour costs and remove the potential for conflict in labour relations. Some of these supply-side issues will be re-considered, in further

detail, in the Case Study the Japanese automobile industry in the following two Chapters.

3.6 Data Sources

Aggregate Demand (AD): Consumption (C), Investment (I), Export Surplus (ES) and the Budget Deficit. Source: Japanese Statistical Yearbook (Various Issues).

Japanese Aggregate Foreign Direct Investment (FDI), Source: Japanese Statistical Yearbook (Various Issues).

Relative Profitability: Profit Margins for Japan relative to a weighted average of Profit Margins for the USA, UK and Germany (weighted by output at purchasing power parity). Gross Profit Margin = (Value Added – Total Wage Bill)/Sales. Source: United Nations Industrial Statistics Yearbook (Various Issues).

Table (3.1)

Japan's Top TNC's Ranked by Ownership of Foreign Assets 1998 (Billions of Dollars and number of employees)

Corporation	Industrial Sector	Assets		Sales		Employment		Global Rank by Foreign Assets	
		Foreign	Total	Foreign	Total	Foreign	Total	All TNC's	By Sector
Toyota	***Automotive***	***44.9***	***131.5***	***55.2***	***101.0***	***113 216***	***183 879***	***6***	***3***
Honda Motor	***Automotive***	***26.3***	***41.8***	***29.7***	***51.7***	.....	***112 200***	***18***	***6***
Sony Corp. [2]	***Electronics***	.....	***52.5***	***40.7***	***56.6***	***102 468***	***173 000***	***20***	***3***
Mitsubishi Corp	Diversified	21.7	74.9	43.5	116.1	3 668	11 650	24	2
Nissan Motor	***Automotive***	***21.6***	***57.2***	***25.8***	***54.4***	.....	***131 260***	***25***	***9***
Mitsui & Co Ltd	Diversified	17.3	56.5	46.5	118.5	.....	7 288	37	4
Itochu Corp.	Trading	15.1	55.9	18.4	115.3	.....	5 775	45	1
Sumitomo Corp.	***Trading/Machinery***	***15.0***	***45.0***	***17.6***	***95.0***	.....	***5 591***	***46***	***2***
Nissho Iwai	Trading	14.2	38.5	9.1	71.6	.....	4 041	49	3
Matsushita Elect.	***Electronics***	***12.2***	***66.2***	***32.4***	***63.7***	***133 629***	***282 153***	***55***	***7***
Fujitsu Ltd.	***Electronics***	***12.2***	***42.3***	***15.9***	***43.3***	***74 000***	***188 000***	***56***	***8***
Hitachi Ltd.	***Electronics***	***12.0***	***76.6***	***19.8***	***63.8***	***58 000***	***331 494***	***58***	***9***
Marubeni Corp	Trading	10.6	53.8	31.4	98.8	.....	8 618	68	4
Mitsubishi Motors	***Automotive***	***8.4***	***25.4***	***16.8***	***29.1***	***18 251***	***29 945***	***88***	***14***
Canon Electronics	***Electronics***	***7.4***	***23.4***	***17.8***	***24.4***	***41 834***	***79 799***	***92***	***11***
Bridgestone	***Auto-Parts***	***7.4***	***14.7***	***11.3***	***17.1***	.....	***97 767***	***93***	***3***
Toshiba Corp.	***Electronics***	***6.8***	***48.8***	***14.5***	***44.6***	.....	***198 000***	***100***	***12***

Source: UNCTAD (2000),

Notes:

1) **Machinery Sector TNC's are in Italics**

2) **Data on Sony's foreign assets is not published, although the company report that 62 % of their "long-lived" assets (i.e. plant and equipment) is located outside Japan (Sony, 1999). UNCTAD (2000) have, therefore, ranked Sony accordingly.**

3) ..... **Data unavailable**

Table (3.2)

Comparative Growth of Japanese Manufacturing Production Overseas Percentage of Domestic Production

Industry	1985	1992	1993	1994	1995	1996	1997
Comparative Growth in Overseas Production All Manufacturing (Index 1985=100, all countries)							
Japan	100	206.7	246.7	286.7	300	386.7	433.3*
USA	100	156.6	150.6	156.6	172.9	.....	
Germany	100	109.6	128.3	138.5	141.6	.....	
Proportion of Output Produced Overseas (%) Japan's Industrial Sectors:							
Chemicals	.....	4.8	7.0	8.1	8.3	10.0	
Electrical machinery	.....	10.8	12.6	15.0	16.8	19.7	
Industrial machinery	.....	4.1	5.8	8.1	8.1	11.7	
Precision tools	.....	3.6	5.6	6.0	6.6	8.6	
Steel and Iron	.....	5.0	6.3	5.4	9.2	12.1	
Textiles	.....	2.3	3.2	4.0	3.5	7.6	
Transport equipment	.....	17.5	17.3	20.3	20.6	24.9	
All Industries	3.0	6.2	7.4	8.6	9.1	11.6	13.0
Japanese TNC's	8.7	17.3	18.3	22.0	25.1	27.5	31.1
Japanese Overseas Manufacturing Employment:							
Absolute Number (millions)		1.1	1.5	1.8	1.8	2.2	
% of domestic employment		7.2	10.8	12.0	12.8	17.2	

Source: MITI (1998)

Notes: 1). Overseas production ratio = Sales of Japanese Manufacturing Affiliates Abroad/Total Sales of Japanese Manufacturing Companies.

2). * MITI estimate for 1997 3). ..... Data unavailable

Table (3.3)

Japanese Outward FDI and Effective Demand 1974-1998 (Annual Data) Ordinary Least Squares Estimates

Dependent Variable Δ *FDI*	(1)	(2)	(3)	(4)
ΔAD_{1t}	-0.092 (-0.139)	-0.073 (-0.122)		
ΔAD_{1t-1}	1.077 (1.125)	0.443 (0.710)		
ΔAD_{1t-2}	-0.597 (-0.855)			
ΔAD_{2t}			-0.367 (-1.734)	-0.310* (1.972)
ΔAD_{2t-1}			1.788 (0.489)	1.321 (0.517)
ΔAD_{2t-2}			-0.686 (-0.793)	
Δ *Relative Profit*	-62652.12** (-2.158)	-68273.5*** (-3.185)	-69048.61** (-2.409)	-72727.28*** (-3.506)
Δ *Relative Profit* $_{t-1}$	-25593.60 (-0.752)	-23515.77 (-0.772)	-35933.55 (-1.045)	-50387.00** (-2.052)
Δ *Relative Profit* $_{t-2}$	-6602.12 (-0.194)		2607.298 (0.068)	
Δ *FDI* $_{t-1}$	0.168 (0.526)	0.161 (0.620)	0.192 (0.586)	
Δ *FDI* $_{t-2}$	-0.184 (-0.530)		-0.064 (-0.184)	
R-Bar Squared	0.27	0.35	0.32	0.44
Durbin Watson	1.84	1.84	1.67	1.53
Jarque-Bera $\chi^2(2)$	1.51 [0.47]	1.54 [0.46]	0.54 [0.76]	0.87 [0.65]
Ljung-Box Q(4)	0.71 [0.95]	3.41 [0.49]	1.94 [0.74]	2.46 [0.65]
Heteroscadasticity	3.08 [0.19]	3.38 [0.03]	0.82 [0.66]	1.42 [0.35]
Wald		1.49 [0.68]		1.15 [0.77]

Notes:

1. $AD_1 = C + I + BD + ES$ (i.e. includes consumption) and $AD_2 = I + BD + ES$ (i.e. excludes consumption).

2. The results were estimated by Eviews (version 3.1). The associated t-ratios are in parenthesis beneath the estimated coefficients and * indicates statistically significant at the 1% level, ** at 5% and * at 10%. The test for normality is the Jacque-Bera $\chi^2(2)$ test. Q(n) is the Ljung-Box χ^2statistic, for serial correlation, with n degrees of freedom. The test for heteroscadasticity is White's test (1980), which asymptotically follows a χ^2 distribution, with degrees of freedom equivalent to the number of slope coefficients in the test regression. Finally, these diagnostic tests have computer-generated probabilities (in parenthesis) indicating the probability of accepting the null hypothesis of no model misspecification. The Wald test is used as a variable deletion test, imposing a linear restriction that coefficient values are zero.**

Chapter 4

The Globalisation of the Japanese Automobile Industry: Strategic Behaviour and Transnational Production Networks

4.1. Introduction

We now focus our attention upon the role of Japanese automotive transnationals and the globalisation of the Japanese automobile industry. As we have already noted, the automobile industry plays the leading role within Japan's domestic machinery sector and accounts for the largest and widest number of keiretsu linkages within Japan (see Chapter (2)). The industry has also been the "strategic focus" for much of MITI's post-war industrial policy and is also widely acknowledged as providing Japan with "national champions" such as the large assemblers (referred to as Original Equipment Manufacturers (OEMs)), Toyota Nissan and Honda (see also Table (3.1), Chapter (3)).

In the global economy, the automobile industry has consistently recorded the highest level of actual overseas output and also the highest overseas production ratio (24.9%) of all Japan's manufacturing industries (see Table (3.2), Chapter (3)). The automobile industry can, therefore, be regarded as being the most "global" of Japanese industries. From this perspective, the industry provides an ideal basis for a Case Study, which will enable us to gain useful insights into the (general) nature of the Japanese transnational corporation, its evolution into a global entity, its strategic behaviour and its involvement in the development of a *new (overseas) keiretsu*, otherwise known as a transnational production network. Furthermore, the Case Study also enables us to

explore, more specifically, some of the supply-side theories of transnationalism that were introduced in Chapter (3).

Although, much has been written about the Japanese automobile industry (see, for instance, Womack et.âi 1990; Smitka, 1991), this Case Study differs in that it considers the industry from a *truly global* perspective. The Case Study is presented in two Chapters. In this Chapter, we draw upon *new, primary data* sources to provide *new evidence* on the *scale* and *pattern* of globalisation within the industry. This data has been carefully *collated* from the Dodwell Directory (1997). Further details of this unique data set are provided in Appendix (A). In Chapter (5), we consider the experiences of various actors involved in Japanese automotive transnational production networks, using direct insights from *interviews* with and *questionnaires* from Managing Directors and Senior Managers of UK based Japanese suppliers. We pay particular attention to the nature of the various relationships that have evolved between Japanese OEMs and their suppliers within this *new keiretsu.* However, given that our results only relate to experiences in the UK, we are careful not to generalise our results.

This Chapter begins with a (brief) profile of each of Japan's OEMs and also the distinction between "Group" and "Independent" suppliers. We also note some recent trends in the domestic industry. We then consider the globalisation of the industry (Section (4.3)), concentrating upon the role played by Japan's large OEMs. In particular, we focus upon the strategic behaviour in entry patterns, where we observe the Knickerbocker (1973) effect. Section (4.4) examines the internationalisation of the Japanese auto-components industry. We provide new, original data to show the extent

to which Japan's OEMs have actively been involved in (strategically) recreating their domestic *keiretsu* networks, internationally, to form a *new keiretsu*; a transnational production network. Finally, Section (4.5) concludes.

4.2 Japan's Domestic Automobile Industry: Overview

4.2.1 Profiles of Japan's OEMs

There are 11 "Japanese" OEMs that manufacture passenger cars, mini-cars and commercial vehicles (i.e. vans, trucks and buses). All of the Japanese OEMs are transnational corporations and a profile of each of them, as at the 30th June 2000, has been compiled and is presented in Table (4.1)[1]. The table lists the OEMs' major domestic and overseas plants with entry date(s) and also includes details of both equity holding(s) in these subsidiaries and, where possible, joint venture partners. Limited information on capacity or production runs is also provided, where available. The global position of Japan's OEMs will be discussed in further detail, in Section (4.3).

Originally the 11 OEMs were established as independent companies, but since the Second World War, there has been considerable co-operation between Japanese OEMs on both technological and product development. Such technology sharing has predominantly been between the larger OEMs and smaller producers who operate in niche segments of the market. For instance, Toyota has a long history of involvement with the small car producer, Diahatsu, and also the truck maker, Hino. Nissan has had similar arrangements with Fuji Heavy Industries and also its own subsidiary Nissan Diesel. In the early post-war years, these ties were often encouraged by MITI, as part

[1] The main details were acquired from Dodwell (1997), which was updated using information from MIRA (1997), Bursa et.al (1998) and recent company reports.

of an industrial strategy of cartelisation to strengthen the international competitiveness of the Japanese automobile industry (Johnson, 1982).

The technological arrangements were initially supplemented by small cross-shareholdings between the companies involved. Such cross-shareholdings promoted trust and mutual cooperation and also re-enforced the commitment of each company to joint projects. However, in recent years, the larger Japanese OEMs - particularly Toyota - have substantially raised their equity participation in their smaller partners, to obtain a "controlling interest" (Dodwell, 1997; Bursa. et.al, 1998). This increased equity participation has occurred during a period in which there have also been significant changes in the ownership structures of Japanese OEMs - in particular, there has been substantial foreign equity participation within Japanese OEMs (see Table (4.1)). These recent trends are now reflective of the increasing level of concentration within the global automobile industry. This is discussed in further detail, in Section (4.3.3).

4.2.2 Group vis-à-vis Independent Suppliers

As we mentioned in Chapter (2), the 11 Japanese OEMs are each supported by *keiretsu* networks that, in the aggregate, consist of approximately 1,400 Japanese auto-parts suppliers. Smitka (1991) provides an historical overview of the development and the evolving structure of the Japanese auto-supply industry. For our analysis it is important to note that Japan's auto-suppliers can be classified as either a "Group" or "Independent" supplier. This distinction is defined in the Dodwell Report (1997):

"A Group supplier is defined as a subsidiary or affiliate of an automaker and/or company which depends on a single automotive company for 50% of its annual sales with some exceptions e.g. a company whose dependence is less than 50% may be regarded as a Group company, taking into consideration such factors as historical relationships, personnel ties and licensing agreements" (Dodwell Report, p.178, 1997).

It follows that an "Independent" supplier is one that supplies most OEMs, without any OEM affiliation in terms of major shareholdings and personnel exchange[2]. Typical Independent firms include Akebono Brake, NTN and Yazaki, who are involved in the production of brakes, bearings and wire harnesses; products that are standard auto-parts, which, in production, can generate large internal economies of scale through the use of a particular technology.

One other difference between Group and Independent suppliers is that the former are often precluded from supplying consumers directly, with replacement parts. These restrictions do not hold for Independent suppliers (Dodwell, 1997). However, it should be noted that being a Group supplier no longer precludes the firm from supplying other OEMs. This has become more apparent as the Japanese OEMs have widened their global supply base, while suppliers have responded by beginning to trade with more than one OEM (Sako, 1996).

4.2.3 Recent Trends

On average, over two-thirds of Japan's domestic automobile production consists of passenger cars (including mini-cars), while commercial vehicles account for the

[2] It is true, of course, that some Japanese OEMs have "minor" shareholdings in some Independent suppliers. For instance, in Akebono Brake, Toyota holds a 14.3% stake, Nissan 7.5%, Isuzu 4.9% and Hino 2.2% (Toyo Keizui Inc, 2000).

remaining one third of output. The trend in domestic production is one of long-term decline. In 1996, total automobile production, in Japan, was just over ten million units, which was 75% of the 1990 level. During the same period, world output had grown by 3.2%. Dodwell (1997), attribute the decline in Japan's production to falling domestic demand and, more significantly, to the increasing transfer of manufacturing capacity overseas (see Figure (4.1)).

However, despite domestic decline, Japan's large car producers continue to enjoy a significant proportion of the global market (see also Table (3.1), Chapter (3)). Dicken (1998, p.342) notes that they are increasingly *"moving towards a greater transnationalisation of their production"*. Toyota, Nissan and Honda have, in particular, all stated a medium term ambition to manufacture more cars overseas than in Japan. Consequently, Japanese car exports have been falling steadily since 1985 and, for the first time, in 1995, they were exceeded, in both output and revenue, by production from Japanese foreign subsidiaries (Dicken, 1998).

4.2.4 The Structure of Japan's Domestic Automobile Industry Revisited

We have already provided an outline of the domestic Japanese automobile industry, in Chapter (2). The main conclusion was that the industry has a pyramidal structure, with the OEMs at the apex. It is important to recall that the Japanese OEM is typically a vertically de-integrated entity, which is involved in long-standing business relations with suppliers in so-called *keiretsu* networks. These relationships involve "mutual trust" and co-operation between the actors (Smitka, 1991). However, while we recognised these industry characteristics, we argued that control and strategic

decisions are concentrated amongst the corporate hierarchies of Japan's large automotive firms.

This latter point is important, since it aids our understanding of the nature of the Japanese (automotive) transnational corporation, and also its role in the global economy. It is the OEMs' corporate hierarchies that shape both the operations and the long-term direction of the Japanese automobile industry. The strategic decision for the industry to globalise (with implications for the control of international operations) is one such example and has had profound implications for all firms throughout the sector. These issues will be explored in further detail in both this and the following Chapter. It is to the globalisation of the industry, to which we now turn.

4.3 Japan's OEMs as Global Actors

4.3.1 The Global Position of Japanese OEMs as at 30.6.2000

The starting point for our analysis of the globalisation of the Japanese automobile industry is Table (4.1). The data in this table provides some information on the global position of Japanese OEMs as at 30th June 2000. As Table (4.1) clearly shows, Japan's OEMs are now represented on a truly global scale, with the large assemblers having built or acquired equity stakes in production facilities throughout five continents. In addition, it should also be noted that the Japanese OEMs' global operations are much wider than the production that occurs within these plants. Through licensing agreements and, more importantly, extensive sub-contracting arrangements, the large Japanese OEMs have increasingly been able to expand their global production network. A consequence of these trends is that while Japan's vehicle exports are in long-term decline and have been falling steadily since 1985 (Dodwell,

1997), the ratio of overseas to domestic production has been significantly rising for all of Japan's large OEMs. In this respect, the latest overseas production ratios (see Table (4.1)) are significantly higher for Toyota (34%), Nissan (38%), Mitsubishi Motors (35%) and Honda (51%), than for the whole of the transport equipment sector (24.9%) and Japanese industry (14.1%). Furthermore, we have already noted that all of the major Japanese OEMs have stated a medium term ambition to manufacture more vehicles overseas than in Japan (Dicken, 1998, p.342).

Moving to the geography of the Japanese OEM operations, we can see that it is predominantly concentrated within the economies of North America, Europe and East Asia (see Table (4.1)). This is not surprising, given that 92% of the world's automobile production takes place within these markets. From a first glance, it appears that Japanese OEMs are particularly well represented in Asia, although caution needs to be taken when trying to make inferences about the scale of these operations. Unfortunately, Table (4.1) does not distinguish between plants that have fully integrated car-manufacturing facilities and those that are merely final assembly operations[3]. Limited information reported in Bursa et.al (1998) and MIRA (1997), implies that the Asian plants are much smaller, and constrained in terms of capacity and product range, compared to their counterparts in North America, Europe and Japan (see also Table (4.1), for (limited) data on output and capacity levels). Dicken (1998), goes further to note the existence of high tariffs on finished vehicles throughout the region has meant that it is not cost effective to operate full car production in East Asia. However, there is a long history of a vertical production chain

[3] An example of a fully integrated car-manufacturing facility can be found at Nissan's Sunderland plant in the UK. Described by Bursa et.al (1998, p.142) as *"one of the most integrated car manufacturing facilities in Europe"*, the plant contains panel pressing, body assembly, paint shop, plastics injection and blow moulding facilities, engine machining and assembly, plus final car assembly.

chain between Japan and East Asia in the automobile industry (Dicken, 1998). These observations may then be consistent with the fact that the Japanese OEMs' most prevalent form of entry within East Asia has been through forming a joint venture with an indigenous assembler. By pooling capital costs, sharing platforms and technology, the Japanese OEMs are able to assemble and market low-cost vehicles, and gain significant market shares within the region (Dicken, 1998).

In contrast to East Asia, the Japanese OEM operations in North America, and particularly those in the USA, have been fully integrated on a global scale. Honda was the first Japanese OEM to begin full car production in the USA, with its plant at Marysville, Ohio, which opened in 1979. Both Toyota and Nissan subsequently followed Honda in the early 1980's, as higher domestic wages and the imposition of quotas and Voluntary Export Restraints (VERs) began to hit exports from Japan. The plants in the USA are the largest Japanese OEM plants outside Japan, equipped with fully integrated car manufacturing facilities to serve the large North American markets. Typically, the North American Japanese transplants are green-field sites, in rural locations, where the influence of labour unions is minimal (Dicken, 1998). In the mid to late 1980's, Nissan, Toyota and then Honda began to invest in similar platforms in Europe, with the UK being the preferred base[4]. By the late 1980's, the transplants were not only serving national markets but were also used to export to other locations across the globe, including Japan.

[4] There are many reasons for the UK being the prominent choice for Japanese OEMs in Europe. Typically these include the UK having lower production costs than the EU, weaker labour legislation, the availability of generous tax and subsidies and the fact that English is Japan's second language (for further details, see Dicken, 1988).

It was through their US transplants, that the Japanese OEMs began to pioneer a strategy of creating "the world car". This concept is based on the premise that a vehicle is designed using a set of basic components (such as floor pans and power-trains), with vehicle derivatives then tailored to suit various national markets (see Bursa et.al 1998). This enables the OEM to build a range of models using a shared platform enabling the OEM to attain scale economies, particularly in research and design, purchasing components and - through the more efficient use of platforms - during the actual manufacturing processes. According to Bursa et.al (1998), the early models – such as Toyota's Corolla – were comparatively low priced, but the basic common design often lacked appeal across wider markets. However, in recent years, the introduction of flexible computer controlled manufacturing systems has enabled the OEMs to widen and extend regional variations to match consumer demand.

Japanese OEMs are also establishing themselves outside the main automobile markets. In South America, Toyota leads the Japanese presence, with access to facilities that are geographically dispersed across the continent. During the 1990's, the company increased its activities in the region with investment in new sites in Columbia, Argentina and more recently Brazil. The other Japanese OEMs have smaller footholds in the continent, although this will change as the economies mature. As yet, the Japanese South American transplants are smaller scale operations compared to those in the North American or European economies, with facilities generally designed for assembly rather than full car production (Bursa. et.al 1998).

In Oceania, only Toyota and Mitsubishi now have production facilities with transplants in Australia. Until 1997, Toyota, Nissan, Honda and Mitsubishi all had

assembly plants in New Zealand, but these were closed following the country's abolition of vehicle import duties that made exporting to the market more feasible. Africa remains the one major continent that the Japanese OEMs have yet to fully penetrate. Most Japanese car production has been through sub-contracting and licensing agreements with local assemblers. However, in 1997, both Toyota and Nissan purchased substantial stakes in their South African partners and it is envisaged that more Japanese automobile investment will soon follow into the region (MIRA, 1997).

4.3.2. Strategic Behaviour in Entry Patterns

The strategic behaviour of both Toyota and Nissan in acquiring stakes in their South African partners appears to fit Knickerbocker's (1973) view of international oligopolistic rivalry. Knickerbocker (1973) noted that the timing of the entry of US firms into overseas markets was "bunched", while Dunning (1994) has noted a similar pattern in the entry of predominantly Japanese machinery firms into Europe. Knickerbocker's (1973) explanation for this type of phenomena is that, large national firms imitate the behaviour of their domestic, growth-seeking rivals, particularly those rivals who invest overseas to enhance their market shares. The game becomes one of "following the leader", with firms engaged in an international "mutual exchange of threats", each aware that a failure to respond may leave them in a weaker global market position vis-à-vis their rivals. In this respect, global strategic interdependence between firms leads to cycles of both aggressive and defensive investments in international markets.

A closer look at entry patterns in Table (4.1) reveals that the behaviour of Japan's larger OEMs appears to fit Knickerbocker's (1973) hypothesis, particularly entry into the North American, European and East Asian economies. For instance, consider East Asia, where it appears that Nissan was the early "leader", with its Taiwan affiliate in 1959. Within three years, both Toyota and Honda had responded with similar investments in the region. The late 1960's then saw both Toyota and Honda engaged in "tit for tat" investments in Indonesia, Malaysia, and Thailand respectively. The net result of all this was that, by the early 1970's, in terms of equity stakes in East Asian affiliates, both the followers – Toyota and Honda – had acquired a wider geographical manufacturing presence than the initial leader Nissan. Consequently, Nissan responded by investing in a Malaysian affiliate in 1976.

The next surge of Japanese automobile investment within the region was in the early 1980's, and again it was Nissan that "led" the way, with a joint venture in the Philippines (1983). The response of Toyota, Honda and now Mitsubishi was the same as before: within four years these rivals had made multiple investments - in geographical space - throughout the region. During the 1990's, Nissan reacted by widening its manufacturing presence in Asia, which again has encouraged others to respond (see Table (4.1)). There is also evidence of strategic behaviour within the continent's sub-markets. Toyota was the first Japanese OEM to invest in the potentially large consumer markets of India and Southern Asia, which induced a strategic response from Honda (see Table (4.1)). Similarly, during the 1990's, Toyota has led the way into China (1991), followed this time by Nissan (1994) and more recently Mitsubishi (1998).

A similar analysis can also be applied to Japanese OEM entry patterns in both North America and Europe. Honda's investment in manufacturing facilities at Ohio, USA (1979), was followed by both Nissan's transplants in Tennessee and Toyota's in California and Kentucky during the early 1980's. Once again, in the late 1980's, both Honda and Toyota widened their geographical manufacturing presence with transplants in Ontario, Canada, while Nissan eventually responded by increasing its capacity at its Mexican transplant (Dicken, 1998). Mitsubishi and Mazda also entered the USA with joint venture operations in Illinois and Michigan respectively. In the late 1990's, both Toyota and Nissan have become engaged in more "tit for tat" investments within the region (see Table (4.1)).

In Europe, the early 1980's saw Nissan "lead" the way with its transplants in Catalonia, Spain followed by its much larger operations in the North East of England. Toyota responded with a similar investment at Burnaston, Derbyshire, in the UK. Honda's entry into Europe had actually been earlier than both their main rivals, but their European operations had initially taken the form of a joint venture with the indigenous UK manufacturer, British Leyland (the predecessor to Rover), and it was not until the late 1980's that Honda's vehicles were being manufactured on British platforms. Honda now has its own production facilities at Swindon, in the UK. Meanwhile, Mitsubishi Motors have also begun large-scale production in Europe, through a joint venture with Volvo (see Table (4.1)).

A simple attempt to capture the (global) strategic interaction, between Japan's four major OEMs, is through the use of a correlation matrix for the dispersion of major (Japanese) OEM plants (as listed in Table (4.1)), by region, as at 31/12/1980 and again

at 30/6/2000. In this respect, for each Japanese OEM, we correlate the number of transplants in operation (as listed in Table (4.1)) vis-à-vis its domestic rivals, in nine economic or strategic locations[5]. This approach is similar to that of Knickerbocker (1973, p.49), although his statistical analysis considered strategic behaviour in a number of industries. Our correlation coefficients are presented in Table (4.2), although the reported results are accompanied by a caveat. This is that the correlation coefficients can be open to wide interpretation and particularly so in this case, given that the nature and timing of affiliate formation varies considerably amongst the OEMs. The correlation coefficients in Table (4.2) are dependent upon both the date and region(s) chosen for calculation and so should be treated with caution. This aside, a simple comparison of the correlation coefficients in 1980 and 2000, from Table(s) (4.2a and 4.2b), point to a significantly positive relationship between the numbers of OEM plants located across regions. Furthermore, the strength of the association between Toyota and Nissan and Toyota and Honda also appears to increase over the period, which may indicate a rise in the intensity of strategic interaction between the OEMs. This result certainly appears consistent with the preceding analysis and the patterns of entry observed in Table (4.1).

So far, the analysis in this Section has only allowed for general conclusions to be drawn. This reflects the limited information available on the extent of activities in the

[5] It was felt that it was better capture global strategic interaction on a regional basis, rather than a country basis, since OEMs typically regard regions as strategic locations for global production. Nine "regions" were used which were based upon geography and viable trading areas. The regions were North and Central America, South America, the EU, non-EU economies, the East Asian economies, China, West Asia, Africa, and Oceania. China was not included in the East Asian economies because the country has only recently begun to open its trading borders and is regarded, strategically, as a separate site. For a similar reason, OEM operations in the EU and non-EU countries were not amalgamated together. Given that the first overseas OEM affiliate was in 1959, and the data in Table (4.1) ends at 2000, it was felt 1980 might be reasonable benchmark date with which to compare strategic behaviour.

OEMs' overseas subsidiaries. The data in Table(s) (4.1) and (4.2), therefore, requires careful consideration and interpretation. In this respect, a glance at Table (4.1), confirms that Nissan's operations are less geographically dispersed than their main rivals, which may imply that Nissan has reacted to globalisation, rather than being a leading player. However, Industry Reports regard the company as having been a "leader" in the globalisation of the Japanese automobile industry, particularly in Europe and Asia (MIRA, 1997). This is important because there may be real gains from becoming a "leader". By being the first OEM to invest in manufacturing facilities, in a new market, the OEM widens its market presence and brand appeal. In addition, the OEM will have a preferential choice over potential sites. Consequently, the OEM will have more time - relative to its rivals - to be able to integrate both its domestic and overseas production operations, and also establish relationships with both indigenous and Japanese suppliers.

These "leadership" advantages appear to manifest themselves in relative market shares. According to AAMA (1998), Nissan's aggregate market share in Europe, in 1996, was 3.1%, followed by Toyota (2.8%) and Honda (1.5%). In North America, where Honda led the Japanese transplant entry, Honda has 9.2%, Toyota 7.7% and Nissan 4.3% of the total market. Furthermore, both the Toyota Camry and Honda Accord were the best selling vehicles in the USA during 1997 (AAMA, 1998). AAMA (1998) also report that the relative (Japanese) market positions in these economies have remained stable, since the Japanese OEMs built their transplants in the early 1980's. The East Asian markets, of course, are much smaller and more fragmented, but are dominated by the Japanese OEMs, who account for approximately 80% of new vehicle sales. Throughout the continent, the largest players in each national market

tend to be those Japanese OEMs, which have a significant manufacturing presence (MIRA, 1997)). The East Asian markets are not yet mature, but it would appear that the Japanese OEMs are in a strong position to exploit the opportunities on offer.

These market positions may, of course, reflect earlier successful export penetration by Japanese OEMs, which has enabled them to establish a brand image and acquire a favourable reputation. For instance, Honda has a long and successful history of serving the US market through exports (Bursa.et.al, 1998; Dicken, 1998). It may be that export success provides the OEM with a Hymer (1976) type "specific advantage", allowing the OEM to assume "leadership". FDI is then undertaken by the OEMs to protect and expand their respective market shares.

4.3.3 Recent Ownership Changes and Foreign Participation in Japanese OEMs

It was briefly mentioned in Section (4.2.1), that there have been significant recent changes in the ownership structures of Japanese OEMs. The increasing globalisation of the industry appears to have coincided with a corresponding increase in merger activity, particularly between Japanese and foreign OEMs, which has been primarily instigated by the latter. This is particularly interesting since, traditionally, MITI have been opposed to any foreign participation in Japanese OEMs and industrial policy has attempted to prevent such involvement. For instance, Johnson (1982) reports of how MITI, following Japan's capital liberalisation reforms, during the late 1960's, was successful in persuading Toyota and Nissan not to become involved in either joint ventures or other equity holding arrangements with the large American manufacturers. MITI was, however, less successful in negotiations with Mitsubishi Motors, who

formed a joint venture with Chrysler in 1971, a move that can be seen as initiating the liberalisation of Japanese automotive capital (Johnson, 1982).

The recent changes in OEM ownership and the associated rise in the global concentration of the industry have particularly gathered pace since 1996. Most observers argue that Western markets have become saturated, leaving many OEMs with stagnant order books and (global) excess capacity. Consequently, lower returns on capital and falling equity values have meant that some OEMs have become vulnerable to takeover, with merger being regarded as a means towards a large-scale rationalisation and restructuring of the industry (Bursa.et.al, 1998). Larger or more successful OEMs are purchasing their "weaker" international rivals to essentially secure a "brand image", to obtain entry into niche markets. In this respect, the Chairman of Daimler-Chrysler, Bob Eaton, believes that the current number of major world car producers of 14 is untenable, and will fall to around 8 within the next few years (Bursa et.al, 1998).

With regards to the Japanese OEMs, only Honda has yet to be directly involved in these ownership changes. Toyota, as mentioned earlier, has strengthened its long-term relationships with both Diahatsu and Hino and has become the largest shareholder in each company. The acquisition of Diahatsu provides Toyota with a specialist small car producer, while the increased participation in Hino, increases Toyota's options in the global commercial vehicle market. Toyota's strategy is similar to that of one of its global rivals, the American giant, General Motors, who are, ironically, now the major shareholders of both Suzuki and Isuzu – both the direct major (Japanese) domestic rivals to Daihatsu and Hino.

The most significant changes in ownership relate to the acquisitions of three of Japan's large OEMs – Mitsubishi Motors, Mazda and particularly Nissan - by foreign companies. Mazda's relationship with Ford was consolidated when the American company purchased a controlling stake (33.4%) in 1996 and installed an American President. The acquisition of Mazda provided Ford with the opportunity to gain a foothold in the Japanese market. According to Bursa et.al (1998), both companies will further integrate their global operations, sharing common platforms, and basic engine design and transmission structures. The most recent proposed merger - announced in July 2000 - is between Mitsubishi Motors and Daimler-Chrysler, which will leave the German company as the largest shareholder (34% stake) and there is a strong possibility that a full takeover will occur by 2002. As yet, little is known what effect the merger will have upon Mitsubishi's operations, but it is thought that Daimler-Chrysler are to appoint their own top executives to overhaul the current management structure and outgoing Mitsubishi Motors President, Katsuhiko Kawasoe, anticipates *"sweeping organisational changes"* (Nikkei Weekly, 3/9/2000).

The most controversial takeover, within Japan, has been French based Renault's acquisition of Nissan, Japan's second largest OEM, in 1998. During the late 1990's Nissan had become vulnerable to a takeover given its high debt equity ratio and falling share price. Renault's acquisition has had important consequences for Nissan and their predominantly Japanese supply base. Nissan's new (Renault appointed) President, Carlos Ghosn, has embarked upon a Western style of organisational restructuring, with cutbacks in plant investment, planned factory closures in Japan and moves towards global sourcing and a dismantling of the company's *keiretsu* Corporate Groups. The latter has included plans to sell Nissan's large equity stakes in two of its largest

components firms, Calsonic Kansei and Ikeda Bussan, to the US auto-suppliers Delphi and Johnson Controls respectively (Nikkei Weekly, 21/8/2000). Outlining the future for Nissan, Ghosn has consistently made it clear that *"maintaining keiretsu ties, complete with cross-shareholdings and production, personnel and technology exchanges, is not an objective.....the question is whether suppliers will commit to 20% cost reductions for Nissan in a credible way"* (Nikkei Weekly, 25/10/99).

The Nissan case highlights some of the likely implications of increased foreign participation in Japanese OEMs. In particular, the industry's supply base can no longer rely upon orders from their main OEM, but instead will have to compete with other global suppliers. Consequently, suppliers themselves are becoming involved in international mergers, in order to maintain a stronger bargaining position vis-à-vis the OEMs. Throughout the Japanese automobile industry, there are calls for Western style re-structuring, with changes in managerial and organisational practices. These changes may not conform to Japanese culture and could be difficult to implement (Nikkei Weekly, 25/10/99).

The increased merger activity should not be seen as being independent from globalisation. Rather, both rising merger activity and globalisation should be regarded as endogenous. From being small independent producers, the Japanese OEMs were promoted as "national champions" on the global stage (see Chapter (2)). Japanese automotive capital was liberalised and Japan's OEMs became transnational corporations. As the world's major automotive markets have become saturated, experiencing a slow growth in demand, a number of Japanese (and other) OEMs have seen falls in their Stock Market valuations and have subsequently become vulnerable

to (international) takeovers. These ownership changes will have a number of important consequences for the industry, particularly for Japan's smaller domestic suppliers in the *keiretsu* networks, who may no longer be able to rely upon their main OEM contractors for new orders (see Chapter (6)). Unlike in the immediate post-Second World War period, MITI has been powerless to prevent or nullify the effects of these changes.

4.4 The Internationalisation of the Japanese Components Industry

4.4.1 Corporate Globalisation, Specific Advantage and the New Keiretsu

The analysis in the previous section considered the emergence of the large Japanese OEMs on a global scale. However, as we noted in Chapter (2) and Section (4.2.4), Japan's domestic automobile industry also consists of a wide and extensive set of *keiretsu* networks of auto-suppliers. In this Section, we will show the degree to which Japan's large OEMs have (strategically) tried to recreate these *keiretsu* networks in the global economy. The *new data* presented in this Section will, therefore, enable us to gauge the full extent of globalisation within the Japanese automobile industry, while also providing us with insights into the evolution and development of these Japanese transnational networks.

The data in Table (4.1) and Tables (4.3a to 4.3e) reveal a symmetrical pattern in the overseas entry of Japan's OEMs and auto-suppliers, with the timing of overseas entry being "bunched" and concentrated within the North American, European and East Asian economies[6]. These patterns reflect an attempt by the Japanese automobile industry to reproduce the close domestic relationships between Japan's OEMs and

[6] Indeed, 96% of Japanese offshore supplier affiliates are located within these economies (see Table (4.3a to 4.3e)).

their suppliers, throughout the globe. In essence, Japan's OEMs have been strategically establishing a *new (overseas) keiretsu,* or a transnational production network. This has been achieved through OEMs actively "encouraging" their core domestic suppliers, to set up wholly owned subsidiaries or, in many cases, establish joint ventures with indigenous suppliers.

The rationale behind the *new keiretsu* lies in both maintaining the Japanese automobile industry's specific (competitive) advantages and reducing the uncertainty associated with operating in a different environment. These "specific advantages" primarily relate to the domestic industry's governance structure, the various control mechanisms available to the OEMs and the close relationships that have developed between OEMs and suppliers (see Chapter (2) for further details). When production is shifted overseas, Japan's large OEMs could lose these advantages, particularly when they have to establish new supply chains with indigenous suppliers (Gittelman and Dunning (1992)). This may be because (Western) supplier-manufacturer contracts are based upon competitive bidding, rather than the cultivation of long-term trading arrangements. An additional problem is that indigenous suppliers are generally unfamiliar with the format of Japanese production processes, which involve an understanding of *Just-in-Time (JIT)* delivery systems, *lean* production, *kaizen* quality control and also the (Japanese) labour bargaining process (see Section (2.3.2 and 2.3.3), Chapter (2)).

More fundamentally, these difficulties, combined with an absence of an (controlling) equity stake in indigenous suppliers, reduce the effectiveness and enforceability of the various control mechanisms available to Japanese OEMs (see Section (2.4) of Chapter

(2)). In the light of these uncertainties, it was rational for Japan's OEMs to minimise the risks associated with international production by continuing to work with their acknowledged suppliers and attempt to replicate Japanese industrial organisation at their overseas sites. A further advantage for the Japanese OEMs was that by using their core Japanese suppliers and employing similar technology as in Japan, the OEMs could directly compare production costs between international supply subsidiaries, along the value chain. This provides the OEMs with greater leverage in their bargaining position with subsidiaries and allows them to exert direct control over an international division of labour.

The importance for Japan's OEMs to maintain control and protect their specific advantages, in international automobile production, is reflected by their direct involvement in the development of the *new keiretsu*. This involvement has often extended to identifying potential sites for supplier transplants and/or possible joint venture partners for suppliers. The interview responses from Managing Directors (MDs) of Japanese suppliers, in the UK, provide a direct insight into the influence of the large OEMs. Consider, for instance, the comments of an MD, from a Honda Group supplier, based in the South West of England:

"The decision to build a new factory here was really Honda's. Honda own 49% of our parent company in Japan and consequently they have a large influence on decisions. Honda had chosen the Swindon site in preference to other European sites for new car production. It was decided that we, as one of Honda's core suppliers in Japan, should support their operations here, in a joint venture with a (Honda) chosen UK supplier. That was the main reason for us to locate here. For us, other location factors were not really an issue. However, we have benefited from things such as the region's infrastructure".

MDs also expressed similar sentiments at two of the three other UK based (Group) supplier affiliates, where interviews were also conducted. However, as noted in Chapter (2) (Section (2.4)), equity participation in the supplier is not the only control mechanism available to the OEMs. In this case, it is interesting to note that Japanese OEMs have also been in a position to exert their authority over non-Group suppliers. An MD from an Independent Japanese supplier that produces aerials, based in the West Midlands commented:

"In Japan, Toyota is our main customer. When Toyota began operations here, our parent company decided to follow them to maintain customer relations. Otherwise there was a real danger that we would lose their custom to a rival supplier ".

The threat of sourcing production from a (global) rival supplier is, therefore, a credible threat to "encourage" domestic Japanese suppliers to follow their main OEM into overseas markets.

Industry logistics also allow Japan's OEMs to indirectly determine the actual (overseas) location of their suppliers. As mentioned in Chapter (2) (Section (2.4.4)), Japanese production processes generally favour a close geographical proximity between the OEMs and their supplier's transplants and, as in Japan; the close proximity of operations is a notable feature of the *new keiretsu*. In the USA, for instance, large Japanese dominated automotive clusters have emerged to rival domestic producers (Dicken, 1998). The importance of geographical proximity is that it helps to facilitate good working relationships between the OEM and supplier transplants, and also assists in the smooth functioning of *Just-In-Time* (JIT) delivery

systems. An MD, from a Toyota supplier, in the West Midlands, UK, acknowledged these points:

"Toyota expect us to make 28 deliveries to their assembly plant at Burnaston, per day and we are working on increasing that load, without incurring additional capital expenditure. In addition, our employees regularly meet representatives from Toyota to discuss production operations. Being close to their plant at Burnaston was therefore an important logistical consideration".

In addition, the MD's comments appear to be supported by other UK based Japanese suppliers, since 76.2% of all questionnaire respondents regarded the issue of regional proximity, to their main Japanese OEMs operations, as being the most important reason for the precise location of their own transplant[7]. It appears then that, throughout the industry, corporate strategy is determined to suit the global activities of the large OEMs. In short, Japan's OEMs are responsible for choosing the optimal location and time horizon for new automotive production. The OEMs can then either exploit their equity stake or their various control mechanisms to "persuade" their suppliers to follow them overseas.

4.4.2 The Fusion of Entry: Group vis-à-vis Independent suppliers

As mentioned in Section (4.4.1), the general patterns of overseas supplier entry are shown in Table(s) (4.3a to 4.3e). In Table(s) (4.4a to 4.4c), details of supplier entry into East Asia, Europe and North America is decomposed into Group and Independent supplier entry. A Country-Group breakdown is also provided in Table (4.5). These tables allow a closer investigation of the evolution and composition of the *new keiretsu*. This is important, since although Independent suppliers will form part of the

[7] See Appendices (A) and (B) for details of the Questionnaire.

OEMs' *new keiretsu*, their role is likely to be looser and less defined than those of Group suppliers (see Section (4.2.2)).

From the Tables (4.3 and 4.4), it is clear that the earliest and largest regional concentration of overseas Japanese supplier affiliates is in East Asia. These offshore bases have become a source of low cost labour for Japanese auto-suppliers and they support the Japanese OEM activities throughout the whole region. However, production is not only for the Asian markets. Indeed the bases are sometimes referred to as "export platforms", since they also supply a significant proportion of components to both Western and Japanese markets as part of a vertical production chain (Wells, 1993; Dicken, 1998; MITI, 1998). The transplants are widely dispersed throughout the region, although Taiwan, Thailand and Indonesia are clearly the most favoured sites for production. During the 1990's, however, China emerged as the most important Asian economy for new Japanese (automobile) subsidiary formation - possibly at the expense of its neighbour, Taiwan (see Table (4.3a) and also Table (4.1)). In terms of composition, 64.8% of East Asian transplants belong to Independent suppliers (see Table (4.4a)). Historically, the large Independent suppliers have served a wide (global) client base that also includes non-Japanese OEMs [8]. In order to serve the global market competitively, Independent suppliers were amongst the first Japanese component firms to extensively outsource their operations and, in this respect, they predominantly took advantage of the low cost East Asian "export platforms" and began to create an international division of labour. It was not until the early 1980's that Group suppliers began to set up extensive East Asian regional operations, in order to support the

[8] These Independent suppliers included the likes of Asahi Glass and NSK Ltd, who were engaged in large scale manufacturing of specific components such as car glass and bearings for all the Japanese OEMs and amongst others, General Motors and Ford (Dodwell, 1997).

increased overseas activities of their main OEMs and also to take advantage of lower labour costs (see Table (4.4a)).

In North and Central America and Europe, supplier entry patterns are similar to those of Japan's OEMs. Large-scale entry - by both Group and Independent suppliers - began in the early 1980's, with affiliates being primarily established to support the large Japanese OEM operations in the region(s). Since the early 1980's, the USA has attracted the largest number of new Japanese supplier transplants, than any other country in the world. By 1996, the USA accounted for 30.1% of all overseas Japanese supplier transplants: a statistic that reflects the strategic importance of the US economy for Japanese automobile production. For similar reasons, the UK accommodates the largest number of Japanese supplier transplants within the European Union (see Table(s) (4.3b), (4.3c), and (4.5)). The composition of supplier affiliates within both North and Central America and Europe, is more balanced than those in East Asia. In 1996, 50.2% of all North American based Japanese auto-suppliers were affiliated to an OEM Corporate Group, while in Europe the comparative figure was 46.4%. As noted in Section (4.3.1), Japanese OEM operations, within these regions, are much larger than those in their offshore affiliates in East Asia. The higher proportion of Group suppliers reflects the strategic role that they play in the *new keiretsu* and is an indication of their importance in maintaining the Japanese automobile industry's (global) specific advantages (see Section (4.4.1)).

In terms of Corporate Groups, both Toyota and Nissan have established the largest number and the widest dispersion of Group supplier affiliates. Honda relies upon relatively fewer offshore Group affiliates, while Mitsubishi's Group suppliers have not

yet significantly expanded overseas (see Tables (4.4) and (4.5)). Group supplier affiliates are, not surprisingly, predominantly located in countries where their main OEM has production facilities. With regards to Independent suppliers, the majority (55%) of their overseas transplants are dispersed throughout Asia, although they also have a significant presence in the USA and Europe to serve both Japanese and foreign OEMs. To some extent, the data in Tables (4.4) and (4.5) reflect both the scale and scope of the respective OEMs overseas operations (see Section (4.3.1) and Table (4.1)). However, there is a caveat with this interpretation, in that it ignores the possibility that some OEMs, particularly those involved in joint ventures with foreign OEMs, are using indigenous suppliers. What is clear from the data is that through their extensive Group supplier affiliates, both Toyota and Nissan have established *direct control* over a wider geographical space and have created a Group international division of labour.

In Tables (4.6a and 4.6b), we provide estimates of the statistical relationship(s) - as measured by correlation coefficient(s) - between the dispersion of the various Japanese OEM transplants and their Group supplier affiliates. These correlation matrices are calculated on the basis of both country and regional dispersion, as at 31/12/1996. As with Table (4.2), the correlation coefficients should be treated with caution, and it would be unwise to use their numerical values for economic interpretation. This is because of both the small-sample properties of the data and also its qualitative nature, which does not allow us to capture the intensity of Japanese automotive activity in each country/region. However, as we would expect, in all cases there are strong, positive and statistically significant relationships between the dispersion of the various Japanese OEM transplants and their Group supplier affiliates. In addition, the

relationships between the OEM transplants and those of the Independent suppliers are also positive and statistically significant. These results support the idea of a *new keiretsu*, where there is a strategic clustering of overseas Japanese OEM and supplier transplants.

Finally, we note that the main period for all Japanese supplier subsidiary formation – across all regions – was 1986-1990 (see Table(s) (4.3 and 4.4)). During this period, 57.9% of all Japanese supplier affiliates in North America were established, while the comparable figures in Europe and East Asia were 39.1% and 28.1% respectively. To some extent, this dramatic surge in new supplier affiliates relates to the Yen-Dollar realignment arising from the Plaza Accord in 1985, which reduced both asset and production costs in the USA and other countries relative to Japan (Kogut and Chang, 1996). However, it should be noted that, from an industrial organisation perspective, transnational corporations base their long-run international production strategies upon fundamental factors, rather than short-term exchange rate fluctuations. These fundamental factors relate to the global strategic behaviour of Japan's large OEMs and their determination to establish control over a *new keiretsu* and to create an international division of labour. Indeed as Dunning (1988b) has argued, currency fluctuations may affect the timing of FDI, but not its long-term trend. The Yen's appreciation may, therefore, have (partially) affected the timing of these offshore automotive investments but it is unlikely to have had any long-term effect upon the extent of the industry's globalisation.

4.4.3 Regional Density Patterns and the Concentration of Supplier Affiliates

So far, our analysis has only provided data on the number of offshore supplier affiliates. However, our hypothesis maintains that the *new keiretsu* principally consist of the *same* cluster of supplier firms and that the same OEM/supplier linkages are primarily being recreated across the globe (see also Martin et.al, 1994). This is important, since it is the recreation of domestic linkages that allows the OEMs and their core suppliers to directly control technology and operations, while also facilitating the direct monitoring of cost differentials between locations. In addition, the arrangements also allow the Corporate Group to achieve organisational scale economies at an international level.

By recreating domestic industrial linkages, in different overseas locations, some core suppliers have become global actors themselves. The extent to which this is occurring is captured in Figure (4.2), which shows the number of offshore manufacturing affiliates per Japanese supplier, by Corporate Group[9]. In other words, the graphs highlight the global density patterns of the suppliers' offshore affiliates. The mean number of all offshore affiliates – per Japanese supplier firm - is approximately 3.0, although the distribution is strongly skewed to the right. Approximately 40% of all suppliers have only one affiliate outside Japan (see Figure (4.2)). The remaining graphs break down the distribution into Independent suppliers and the Corporate Group suppliers. The graphs reveal that while the distribution(s) of Independent supplier affiliates are similar to the general pattern, the Group supplier transplants are, in contrast, significantly less skewed to the right. The skew-ness of the distribution of

[9] In the few cases (less than 2%) where the supplier affiliate has more than one Japanese parent (i.e. a joint Japanese venture), the largest parent equity-holder is assumed as "the firm" to avoid double-counting (see also Section (4.4.4).

the Group supplier affiliates reflects the fact that the Group suppliers are "few" in actual number. It appears that only a small, core of Group suppliers have moved offshore to support their main OEM's overseas activities. This is supported by the data in Figure (4.2) and Table (4.7). For instance, the data reveals that, for Toyota, only 22 Group suppliers have established offshore affiliates, although 10 of these firms have more than two affiliates (see Figure (4.2)). Furthermore, Table (4.7) data also shows that only 4 Toyota Group suppliers have at least one affiliate in each of the North and Central American, European and East Asian markets. These 4 suppliers account for 37 out of 77 Toyota Group affiliates that have been established in these regions (a ratio of 48.1%).

In comparison, 33 Nissan Group suppliers have offshore bases, with a mean number of affiliates (3.0) that is close to the general pattern (see Figure (4.2)). Again, only 6 Group suppliers have at least one affiliate in each of the main automobile markets of North and Central America, Europe and East Asia (Table (4.7)) These 6 suppliers account for 40 (out of 98) Nissan Group affiliates established in these regions (i.e. 40.8%). Honda's offshore supply base consists of 22 Group supply firms, which is the same number as Toyota, although the Honda Group suppliers' mean number of affiliates is lower at 2.1. Only 2 Honda suppliers have affiliates in each of the three major automobile markets, accounting for 11 (out of 45) Group transplants (i.e. 24.4%). With regards to Independent suppliers, 109 firms have overseas production facilities, with a mean of 3.35 affiliates. However, only 19 of these firms have affiliates in each of the main automobile markets, accounting for 143 transplants (or 42.3%) of supplier transplants. In the aggregate, the total number of Japanese supplier firms, with international operations is 143, which represents only 10% of the total

number of domestic suppliers (Dodwell, 1997). The *new keiretsu* is clearly heavily concentrated and is dominated by a few core Japanese suppliers, with transplants across the globe.

An adjunct to this data is the regional density patterns of supplier offshore affiliates, which are reported in Table (4.8). The first column gives the number of supplier firms in the Corporate Group, with manufacturing operations in the region. The second column provides the mean number of affiliates per supplier, while the third column indicates the number of supplier firms with more than one affiliate in the region. Both columns (2) and (3) indicate the degree of regional industrial concentration in the *new keiretsu*, and the regional division of labour within the Group's operations. The column(s) (4) to (6) are correlation matrices of supplier affiliate numbers across the North American, European and East Asian economies. These correlation matrices try to capture the association between the number(s) of one (Group) supplier's affiliates in one region against the number of manufacturing operations the same firm has in another region[10]. Again there is a caveat to treat the value of correlation coefficient(s) with caution, given the data's small-sample properties and its qualitative nature. However, the fact that all but one of the correlation coefficients are positive and statistically different from zero, suggests that there is evidence that the number of one supplier's affiliates in one region is positively associated with the number of supplier affiliates that it has established in another. This may also indicate the recreation of specific Japanese OEM-supplier linkages across the globe (see also Martin et.al, 1994).

[10] For instance, the correlation coefficient for the number of individual Toyota Group suppliers' affiliates in East Asia against the same supplier firms' operations in Europe is calculated as 0.72. This is statistically significant at the 1% level.

4.4.4 Ownership of Supplier Affiliates

We now (briefly) present data on the actual ownership of the supplier affiliates. The data in Table(s) (4.9) provide details of the equity stake of the Japanese parent in the supplier affiliates in the North American, European and East Asian economies as at 31/12/1996. In the few cases, where there is more than one Japanese partner, the Japanese parent firm's equity position is defined as the sum of equity holdings of affiliated firms within the Corporate Group[11].

From the data in Table(s) (4.9), it is clear that the majority of Japanese supplier affiliates involve some form of joint venture with an indigenous supplier. The rationale for the joint ventures, particularly in the Western economies, is that indigenous (Western) suppliers saw the opportunity to gain access to (what were regarded) as superior Japanese technology and automotive products (Cusmano and Takeishi, 1991; Inkpen, 1994). For the Japanese participants, the opportunity of combining resources with (Western) indigenous suppliers eased the financing of new capital expenditure and, more significantly, widened their customer base to include European and Western OEMs. This allowed the transplant(s) to achieve greater economies of scale.

The Japanese equity involvement in the subsidiaries differs between Asia and those in North and Central America and Europe. In East Asia, a Japanese parent wholly owns only 10.3% of supplier affiliates and the majority of Japanese suppliers have an equity stake of less than 50% (see Table (4.9a)). This may reflect tighter government legislation on transnational equity participation within the region. For instance, in

[11] This approach is suggested by Beamish et.al (1997, p.22). The actual number of affiliates that had more than one Japanese partner was less than 2% of the total data set.

Malaysia, foreign investors have to follow strict guidelines and require special governmental authorisation before acquiring equity in indigenous firms. Until the 1997 Asian Crisis, similar arrangements were also in place in South Korea and other East Asian economies (see UNCTAD, 2000, p.147-151). However, in contrast to East Asia, the majority equity holder in both the North and Central America and European supplier affiliates are predominantly the Japanese participant(s). This can be expected, given the importance of control in the Japanese automobile industry, since majority ownership allows the core Japanese firms to direct operations. The nature of these joint venture relationships is examined, in further detail in Chapter (5).

4.5 Concluding Comments

In this Chapter, we have presented *new* data and *new evidence* on the *scale, pattern* and *scope* of the Japanese OEMs' global operations and the development of the *new keiretsu*. This data has allowed us to consider the role of Japan's automotive transnationals in the globalisation of the Japanese automobile industry.

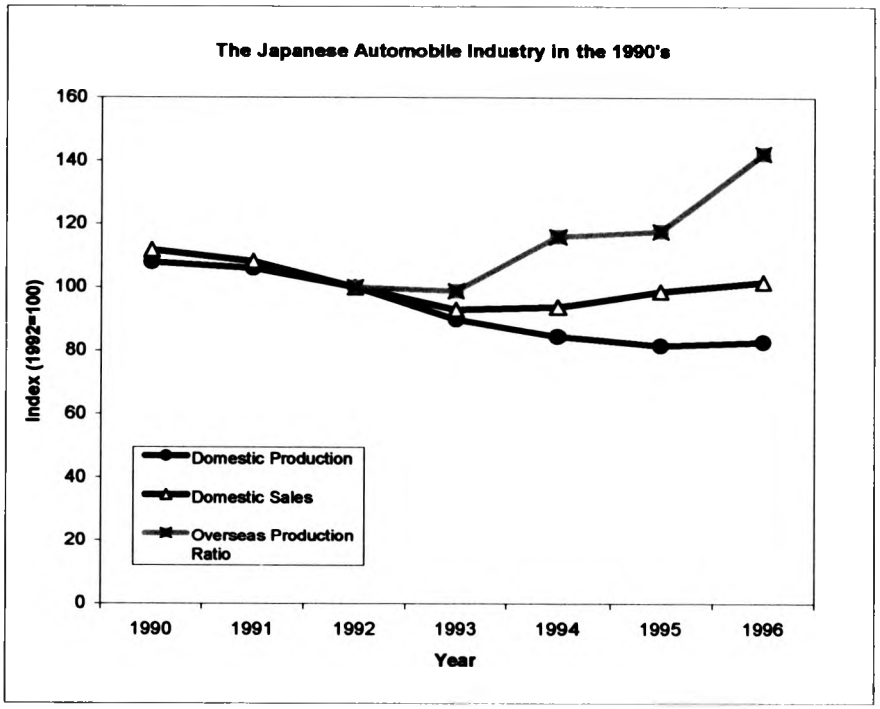
First, we focused upon the large Japanese OEMs, their strategic behaviour and overseas entry patterns. In this respect, there is evidence of strategic interdependence given the "bunching" overseas entry patterns of Japanese OEMs, which provides support for the Knickerbocker (1973) hypothesis. Second, we also considered the internationalisation of the Japanese auto-components industry. This was important, since Japan's OEMs have exploited their domestic control mechanisms and have been strategically developing their own transnational production networks - by directing their core suppliers to join a *new (overseas) keiretsu*. We noted that the majority of Japanese supplier subsidiaries involve joint ventures with indigenous suppliers.

However, in the Western economies, the Japanese participant has usually acquired majority ownership. This is important, since it allows Japanese suppliers to maintain control and to take the initiative in the resolution of conflict (see Chapter (5)).

The *new keiretsu* comprises, at most, only 10% of the domestic Japanese auto-components industry and consists of both Group and Independent suppliers. These suppliers are "few" in actual number and, typically, the same suppliers have production facilities in each of the main automobile markets: East Asia, North and Central America and Europe. In short, the *new keiretsu* is seen as recreating important Japanese OEM-supplier linkages around the globe. This is important since these linkages help to re-enforce the OEMs' control mechanisms with their suppliers, at an international level. They also help to maintain the OEMs' specific (competitive) advantages, which relate to the "close ties" that are typical of Japanese OEM-supplier relationships. The *new keiretsu* also provides the Japanese OEM with an international division of labour. This is also important, since, as we will see in Chapter (5), it provides the OEM with greater control over international wage bargaining.

Figure (4.1)

Domestic Output, Sales and Overseas Production in the Japanese Automobile Industry (1990-1996)



Sources: American Automobile Manufacturers Association (1998)
Dodwell Marketing Consultants (1997)

Table (4.1) Profiles of Japanese Original Equipment Manufacturers (OEMs) - Affiliated Domestic and Overseas Manufacturing Transplants

Main Assembler	Asia & Middle East	North & Central America	Europe	South America	Oceania
Toyota (est 1937). *(Major shareholder – Toyoda Autoloom 5.2%)*	**Thailand (1962):** *JV (60%). Mfg. of cars.* 147,326 units (1996): 67% Local Prod.			**Brazil (1959):** *(100%) Mfg of CV's.* 3,203 units (1996): Local Prod (100%).	
Plants in Japan: *Honsha, Motomachi, Takaoka, Tsutsumi, Tahara, Kamigo, Kyushu. Mfg. of cars, engines & CV's.*	**Malaysia (1968):** *JV (Equity n.a). Mfg. of Cars.* 29,395 units (1996): 12% Local Prod.			**Peru (1967):** *JV (49%) with Mitsui. Mfg of Cars.* 310 units (1996): Local Prod (n.a)	**New Zealand (1965):** *(100%). Mfg. of Cars.* 9,982 units (1996): Local Prod (n.a.) **Closed 1997.**
In addition, Toyota also entrusts production to seven affiliated companies: Toyoda Automatic Loom Works, Toyoda Auto Body, Kanto Auto Works, Hino Motors, Daihatsu, Gifu Auto Body, Central Motor.	**Indonesia (1971):** *JV (49%) with Astra Motors. Mfg of CV's, cars & engines.* 74,761 units (1996): 77% Local Prod.		**Portugal (1972):** *JV (27%) with Salvador Caetano. Mfg. of CV's.* 5,475 units (1996): 59% Local Prod.	**Ecuador (1979):** *(Equity n.a.) Mfg of cars.* 1,286 units (1996): Local Prod (n.a.).	**Australia (1977):** *(100%). Mfg of Cars, engines.* 67,609 units (1996): 100% Local Prod.
With in-house production, Joint Ventures (JV's) and contracting out, Toyota has access to manufacturing facilities at 36 sites in 26 countries.	**Bangladesh (1982):** *(Equity n.a.) Mfg of CV's.* **Taiwan (1984):** *JV (22%) with Hino & Kuosui. Mfg. of CV's, cars.* 79,071 units (1996): 100% Local Prod	**USA (1984):** *JV (50%) with GM. Mfg. of Cars.* 299,993 units (1996): 100% Local Prod.		**Venezuela (1989):** *JV (90%) with Inversiones. Mfg of Cars.* 9,730 units (1996): Local Prod (n.a.).	
In 1997, Toyota purchased a 27.8% stake in ***Toyota South Africa.*** *The amount was the largest single Japanese manufacturing investment in Africa. The plant manufactures cars and output was 92,402 units in 1996 (92% Local Production).*	**India (1985):** *(Equity n.a.) Mfg of cars.*1,681 units (1996): 100% Local Prod. **Philippines (1988):** *JV (25%) with Met. B&T. Mfg. of Cars. 36,867 units (1996):* 45.9% Local Prod.	**USA (1988):** *(100%). Mfg. of Cars.* 385,652 units (1996): 100% Local Prod.	**UK (1992):** *(100%). Mfg of Cars & Engines.* 117,109 units (1996): 100% Local Prod.	**Colombia (1992):** *(Equity n.a) Mfg. of CV's.* 8,669 units (1996): Local Prod (n.a).	
Overseas production ratio (1998): 34%	**Thailand (1988):** *JV (40%) with Siam Motors.Mfg. of Engines.*	**Canada (1988):** *(100%). Mfg. of Cars.* 97,344 units (1996): 100% Local Prod.			
Notes: *Output totals for 1996 taken from Bursa et.al (1998). Local Production ratio refers to the proportion of vehicles manufactured locally where the value of parts imported from Japan was less than 60% of total value of parts in the vehicle.*	**China (1991):** *JV (Equity n.a.) Mfg of cars. 5,101* units (1996): Local Prod (n.a.) **Pakistan (1993):** *(Equity n.a.) Mfg of cars.* 8,543 units (1996): Local Prod (n/a).		**Turkey (1994):** *JV (40%) with Sabanci.Mfg of Cars.* 26,036 units (1996): 100% Local Prod.		
Sources: *Toyota Company Reports, Bursa et.al (1998), Dodwell (1997), MIRA (1997).*	**Thailand (1996):***(Equity n.a.)* Mfg of Cars. **Vietnam (1996):** *(Equity n.a.) Mfg of Cars.* 210 units (1996): Local Prod (n.a) **Philippines (1997):** *(Equity n.a).* Mfg of Cars. **Taiwan (1998):** *(Equity n.a) Mfg. of Cars.* **India (1999):** *JV (74%) with Kirloskar. Mfg of Cars.*	**Canada (1998):** *(Equity n.a)* Mfg of Cars. **USA (1998):** *(100%) Mfg. of CV's.* **USA (1998):** *(100%) Mfg. of Engines.* **USA (1999):** *(100%). Mfg. of Cars.*	**Russia (1999):** *(Equity n.a) Announced possible Mfg of CV's.* **France (2000):** *(100%). Mfg of Cars.*	**Argentina (1997):** *(Equity n.a)* Mfg. of cars **Brazil (1999):** *(Equity n.a.) Announced possible Mfg of Cars*	

Table (4.1) (cont) Profiles of Japanese Original Equipment Manufacturers (OEMs) - Affiliated Domestic and Overseas Manufacturing Transplants

Main Assembler	Asia & Middle East	North & Central America	Europe	South America	Oceania
Daihatsu Motor (est 1907) *(Major shareholder – Toyota 51.1%).* **Plants in Japan:** *Ikeda, Kyoto, Shiga, Toda, Ryuo. Mfg. of Mini Cars, compact cars & CV's.* **Overseas production:** *Through, JV's and contracting out, Daihatsu utilises facilities at 13 sites in 10 countries.* **Notes:** Unfortunately, transplant output data or capacity details are unavailable. **Sources:** *Daihatsu Company Reports, Dodwell (1997).*	**Indonesia (1992):** *JV (20%) with Astra Int.* *Mfg. of CV's* **Malaysia (1993):** *JV (20%). Mfg of Mini cars*		**Italy (1991):** *JV (49%) with Piaggio. Mfg. of CV's.*		
Hino Motors (est 1942) *(Major Shareholder – Toyota 20.5%)* **Plants in Japan:** *Hino, Hamaura, Nitta. Mfg. of CV's.* **Overseas production:** *Through JV's and contracting out, Hino utilises 25 overseas sites for production of CV's.* **Notes:** Unfortunately, transplant output data or capacity details are unavailable. **Sources:** *Hino Company Reports, Dodwell (1997).*	**Thailand (1965):** JV (65%) with Mitsui. *Mfg of CV's.* **Indonesia (1982):** *JV (30%) with Unicor and Sumitomo Corp.Mfg of engines & CV's.* **Taiwan (1984):** *JV (25%) with Toyota and Kuosui.* *Mfg. of CV's.*				
Fuji Heavy Industries (est 1953) *(Major Shareholder- Nissan owns a 4.2% stake).* **Plants in Japan:** *Isesaki, Yajima, Ohta-Kita, Ohizuma, Mitaka.* *Mfg. of Small Cars, CV's & Engines.* **Overseas production:** *Through JV's, FHI utilises facilities in 2 countries.* **Notes:** Unfortunately, transplant output data or capacity details are unavailable. **Sources:** Fuji Heavy Industries Company Reports, *Dodwell (1997).*	**Taiwan (1986):** *JV (45%) with Taiwan Vespa. Mfg of Small Cars & CV's.* Ann.Cap: 42,000 units.	**USA (1989):** *JV (51%) with Isuzu. Mfg of Small Cars & CV's.* Ann. Cap: 170,000 units.			

Table (4.1) (cont) Profiles of Japanese Original Equipment Manufacturers (OEMs) - Affiliated Domestic and Overseas Manufacturing Transplants

Main Assembler	Asia & Middle East	North & Central America	Europe	South America	Oceania
Nissan (est 1933) *(Major Shareholder-Renault 36.8%)* **Plants in Japan:** *Oppama, Murayama, Tochigi, Kyushu, Yokohama, Fuji, Iwaki. Manufacture of cars and CV's.* *In addition Nissan subcontracts assembly to three affiliated companies: Nissan Diesal, Nissan Shatai & Aichi Machine Industry.* **Overseas production:** *Through inhouse production, JV's and contracting out, Nissan utilises manufacturing facilities at 22 sites in 19 countries.* *In 1997, Nissan purchased a 50% stake in Nissan SouthAfrica. The plant manufactures cars. There is also a* **much smaller Nissan plant in Zimbabwe.** **Overseas production ratio (1999): 38%** **Notes: Where available, Annual transplant Capacity** *estimates for 1996 are reported from Dodwell (1997).* **Sources:** *Nissan Company Reports, Bursa et.al (1998), Dodwell (1997), MIRA (1997). Dicken (1998).*	**Taiwan (1959):** *JV (25%) with Yue Loong. Mfg. of Cars and CV's.* **Ann. Cap: 73,000 units.** **Malaysia (1976):** *(Equity n.a). Mfg of cars.* **Thailand (1977):** *JV (25%) with Siam Motors. Mfg. of Cars, CV's and Engines* **Philippines (1983):** *JV (23%) with DMG. Mfg. of Cars.* **Iran (1983):** *(Equity n.a.) Mfg of Cars.* **China (1994):** *(Equity n.a.) Mfg. of Cars.* **Vietnam (1994):** *JV (75%) with Danang. Mfg. of CV's.* **Indonesia (1996):** *JV (35%). Mfg. of Cars.* **Indonesia (2000):** *Possible JV with Salim Group.Mfg of Engines.*	**Mexico (1966):** (100%). *Mfg. of Cars, CV's & Engines.* Ann. Cap: 100,000 units. **USA (1983):** *(100%). Mfg of Car and CV's.* Ann. Cap: 700,000 units. **USA (1998):** *(Equity n.a.) Possible new plant to mfg.cars.*	**Spain (1983):** *(100%). Mfg of Cars and CV's.* Ann.Cap: 120,000 units. **UK (1986):** *(100%). Mfg of Cars.* Ann. Cap: 300,000 units.	**Ecuador (1987):** *(Equity n.a.). Mfg of Cars.*	**New Zealand (1975):** *(100%). Mfg. of Cars and CV's.* **Closed 1997.**
Nissan Diesal (est 1950) *(Major Shareholder-Renault 22.5%, Nissan Motor 22.5%).* **Plants in Japan:** *Ageo, Gunma. Mfg. of CV's.* **Overseas production:** *Through JV's Nissan Diesal utilises facilities in 3 countries.* **Notes: Unfortunately, transplant output data or capacity details are unavailable.** **Source:** *Dodwell (1997).*	**Thailand (1987):** *JV (30%) with Siam. Mfg.of CV's.* **Phillipines (1991):** *JV (30%) with Columbian. Mfg. of CV's.* **Pakistan (1996):** *JV (15%).* **Mfg. of CV's.**				

Table (4.1) (cont) Profiles of Japanese Original Equipment Manufacturers (OEMs) - Affiliated Domestic and Overseas Manufacturing Transplants

Main Assembler	Asia & Middle East	North & Central America	Europe	South America	Oceania
Honda (est. 1948) *(Major Shareholder – Mitsubishi Trust 5.7%).* **Plants in Japan:** *Sayama, Wako, Mohka, Takanezawa, Hamamatsu, Suzuka, Kumamoto. Mfg. of Cars, CV's and Engines.* **Overseas production:** *With in-house production, JV's and contracting out, Honda has access to 89 manufacturing facilities in 33 countries.* **Overseas production ratio (1997): 51%** **Notes:** Where available, *Annual Capacity estimates for 1996 taken from Bursa et.al (1998) and Dodwell (1997) for North American operations.* **Sources:** *Honda Company Reports, Bursa et.al (1998), Dodwell (1997), MIRA (1997).*	**Taiwan (1961):** *JV (Equity n.a). Mfg. of Cars.* Annual Capacity: 60,000 units **Thailand (1967):** *JV (60%). Mfg. Cars/Engines.* Annual Cap: 60,000 units **Indonesia (1986):** *JV (55%) with Prospect Motor. Mfg. of Engines.* Ann. Cap: 14,400 units **India (1988):** *JV (33%) with Shiram. Mfg of Power Equip.* Annual Cap: 120,000 units **Malaysia (1989):** *JV (22.5%). Mfg. of Cars.* Annual Cap: 15,000 units **Philippines (1990):** *JV (47%) with Mitsubishi Corp. Mfg of Cars.* Ann. Cap: 30,000 units **Philippines (1992):** *(100%). Mfg of Engines.* Ann. Cap: 24,000 units. **Pakistan (1994):** *JV (51%). Mfg of cars.* Ann. Cap: 6,000 units. **India (1997):** *JV (90%) with Siel Ltd. Mfg of Cars.*	**USA (1979):** *(100%). Mfg. of Cars & Engines.* Ann. Cap: units. **USA (1985):** *(100%). Mfg of Engines.* Ann. Cap: 750,000 units. **Canada (1986):** (100%). *Mfg. of Cars* Ann. Cap: 120,000 units. **USA (1989):** *(100%). Mfg of Cars.* Ann. Cap:	**UK (1989):** *(100%) Mfg. of Engines.* Annual Cap: 200,000 units **UK (1992):** *(100%) Mfg of Cars.* Annual Cap: 150,000 units **Turkey (1997):** *JV (Equity n.a) with Anadolu Endustri. Mfg. of Cars.* Ann. Cap: 10,000 units	**Brazil (1998):** (100%). *Mfg of Cars.* Annual Capacity (n.a)	**New Zealand (1988):** *(100%) Mfg. of Cars.* Annual Capacity: 72,000 units. **Closed 1997.**
Mazda (est 1920) *(Major Shareholder – Ford 33.4%)* **Plants in Japan:** Honsha, Ujina, Hofu **Mfg. of Cars & CV's.** **Overseas production:** *Through JV's and the relationship with Ford, Mazda is establishing a global presence.* **Notes:** Where available, *Annual Capacity estimates for 1996 taken from Dodwell (1997).* **Sources:** *Mazda Company Reports, Dodwell (1997), MIRA (1997).*	**Malaysia (1968):** *JV (32%) with Bintang. Mfg. of Cars.* **Thailand (1975):** *JV (40%) with Sukosol. Mfg. of CV's.* **Thailand (1998):** *JV (?%) with Ford. Mfg of CV's* **China (n.a):** *JV (17.5%). Mfg. of CV's.* Ann. Cap: 8,000 units **India (n/a):** *JV (15.6%) Mfg of CV's.*	**USA (1985):** *JV (50%) with Ford. Mfg of Cars.* Ann. Cap: 240,000 units		**Columbia (1984):** *JV (70%) with Sumitomo Corp. Mfg.of CV's.*	

Table (4.1) (cont) Profiles of Japanese Original Equipment Manufacturers (OEMs) - Affiliated Domestic and Overseas Manufacturing Transplants

Main Assembler	Asia & Middle East	North & Central America	Europe	South America	Oceania
Isuzu (est 1937) *(Major Shareholder -GM 49%).* **Plants in Japan:** *Kawasaki, Fujisawa, Tochigi, Hokkaido.* *Mfg. of CV's & Engines.* **Overseas production:** *Through JV's and contracting out and its relationship with GM, Isuzu has access to production facilities throughout the globe. In addition to the plants listed opposite, Isuzu also has a 20% stake in* **GM Egypt**, *which manufactures CV's, with an annual capacity of 2,000 units.* **Notes:** Where available, *Annual Capacity estimates for 1996 taken from Dodwell (1997).* **Sources:** *Isuzu Company Reports, Dodwell (1997), MIRA (1997).*	**Thailand (1966):** *JV (47.9%). Mfg. of CV's.* Ann. Cap: 150,000 units. **Malaysia (1984):** *JV(25%). Mfg. of CV's.* **Indonesia (1985):** *2 JV's (12.5% and 32.7% stakes with Pantja Motor). Mfg. of CV's and Engines.* Ann. Cap: 75,000 units. **Thailand (1988):** *JV (63%). Mfg. of Engines.* Ann. Cap: 120,000 units. **China (1995):** *JV (7.4%) with Qingling Motors. Mfg. of CV's.* Ann.Cap: 50,000 units. **Philippines (1995):** *JV (35%) with Mitsubishi Corp. Mfg. of CV's.* Ann. Cap: 7,000 units. **Vietnam (1995):** *JV (35%) with Saigon. Mfg of CV's*	**USA (1989):** *JV (49%) with Fuji Heavy. Mfg of Small Cars & CV's.* Ann. Cap: 90,000 units.	**UK (1987):** *JV (25%) with GM. Mfg of Sports Cars.* Ann. Cap: 60,000 units. **Poland (1999):** *(Equity?) Possible plant for Mfg. of CV's.* **Belgium (2000):** *(Equity?). Possible plant for Mfg. of CV's.* **Turkey (n.a):** *JV (20%). Mfg of CV's.* Ann. Cap: 7,500 units.		
Suzuki (est 1920) *(Major Shareholder -GM 9.9%).* **Plants in Japan:** *Kosai, Iwata, Ohsuka, Sagara.* *Mfg. of Small Cars, CV's and Engines.* **Overseas production:** *Through JV's and contracting out, Suzuki Motor has access to production facilities in 27 countries. In addition to the plants listed opposite, Suzuki also has a 20% stake in* **Suzuki Egypt**, *which manufactures small cars, with an annual capacity of 2,000.* **Notes:** Where available, *Annual Capacity estimates for 1996 taken from Dodwell (1997).* **Sources:** *Suzuki Company Reports, Dodwell (1997), MIRA (1997).*	**India (1983):** *JV (50%) with the Indian Govt. Mfg. of Cars.* Ann. Cap: 320,000 units. **Pakistan (1985):** *JV (67.2%). Mfg of Cars & CV's.* Ann. Cap: 30,000 units. **Malaysia (1986):** *JV (49%) with Hitcom. Mfg of Engines.* **Indonesia (1991):** *JV (49%) with Sarim. Mfg of CV's.* Ann. Cap: 70,000 units. **China (1993):** *JV (35%) with Changan Motors.Mfg of Cars.* **Vietnam (1995):** *JV (35%) with Vikyno. Mfg. of CV's.* **Philippines (1997):** *(Equity n.a).* Mfg.of Cars	**Canada (1989):** *JV (50%) with GM. Mfg. of Cars.* Ann. Cap: 200,000 units	**Hungary (1992):** *JV (50%) with Auto Concern. Mfg. of Cars.* Ann. Cap: 50,000 units.		

Table (4.1) (cont) Profiles of Japanese Original Equipment Manufacturers (OEMs) - Affiliated Domestic and Overseas Manufacturing Transplants

Main Assembler	Asia & Middle East	North & Central America	Europe	South America	Oceania
Mitsubishi Motors (est 1970) *(Major Shareholder: Daimler-Chrysler 34%)* **Plants in Japan:** *Nagoya, Ohe, Okazaki, Mizushima, Kyoto, Shiga, Kawasaki, Maruko, Nakatsu. Mfg. of Cars, CV's & Engines.* **Overseas production:** *With in-house production, JV's and contracting out, Mitsubishi has access to 14 manufacturing facilities in 13 countries.* **Overseas production ratio (1998):** 35% **Notes:** *Output totals for 1996 taken from Bursa et.al (1998). No data available on Local Production ratio.* **Sources:** *Mitsubishi Motors Company Reports, Bursa et.al (1998), Dodwell (1997), MIRA (1997).*	**Indonesia (1975):** *JV (32%) with Krama Yudha. Mfg. of Engines.* 75,100 units (1996) **Malaysia (1983):** *JV (8%) Mfg of Cars.* 173,000 units (1996). **Taiwan (1986):** *JV (15.9%) Mfg of Cars.* 79,000 units (1996). **Philippines (1987):** *JV (50%) with Nissho Iwai. Mfg of Cars* 37,800 units (1996). **Thailand (1987):** *JV (98%) with Sittipol. Mfg of Cars.* 87,100 units (1996). **Vietnam (1995):** *JV (25%) with Proton. Mfg. of Cars.* 200 units (1996). **China (1998):** *JV (49%) with Harbin Dong-An. Mfg of Engines.*	**USA (1988):** *JV (92.5%). Mfg of Cars.* 193,000 units (1996).	**Portugal (1982):** *(100%). Mfg. of CV's.* 5,600 units (1996). **Netherlands (1995):** *JV (33.3%) with AB Volvo. Mfg. of Cars.* 44,400 units (1996).	**Columbia (n.a.):** *(Equity n.a.). Mfg of cars.* 4,200 units (1996). **Venezuela (n.a.):** *(Equity n.a.). Mfg. of cars.* 3,400 units (1996).	

Sources: Bursa et.al (1998), Dodwell Marketing Consultants (1997), Motor Industry Research Association (1997), Company Reports.

Notes:

i). Country name indicates the location of the transplant.

ii). N.A. refers to data not available.

iii). Where available, the first figure after the date, shows the parent Japanese OEM's equity stake (in parenthesis).

iv). JV indicates Joint Venture. Where known, the Japanese OEM's joint venture partner(s) are stated.

v). CV's indicate the production of commercial vehicles.

vi). Where known, actual production figures, for the transplant, are stated for 1996. Alternatively, and where available, annual capacity estimates are reported from Dodwell (1997). Annual capacity data should not be taken as indicative of annual production runs.

vii). An example of how to read an entry is as follows: Consider **Mitsubishi's** entry: **Netherlands (1995):** *JV (33.3%) with AB Volvo. Mfg. of Cars.* 44,400 units (1996). This should be read as Mitsubishi had a 33.3% stake in a Joint Venture with AB Volvo, to manufacture passenger cars in the Netherlands. Manufacturing operations began in 1995. In 1996, 44,400 vehicles rolled off the assembly line.

Table (4.2)

Examining the Knickerbocker (1973) Hypothesis:
Correlation between the dispersion of Japanese OEM Plants, by Economic Region

Table (4.2a)
Correlation Matrix of Dispersion of Japanese OEM plants as at 30/6/2000

	Toyota	Nissan	Honda	Mitsubishi Motors
Toyota	1.00			
Nissan	**0.82**	1.00		
Honda	**0.89**	**0.81**	1.00	
Mitsubishi Motors	**0.86**	**0.90**	**0.74**	1.00

Table (4.2b)
Correlation Matrix of Dispersion of Japanese OEM plants as at 31/12/1980

	Toyota	Nissan	Honda	Mitsubishi Motors
Toyota	1.00			
Nissan	**0.56**	1.00		
Honda	**0.40**	**0.93**	1.00	
Mitsubishi Motors	N/A	N/A	N/A	1.00

i) Table(s) (4. 2a and b) show the correlation coefficient r, between the global (regional) dispersion of Japanese OEM plants, as at 31/12/1996. All the bivariate relationships are calculated on the basis of the regional location of Japanese OEM manufacturing operations as highlighted in Table (4.1). These correlation coefficients attempt to capture the global strategic rivalry, between Japan's four major OEM's. Correlations for Mitsubishi were not calculated for 1980, since it only had one overseas plant in operation at that time, and is therefore an outlier. All correlations are statistically significant at the 1% level.

ii) It was felt that it was better capture global strategic interaction on a regional basis, rather than a country basis, since OEM's typically regard regions as strategic locations for global production. To allow for sufficient degrees of freedom, nine "economic regions" were used, based upon geography and viable trading areas. The regions were North and Central America, South America, the EU, non-EU economies, the Pacific Rim economies, China, West Asia, Africa, and Oceania. China and West Asia (i.e. operations in India and Pakistan) were not amalgamated as a "region" with the Pacific Rim economies, because they are areas, which have only recently begun to open their trading borders and are regarded strategically as separate sites (UNCTAD, 2000). For a similar reason, OEM operations in EU and non-EU countries were not amalgamated together. Given that the first overseas OEM affiliate was in 1959, and the data in Table (4.1) ends at 2000, it was felt that 1980 might be reasonable benchmark date with which to compare strategic behaviour.

Table (4.3) Global Entry Patterns of Japanese Auto-Suppliers' Manufacturing Affiliates

Table (4.3a): Entry Patterns of Japanese Auto-Suppliers' Manufacturing Affiliates in Asia

	Pre 1966	1966-1970	1971-1975	1976-1980	1981-1985	1986-1990	1991-1996	Unknown	Total
All Firms									
China	1	0	0	0	0	5	13	3	22
Hong Kong	0	0	1	0	0	0	1	0	2
India	0	1	2	0	3	4	0	0	10
Indonesia	0	0	5	8	3	15	8	5	44
Malaysia	0	2	6	6	7	7	1	4	33
Philippines	0	0	0	3	1	3	6	2	15
Singapore	2	0	5	8	0	2	0	1	18
South Korea	0	0	5	6	4	16	2	5	38
Taiwan	1	11	4	11	9	24	1	2	63
Thailand	6	5	12	5	4	11	7	14	64
Vietnam	0	0	0	0	0	0	1	0	1
Total	10	19	40	47	31	87	40	36	310

Table (4.3b): Entry Patterns of Japanese Auto-Suppliers' Manufacturing Affiliates in Europe

	Pre 1966	1966-1970	1971-1975	1976-1980	1981-1985	1986-1990	1991-1996	Unknown	Total
All Firms									
Belgium	0	0	0	0	0	2	2	0	4
France	0	0	0	0	1	1	2	1	5
Germany	1	0	1	2	3	1	0	0	8
Italy	0	0	0	0	0	2	0	0	2
Hungary	0	0	0	0	0	0	1	0	1
Netherlands	0	0	0	0	2	2	1	0	5
Portugal	0	0	0	0	0	1	0	0	1
Slovak Republic	0	0	0	0	0	0	1	0	1
Spain	0	0	0	2	1	5	1	1	10
Sweden	0	0	0	0	0	0	1	0	1
Turkey	0	0	0	0	0	0	1	0	1
UK	0	0	2	1	1	13	10	3	30
Total	1	0	3	5	8	27	20	5	69

Table (4.3c): Entry Patterns of Japanese Auto-Suppliers' Manufacturing Affiliates in North and Central America

	Pre 1966	1966-1970	1971-1975	1976-1980	1981-1985	1986-1990	1991-1996	Unknown	Total
All Firms									
Canada	0	2	1	0	2	12	1	1	19
Mexico	0	0	0	1	3	5	5	0	14
USA	1	2	8	7	25	111	19	15	188
Total	1	4	9	8	30	128	25	16	221

Table (4.3d): Entry Patterns of Japanese Auto-Suppliers' Manufacturing Affiliates in South America

	Pre 1966	1966-1970	1971-1975	1976-1980	1981-1985	1986-1990	1991-1996	Unknown	Total
All Firms									
Brazil	1	1	4	2	2	0	1	0	11
Columbia	0	0	0	0	0	0	1	0	1
Total	1	1	4	2	2	0	2	0	12

Table (4.3e): Entry Patterns of Japanese Auto-Suppliers' Manufacturing Affiliates in Oceania

	Pre 1966	1966-1970	1971-1975	1976-1980	1981-1985	1986-1990	1991-1996	Unknown	Total
All Firms									
Australia	1	0	4	1	2	4	0	0	12
New Zealand	0	0	0	0	0	1	0	0	1
Total	1	0	4	1	2	5	0	0	13

Source: Dodwell Marketing Consultants (1997)

Notes:

1). The data shows the number of supplier manufacturing affiliates established during each five-year period.

Table (4.4) Entry Patterns of Japanese Auto-Suppliers' Manufacturing Affiliates by Corporate Group

Table (4.4a) Entry Patterns of Japanese Auto-Suppliers' Manufacturing Affiliates in East Asia (By "Group")

Group	Pre 1965	1966-1970	1971-1975	1976-1980	1981-1985	1986-1990	1991-1996	Unknown	Total
Toyota	0	0	1	4	6	16	6	4	36
%	0	0	2.5	8.5	19.4	17.2	15	11.1	11.6
Nissan	0	1	3	4	3	16	8	7	42
%	0	5.3	7.5	8.5	9.7	18.4	20	19.4	13.5
Honda	1	0	0	7	2	2	1	7	20
%	10	0	0	14.9	6.5	2.3	2.5	19.4	6.5
Mitsubishi	0	0	0	0	0	1	0	2	3
%	0	0	0	0	0	1.2	0	5.6	0.97
Other "Group"	0	0	1	0	1	3	1	2	8
Suppliers %	0	0	2.5	0	3.2	3.4	2.5	5.6	2.6
Independent	9	18	36	32	19	50	24	14	201
Suppliers %	90	94.7	87.5	68.1	61.2	57.5	60	38.9	64.8
All Suppliers	10	19	40	47	31	87	40	36	310

Source: Dodwell Marketing Consultants (1997).
Notes: i). The first number is a count, the second is a column %.
ii). The data shows the number of supplier manufacturing affiliates established by Corporate Group, in each five year period.

Table (4.4b) Entry Patterns of Japanese Auto-Suppliers' Manufacturing Affiliates in Europe (By "Group")

Group	Pre 1965	1966-1970	1971-1975	1976-1980	1981-1985	1986-1990	1991-1996	Unknown	Total
Toyota	1	0	1	0	1	5	2	1	11
%	100	0	33.33	0	12.5	18.5	10	20	15.9
Nissan	0	0	0	1	2	7	2	1	13
%	0	0	0	20	25	25.9	10	20	18.8
Honda	0	0	0	0	0	0	4	1	5
%	0	0	0	0	0	0	20	20	7.3
Mitsubishi	0	0	0	0	0	0	0	0	0
%	0	0	0	0	0	0	0	0	0
Other "Group"	0	0	0	0	0	1	2	0	3
Suppliers %	0	0	0	0	0	3.7	10	0	4.4
Independent	0	0	2	4	5	14	10	2	37
Suppliers %	0	0	66.66	80	62.5	51.9	50	40	53.6
All Suppliers	1	0	3	5	8	27	20	5	69

Source: Dodwell Marketing Consultants (1997). Notes:
i). The first number is a count, the second is a column %.
ii). The data shows the number of supplier manufacturing affiliates established by Corporate Group, in each five year period.

Table (4.4c) Entry Patterns of Japanese Auto-Suppliers' Manufacturing Affiliates in North and Central America

Group	Pre 1965	1966-1970	1971-1975	1976-1980	1981-1985	1986-1990	1991-1996	Unknown	Total
Toyota	1	1	0	0	1	23	2	2	30
%	100	25	0	0	3.33	17.9	8	12.5	13.57
Nissan	0	0	0	2	7	22	9	3	43
%	0	0	0	25	23.33	17.2	36	18.75	19.45
Honda	0	0	0	2	2	11	2	3	20
%	0	0	0	25	6.66	8.6	8	18.75	9
Mitsubishi	0	0	0	0	0	4	0	1	5
%	0	0	0	0	0	3.1	0	6.25	2.3
Other "Group"	0	0	0	0	0	7	1	5	13
Suppliers %	0	0	0	0	0	5.5	4	31.25	5.9
Independent	0	3	9	4	20	61	11	2	110
Suppliers %	0	75	100	50	66.66	47.7	44	12.5	49.8
All Suppliers	1	4	9	8	30	128	25	16	221
%									

Source: Dodwell Marketing Consultants (1997).
Notes:
i). The first number is a count, the second is a column %.
ii). The data shows the number of supplier manufacturing affiliates established by Corporate Group, in each five year period.

Table (4.5)
Distribution of Japanese Group Suppliers' Manufacturing Affiliates by Overseas Location as at 31/12/1996

Country \ Group	Toyota Group	Nissan Group	Honda Group	Mitsubishi Group	Other Group	Independent Suppliers	Total
China	4	3	0	0	1	14	22
Hong Kong	0	0	0	0	0	2	2
India	2	1	1	0	0	6	10
Indonesia	4	6	4	0	1	29	44
Malaysia	3	5	1	1	1	22	33
Philippines	3	2	1	0	0	9	15
Singapore	0	0	0	0	0	18	18
South Korea	3	4	0	1	2	28	38
Taiwan	10	17	4	0	0	32	63
Thailand	7	4	9	1	3	40	64
Vietnam	0	0	0	0	0	1	1
Asia	*36*	*42*	*20*	*3*	*8*	*201*	*310*
Belgium	0	0	0	0	2	2	4
France	3	1	0	0	0	1	5
Germany	1	0	0	0	0	7	8
Italy	1	0	0	0	0	1	2
Hungary	0	0	0	0	0	1	1
Netherlands	0	1	0	0	0	4	5
Portugal	0	0	0	0	0	1	1
Slovak Rep.	0	0	0	0	0	1	1
Spain	1	2	1	0	1	5	10
Sweden	0	1	0	0	0	0	1
Turkey	0	0	0	0	0	1	1
UK	5	8	4	0	0	13	30
Europe	*11*	*13*	*5*	*0*	*3*	*37*	*69*
Canada	3	0	2	0	5	9	19
Mexico	0	6	0	0	1	7	14
USA	27	37	18	5	7	94	188
North America	*30*	*43*	*20*	*5*	*13*	*110*	*221*
Brazil	3	0	1	0	0	7	11
Columbia	0	0	0	0	0	1	1
South America	*3*	*0*	*1*	*0*	*0*	*8*	*12*
Australia	3	1	0	0	0	8	12
New Zealand	0	0	0	0	0	1	1
Oceania	*3*	*1*	*0*	*0*	*0*	*9*	*13*
Total	83	99	46	8	24	365	625

Source: Dodwell Marketing Consultants (1997).

Table (4.6a)
Correlation Matrix for Dispersion of Japanese Automotive Affiliates (By Country) as at 31/12/96[i]

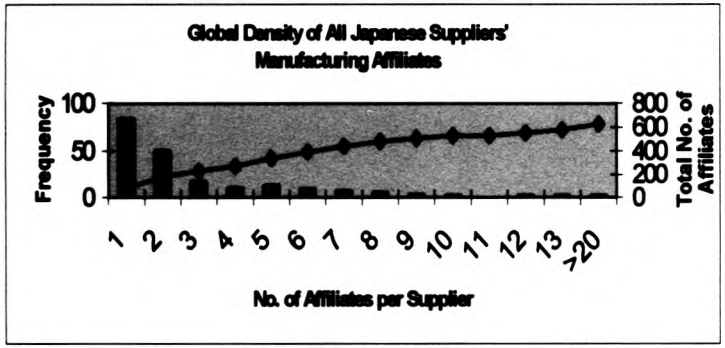
	All OEMs	Toyota	Nissan	Honda	Mitsubishi	Other OEMs	Independent Suppliers
Toyota Group Suppliers		0.51					0.94
Nissan Group Suppliers			0.44				0.91
Honda Group Suppliers				0.76			0.92
Mitsubishi Group Suppliers					0.32		0.89
Other Group Suppliers						0.33	0.76
All Group Suppliers							0.95
Independent Suppliers	0.65	0.50	0.41	0.69	0.42	0.51	1.00

Table (4.6b)
Correlation Matrix for Dispersion of Japanese Automotive Affiliates (By Region) as at 31/12/96[ii]

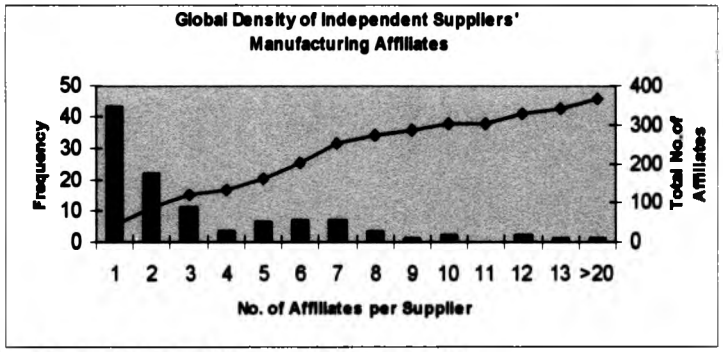
	All OEMs	Toyota	Nissan	Honda	Mitsubishi	Other OEMs	Independent Suppliers
Toyota Group Suppliers		0.69					0.95
Nissan Group Suppliers			0.75				0.93
Honda Group Suppliers				0.92			0.95
Mitsubishi Group Suppliers					0.51		0.78
Other Group Suppliers						0.44	0.81
All Group Suppliers							0.93
Independent Suppliers	0.92	0.80	0.92	0.95	0.84	0.87	1.00

Notes:
i) Table (4.6a) shows the correlation coefficient r, between the global (country) dispersion of OEM and supplier affiliates, by Corporate Group, as at 31/12/1996. All the bivariate relationships are calculated on the basis of the country location of Japanese automobile manufacturing production and on the basis of the data available, there were Japanese OEM and/or supplier operations in 36 countries outside Japan. All coefficients are statistically significant at the 1% level.
ii) Table (4.6b) shows the correlation coefficient r, between the global (regional) dispersion of OEM and supplier affiliates, by Corporate Group, as at 31/12/1996. All the bivariate relationships are calculated on the basis of the regional location of Japanese automobile manufacturing production. Nine regions were used, based upon geography and viable trading areas. They were North and Central America, South America, the EU, non-EU, the Pacific Rim economies, China, West Asia, Africa, and Oceania.
All coefficients are statistically significant at the 1% level.
iii) In each table, the final column reports the correlation coefficient between Independent supplier affiliates and Group supplier affiliates, thus capturing the strategic clustering of the new keiretsu . All the raw data was collated from Dodwell (1997) and is reported in Tables (4.1) and (4.3 to 4.5).

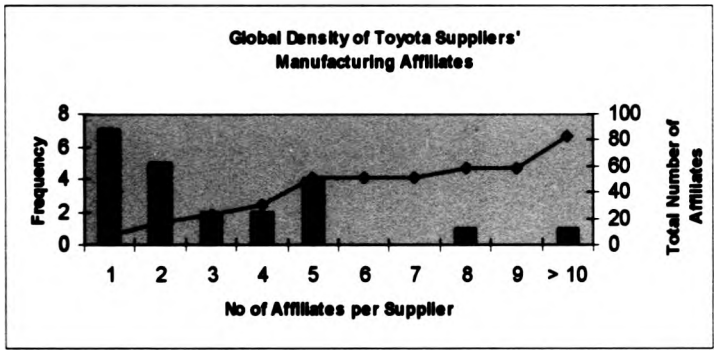
Figure (4.2) Global Density Patterns of Japanese Auto-Suppliers' Offshore Manufacturing Affiliates



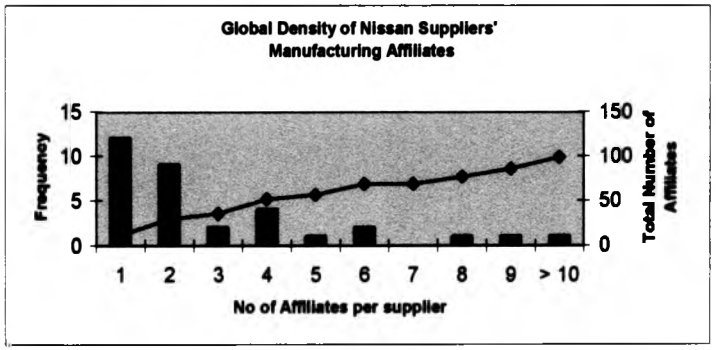
No of firms = 205, Mean = 3.05, s.d. = 3.22, Skewness = 2.44



No of firms = 109, Mean = 3.35, s.d. = 3.34, Skewness = 2.52



No of firms = 22, Mean = 3.77, s.d. = 4.78, Skewness = 1.04

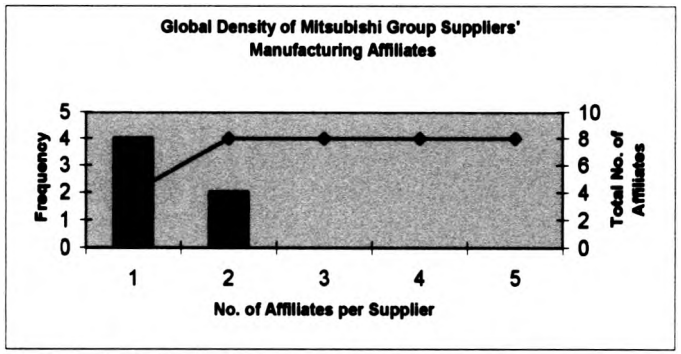


No of firms = 33, Mean = 3.0, s.d. = 2.72, Skewness = 1.64

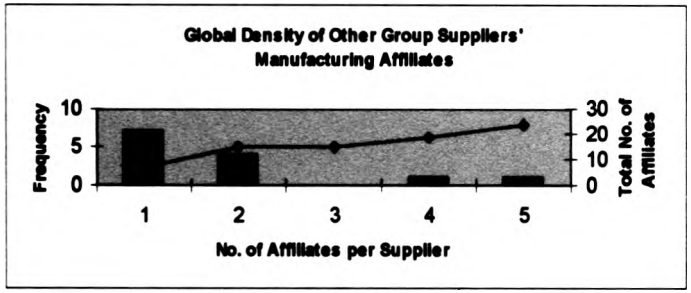
Figure (4.2) (Cont.)

Global Density Patterns of Japanese Auto-Suppliers' Offshore Manufacturing Affiliates

No of Firms = 22, Mean = 2.1, s.d. = 1.78, Skewness = 1.71



No of Firms = 6, Mean = 1.33, s.d. = 0.47, Skewness = 1.26



No of Firms = 13, Mean = 1.85, s.d. = 1.23, Skewness = 1.08

Notes: i) Source: Dodwell Marketing Consultants (1997)

ii) Skewness is calculated by $[n/(n-1)(n-2)]\ \Sigma[(x_i - \mu)/\sigma]^3$. Positive values indicate the distribution is skewed to the right. A value of 0 is indicative of a normal distribution.

Table (4.7)

The Global Concentration of the *New Keiretsu* Suppliers

The first number in each column shows the number of supplier firms that have affiliates in both regions. The figure in parenthesis indicate the number of transplants, in both regions, where these supplier firms have an equity stake e.g. There are 11 Toyota Group suppliers that, collectively, have 51 transplants located across East Asia and North/Central America.				
Group	**East Asia & North/Central America**	**East Asia & Europe**	**Europe & North/Central America**	**East Asia, Europe & North/Central America**
Toyota Group	**11 (51)**	**4 (26)**	**4 (21)**	**4 (37)**
Nissan Group	**18 (69)**	**6 (27)**	**7 (26)**	**6 (40)**
Honda Group	**11 (30)**	**2 (9)**	**3 (7)**	**2 (11)**
Mitsubishi Group	**2 (4)**	**0 (0)**	**0 (0)**	**0 (0)**
Other Group	**4 (10)**	**2 (6)**	**2 (6)**	**2 (9)**
Independent Suppliers	**45 (214)**	**21 (107)**	**24 (85)**	**19 (143)**

Source: Dodwell Marketing Consultants (1997)

Table (4.8) Regional Density Patterns of Japanese Suppliers' Offshore Manufacturing Affiliates as at 31/12/1996

Region	Number of Firms (1)	Mean & (Std. Dev) of Number of Affiliates (2)	Number of Firms with more than one affiliate in the region (3)	Correlation Coefficient(s) matrix of number of Supplier Affiliate Numbers across the Triad Region. This captures the relationship between the number(s) of one (Group) supplier's affiliates in one region against the number of operations it has in another region. The critical value & level of statistical significance is in parenthesis. Asia (4)	Europe (5)	North &Central America (6)
Asia						
Toyota Group	15	2.4 (1.9)	11	N/A	0.72 (1%; c.v. 0.3)	0.78 (1%; c.v. 0.3)
Nissan Group	24	1.75 (1.1)	11	N/A	0.62 (1%; c.v. 0.3)	0.74 (1%; c.v. 0.3)
Honda Group	14	1.43 (1.1)	2	N/A	0.55 (1%; c.v. 0.4)	0.44 (1%; c.v. 0.4)
Mitsubishi Group	3	1.0 (0)	0	N/A	N/A	0.42 (5%;c.v. 0.36)
Other Group	6	1.33 (0.5)	2	N/A	0.50 (1%; c.v. 0.25)	0.44 (1%; c.v.0.25)
Independent Suppliers	81	2.48 (1.9)	43	N/A	0.43 (1%; c.v. 0.23)	0.33 (1%; c.v.0.23)
All Suppliers	*143*	*2.17 (1.7)*	*69*	N/A	*0.53* (1%; c.v. 0.23)	*0.53* (1%;c.v. 0.23)
Europe						
Toyota Group	4	2.75 (1.5)	3	0.72 (1%; c.v. 0.3)	N/A	0.77 (1%; c.v. 0.3)
Nissan Group	8	1.63 (1.0)	3	0.62 (1%; c.v. 0.3)	N/A	0.47 (1%; c.v. 0.3)
Honda Group	4	1.25 (0.4)	1	0.55 (1%; c.v. 0.4)	N/A	0.11 (5%; c.v. 0.3)
Mitsubishi Group	0	0 (0)	0	N/A	N/A	N/A
Other Group	2	1.5 (0.5)	1	0.50 (1%; c.v. 0.25)	N/A	0.41 (1%; c.v.0.25)
Independent Suppliers	28	1.32 (0.7)	6	0.43 (1%; c.v. 0.23)	N/A	0.56 (1%; c.v.0.23)
All Suppliers	*46*	*1.5 (0.9)*	*14*	*0.53* (1%; c.v. 0.23)	N/A	*0.57* (1%; c.v 0.23)

Table (4.8) (cont.) Regional Density Patterns of Japanese Suppliers' Offshore Manufacturing Affiliates as at 31/12/1996

Region	Number of Firms (1)	Mean & (Std. Dev) of Number of Affiliates (2)	Number of Firms with more than one affiliate in the region (3)	Correlation Coefficient(s) matrix of number of Supplier Affiliate Numbers across the Triad Region. This captures the relationship between the number(s) of one (Group) supplier's affiliates in one region against the number of operations it has in another region. The critical value & level of statistical significance is in parenthesis. Asia (4)	Europe (5)	North &Central America (6)
North and Central America						
Toyota Group	18	1.67 (1.2)	7	0.78 (1%; c.v. 0.3)	0.77 (1%; c.v. 0.3)	N/A
Nissan Group	26	1.65 (0.8)	12	0.74 (1%; c.v. 0.3)	0.47 (1%; c.v. 0.3)	N/A
Honda Group	18	1.11 (0.3)	2	0.44 (1%; c.v. 0.4)	0.11 (5%; c.v. 0.3)	N/A
Mitsubishi Group	5	1.0 (0)	0	0.42 (5%; c.v. 0.36)	N/A	N/A
Other Group	11	1.18 (0.4)	2	0.44 (1%; c.v.0.25)	0.41 (1%; c.v.0.25)	N/A
Independent Suppliers	72	1.53 (1.1)	21	0.33 (1%; c.v.0.23)	0.56 (1%; c.v.0.23)	N/A
All Suppliers	*150*	*1.47 (0.9)*	*44*	*0.53* (1%; c.v. 0.23)	*0.57* (1%; c.v 0.23)	N/A
South America						
Toyota Group	3	1 (0)	0	N/A	N/A	N/A
Nissan Group	0	0 (0)	0	N/A	N/A	N/A
Honda Group	1	1 (0)	0	N/A	N/A	N/A
Mitsubishi Group	0	0 (0)	0	N/A	N/A	N/A
Other Group	0	0 (0)	0	N/A	N/A	N/A
Independent Suppliers	8	1 (0)	0	N/A	N/A	N/A
All Suppliers	*12*	*1 (0)*	*0*	N/A	N/A	N/A

Table (4.8) (cont.) Regional Density Patterns of Japanese Suppliers' Offshore Manufacturing Affiliates as at 31/12/1996

Region	Number of Firms (1)	Mean & (Std. Dev) of Number of Affiliates (2)	Number of Firms with more than one affiliate in the region (3)	Correlation Coefficient(s) matrix of number of Supplier Affiliate Numbers across the Triad Region. This captures the relationship between the number(s) of one (Group) supplier's affiliates in one region against the number of operations it has in another region. The critical value & level of statistical significance is in parenthesis. Asia (4)	Europe (5)	North & Central America (6)
Oceania						
Toyota Group	1	3 (0)	1	N/A	N/A	N/A
Nissan Group	1	1 (0)	0	N/A	N/A	N/A
Honda Group	0	0 (0)	0	N/A	N/A	N/A
Mitsubishi Group	0	0 (0)	0	N/A	N/A	N/A
Other Group	0	0 (0)	0	N/A	N/A	N/A
Independent Suppliers	7	1.28 (0.5)	2	N/A	N/A	N/A
All Suppliers	*9*	*1.44 (0.7)*	*3*	N/A	N/A	N/A

Source: Dodwell Marketing Consultants (1997)

Notes:

1) The first column gives the number of supplier firms in the Corporate Group with manufacturing operations in the region. The second column provides the mean number (and the standard deviation) of affiliates per supplier, while the third column indicates the number of supplier firms with more than one affiliate in the region.

The column(s) (4) to (6) are correlation matrices of supplier affiliate numbers across the Triad region. These try to capture the relationship between the number(s) of one (Group) supplier's affiliates in one region against the number of manufacturing operations the same firm has in another region. For instance, the correlation coefficient for the number of individual Toyota Group suppliers' affiliates in Asia against the same firms' operations in Europe is calculated as 0.72. This is statistically significant at the 1% level.

Table (4.9a) - Ownership Details of Japanese Auto-Suppliers' Manufacturing Affiliates in Asia ("by Group")

Group Ownership at 31/12/96	All Suppliers	Independent Suppliers	Toyota "Group"	Nissan "Group"	Honda "Group"	Mitsubishi "Group"	Other "Group"
Wholly Owned: 95-100%	**32**	**22**	**3**	**6**	**1**	**0**	**0**
	10.3	10.9	8.3	14.3	5	0	0
Majority Owned: 51-94%	**54**	**36**	**10**	**5**	**3**	**0**	**0**
	17.4	17.9	2.8	11.9	15	0	0
Co-owned: 50%	**27**	**18**	**2**	**6**	**1**	**0**	**0**
	8.7	9	5.6	14.3	5	0	0
Minority Owned: 5-49%	**161**	**111**	**17**	**18**	**8**	**1**	**6**
	51.9	55.2	47.2	42.8	40	33.3	75
Unknown	**36**	**14**	**4**	**7**	**7**	**2**	**2**
	11.6	7	11.1	16.6	35	66.6	25
All Subsidiaries	***310***	***201***	***36***	***42***	***20***	***3***	***8***

Table (4.9b) Ownership Details of Japanese Auto-Suppliers' Manufacturing Affiliates in Europe ("by Group")

Group Ownership (Equity Stake)	All Suppliers	Independent Suppliers	Toyota "Group"	Nissan "Group"	Honda "Group"	Mitsubishi "Group"	Other "Group"
Wholly Owned: 95-100%	**31**	**14**	**6**	**8**	**2**	**0**	**1**
	44.9	37.8	54.5	61.5	40	0	33.3
Majority Owned: 51-94%	**15**	**9**	**3**	**1**	**2**	**0**	**0**
	21.7	24.3	27.3	7.7	40	0	0
Co-owned: 50%	**2**	**1**	**0**	**1**	**0**	**0**	**0**
	2.9	2.7	0	7.7	0	0	0
Minority Owned: 5-49%	**16**	**11**	**1**	**2**	**0**	**0**	**2**
	23.2	29.7	9.1	15.4	0	0	66.6
Unknown	**5**	**2**	**1**	**1**	**1**	**0**	**0**
	7.3	5.4	9.1	7.7	20	0	0
Total number of Subsidiaries	***69***	***37***	***11***	***13***	***5***	***0***	***3***

Source: Dodwell Marketing Consultants (1997)

Table (4.9c) Ownership Details of Japanese Auto-Suppliers' Manufacturing Affiliates in North and Central America ("by Group")

Group Ownership at 31/12/96	All Suppliers	Independent Suppliers	Toyota "Group"	Nissan "Group"	Honda "Group"	Mitsubishi "Group"	Other "Group"
Wholly Owned: 95-100%	**98**	**57**	**14**	**16**	**7**	**0**	**4**
	44.3	51.2	46.7	37.2	35	0	30.8
Majority Owned: 51-94%	**49**	**24**	**4**	**12**	**7**	**0**	**2**
	22.2	21.8	13.3	27.9	35	0	15.4
Co-owned: 50%	**24**	**13**	**8**	**1**	**1**	**1**	**0**
	10.8	11.8	26.7	2.3	5	20	0
Minority Owned: 5-49%	**34**	**14**	**2**	**11**	**2**	**3**	**2**
	15.4	12.7	6.7	25.6	10	60	15.4
Unknown	**16**	**2**	**2**	**3**	**3**	**1**	**5**
	7.2	1.8	6.7	7	15	20	38.4
All Subsidiaries	***221***	***110***	***30***	***43***	***20***	***5***	***13***

Source: Dodwell Marketing consultants (1997)

Notes: i). The First number is a count, the second is a column %.

ii). The data in Table(s) (4.9) provide details of the equity stake of the Japanese parent in the supplier affiliates throughout the North American, Asian and European economies, as at 31/12/1996. In the few cases, where there is more than one Japanese partner, the Japanese parent firm's equity position is defined as the sum of equity holdings of affiliated firms within the Corporate Group. This approach is suggested by Beamish et.al (1997, p.22). The actual number of affiliates that had more than one Japanese partner was less than 2% of the total data set.

Chapter (5)

Relationships Inside the *New Keiretsu* - The Case of Japanese Auto-suppliers Based in the UK

5.1 Introduction

The analysis and data presented in Chapter (4) highlighted the extent to which Japan's automotive Original Equipment Manufacturers (OEMs) and their core suppliers have (strategically) been establishing transnational production networks - *the new keiretsu* - around the globe. The main aim of the *new keiretsu* has been to control and maintain the specific (competitive) advantages of the Japanese automobile industry, in international production. It was argued that these specific advantages primarily relate to the nature of the close relationships, which exist between the OEMs and their suppliers, within Japan's domestic industry. In order to replicate these relationships internationally, the nucleus of each of the major Japanese OEMs' *new keiretsu* consists of the same core (Japanese) players within each of the major regional trading blocs (see Chapter (4)).

The establishment of the *new keiretsu* raises some interesting questions, particularly relating to the extent to which Japanese business relations and industrial practices have been replicated at the operational level. While the nucleus of the *new keiretsu* resembles that in Japan, the *new keiretsu* also consists of a mix of Japanese and indigenous managerial staff and personnel, and also indigenous suppliers required for the supply of raw materials and other

inputs[1]. In some cases, Japanese suppliers have established joint ventures with indigenous manufacturers. These all involve developing new relationships with new employees and business partners, the majority of whom are generally unfamiliar with Japanese culture and industrial practices. Ultimately, the success of the *new keiretsu* and the ability of the Japanese automobile industry to protect its specific (competitive) advantages, in the global economy, lie within developing "close ties" with both these new and existing partners.

This Chapter explores a number of issues that arise from the various relationships within the *new keiretsu.* In considering these issues, we draw upon fieldwork research from a Case Study of the experiences of Japanese auto-suppliers, based in the UK. This involved interviews with 7 Managing Directors (MDs) and also a survey questionnaire that was completed by 27 Managing Directors/Senior Managers of UK based Japanese auto-suppliers. The questionnaire response rate was 71.1% (see Appendices (A) and (B), for further details). The Case Study is a first attempt to explore the operational experiences of Japanese auto-suppliers, at the affiliate level, in the UK. It allows us to derive direct insights into the strength and nature of the various relationships - within the Japanese automobile industry - that have evolved within the UK.

In particular, this Case Study considers the autonomy of affiliates, their relationships with their Japanese parent in decision-making and manufacturing operations and their experiences with the indigenous labour supply (Section

[1] In some regions (such as the EU), Japanese manufacturers have to abide by "rules of origin" and "local content rules" that insist upon a certain proportion of inputs being sourced within the region (Mackinnon, 1990).

(5.2)). We then explore the business relationships between the OEMs and their suppliers, and also the indigenous supply chain, noting differences between Group and Independent suppliers (Section (5.3)). Finally we consider the experience of the Japanese-European automotive joint ventures. Here, we note the potential for conflict between both participants and discuss how such conflicts may be resolved (Section (5.4)). We also compare our results with those of Inkpen (1994), who considered the performance of Japanese-North American joint ventures, in North America.

We should note that there are caveats with regards to our Case Study approach and that it would be unwise to generalise the results to make inferences about the experiences of Japanese supplier affiliates elsewhere. The results reported here, are based upon a survey of MDs from UK based Japanese suppliers. As such, they relate specifically to their experiences in the UK[2]. A further caveat is that some questions ask the MDs to quantify their experiences using a 7-point scale (see Appendix (B)). In these cases, the absence of comparable data-scores (e.g. from non-Japanese component suppliers) may preclude a wider interpretation of these results. Nevertheless, the insights gained from this Case Study are both important and useful, particularly since the UK is at the centre of the Japanese automobile industry's European operations (see Chapter (4)). Furthermore, in interview, almost all of the MDs had either visited and/or spent secondments at sister transplants in the USA and Japan. Apart from minor differences, the MDs' reported that business operations, in the US and Japanese transplants, were similar to those in the UK. In this respect, the UK transplants may be regarded as

[2] An attempt was made to survey MDs from US based affiliates. Unfortunately there was a poor response rate and the results are not reported here (See Appendix (A), for further details).

typical *new keiretsu* affiliates. The Case Study, therefore, provides an indication of the various transnational linkages and relations that exist within the *new keiretsu*, while also highlighting several of the control mechanisms used by Japanese OEMs in their global operations.

5.2 Affiliate Characteristics and Operations

5.2.1 Business Associations

The data in Table (5.1) provides details of the main characteristics of the UK based Japanese supplier affiliates in the sample. The affiliates S1-S13 have been or are still part of a joint venture between a Japanese supplier and an indigenous European component manufacturer. These joint venture relationships are examined in further detail in Section (5.4). The affiliates S14-S27 have always been wholly owned Japanese transplants.

In terms of Group suppliers, 13 of the 27 affiliates have Japanese parent(s) who could be identified as belonging to particular Japanese OEM Corporate Groups. The Japanese parents of the other 14 affiliates could be classified as Independent suppliers. As expected, the affiliates' main customers are the Japanese OEMs: Nissan (9 affiliates), Toyota (7) and Honda (6). There were 3 affiliates that regarded all the major Japanese OEMs as equally important, while 2 suppliers suggested other non-Japanese OEMs were their most important customer. The Japanese parent(s) of these 5 affiliates are all Independent suppliers.

5.2.2 Affiliate Relations with Headquarters

All the affiliates in the sample have one or more Japanese expatriates in the top 5 managerial and executive positions. This is not unusual since, compared to Western transnational corporations, Japanese transnationals have a higher than

average expatriate presence, particularly in the automobile industry (see also Harzing, 1999). The expatriates' main role is to ensure that the affiliates' organisational development is consistent with that defined by the Japanese parent firm. In this respect, the affiliates' management teams (which include non-Japanese executives) have significant operational control over manufacturing operations, although they are usually required to report semi-annually to the Japanese parent firm's Board of Directors in Japan. These reports assist the company's hierarchy in monitoring the affiliate's performance.

Approximately two-thirds of the MDs indicated that they were in regular communication with the affiliates' company headquarters in Japan, to discuss corporate strategy. These discussions are mainly focused upon the implementation of corporate strategy, at the affiliate level, rather than its formulation. Indeed, while affiliate executives are encouraged to proffer their advice and express their opinions, the MDs regard their actual influence upon corporate strategy as being minimal. In this respect, the MDs were asked to indicate their degree of influence over corporate strategy on a 7-point scale (where ascending points indicated higher influence)[3]. The mean score was 3.7 (s.d. 1.43) - at the lower to the middle end of the scale. There is a caveat in the wider interpretation of this result, given the absence of comparable data from Japanese affiliates elsewhere. Nevertheless, it appears that, in UK affiliates, corporate strategy follows a "top-down" approach, with affiliates being expected to comply with directives from headquarters. This would appear consistent with our hierarchical view of the Japanese transnational corporation (see Chapter (2)).

[3] Corporate strategies were identified as issues relating to the location of new investment, product development and production processes.

5.2.3 Manufacturing Operations

The activities of the affiliates in the sample range from the manufacture of complete sub-assemblies, such as vehicle bodies and air conditioning, to the production of less specialised components, such as aerials and bearings (see Table (5.1)). In almost all cases, the affiliates' main activities are primarily at the manufacturing end of the research-development-manufacturing continuum. Most of the basic research, design and the development and testing of prototypes are conducted in Japan. The affiliates are generally responsible for adhering to detailed specifications and the final production of the components.

In this respect, the affiliates are generally equipped with similar equipment to that used in Japanese factories, with tools and machinery that are manufactured and designed in Japan. However, the quality and flexibility of this equipment does vary between the affiliates. Some affiliates have the latest technology, while others are still relying upon older machinery that can reduce the efficiency of operations. The variance in the quality of capital depends mainly upon its age and also upon its activity rate. Machinery and equipment is usually replaced at the end of its useful life. This means that those affiliates with high production volumes have a high replenishment rate of their capital stock. Furthermore, those suppliers responsible for major sub-assemblies usually install new (specific) machinery when their major OEM introduces a new model cycle, which is between 4-8 years (Asanuma, 1989).

Given these observations about equipment, it was no surprise that 23 out of the 27 affiliates reported that their production processes were generally similar to

those practiced by their Japanese parent in Japan. This does not mean that each of the 23 affiliates employed *Just-In-Time* delivery systems, *kanban* and *kaizen quality control* processes. It does suggest, though, that whatever processes and procedures the parent firm follows in Japan, similar processes are adopted in the UK affiliate (see Chapter (2), Womack et.al, 1990). However, while it does appear that Japanese industrial processes are being replicated at the operational level, a number of MDs were concerned that their affiliate did not match the efficiency levels of their sister transplants in Japan. For some, this was because of inadequate machinery (see above), although a major factor related to the skill level and flexibility of the indigenous labour force. This latter point is discussed further, in Section (5.2.4).

Finally, although the affiliates generally have little input into actual product development, 15 of them did have access to their parent's Research and Development (R&D) centres within the European Union. A further 6 affiliates expected their Japanese parent to establish such facilities within the next 5 years. The main research that tends to be carried out in these R&D centres is primarily aimed towards adjusting and improving prototypes and products - that have been developed in Japan - for European specification. The majority of these R&D centres are in the UK, although for 3 affiliates, the main R&D facilities are in Germany (see Table (5.1)). In these 3 cases, the MDs indicated that their parent had comparable facilities in Japan and that research there was more basic and intensive, and revolved around actual product development. Interestingly, Germany was chosen as the preferred site for these R&D centres since it was perceived as having a technological advantage in product development,

particularly within the automobile industry. The Japanese OEMs and their suppliers see their German R&D centres as an opportunity to exploit German expertise in engineering.

5.2.4 *Relations with the Indigenous Labour Supply*

It was noted, in Section (5.2.3), that some MDs had concerns about the skill level and flexibility of the indigenous labour supply, which may, in turn, affect the affiliate's level of efficiency. As a measure of the "skills" of the indigenous labour force, the MDs were asked to rate the "skills level" of their employees using a 7-point scale. The mean score was 4.66 (s.d.1.03), which indicated that most MDs thought that their employees had an average ability to carry out required tasks. However, MDs also noted that the indigenous workforce were generally less flexible than comparable (Japanese) workers in Japan, particularly in the range of tasks and the degree of responsibility that they could cover.

The main problems appear to revolve around the nature of the UK labour market where, compared to Japan, there is a higher turnover of employees. As Abegglen and Stalk (1985) and Aoki (1990) have pointed out, the Japanese labour market is characterised by a system of lifetime employment, with employees usually remaining with one company throughout their entire career(s). This allows Japanese employees the time and opportunity to develop a range of skills and flexibility, through continuous (long-term) job rotation within the firm. However, the culture of "short-term" employment in the UK labour market, suppresses these possibilities, since a significant proportion of employees are unlikely to remain with their employer for a long enough period to develop a portfolio of

firm specific tasks. This problem is exacerbated in the UK's "tighter" labour markets, such as the Midlands and the South, where rival firms, in the machinery sector, have engaged in "poaching" the affiliates' key personnel. Indeed, one of the MDs major concerns was a shortage of qualified engineers, technicians and information technology staff. For the Japanese suppliers, these are all problems that would not necessarily be encountered in Japan. Consequently, it is difficult for the affiliates to recreate the long-term management-labour relationships that are regarded as a key part of Japan's industrial success (see also Abegglen and Stalk, 1985).

To overcome personnel shortages and to aid staff development, the affiliates have introduced some job rotation and encouraged "teams of workers" to develop problem-solving skills and to generate new ideas. Furthermore, at 25 of the 27 affiliates, employees are provided with assistance to study for applicable external qualifications to aid their development. In 7 cases, this assistance is conditional upon the employee fulfilling certain contractual obligations, such as remaining with the firm for a specified time[4]. At 17 of the affiliates, specialist employees are offered the opportunity of a secondment at the parent firm's transplants in Japan. Secondments are also used to internationally re-deploy specialist personnel - on a temporary basis - to complete specific tasks at affiliates around the globe. The secondments enable employees to develop their skills and experience, while also helping to establish a degree of loyalty and attachment to the company.

[4] We should note, however, that the majority of these employment practices are not unique to Japanese corporations. Indeed, they have become standard practices within UK (and Western) manufacturing.

We noted in Chapter (2) that, in Japan, Japanese corporations do not tend to deal with independent trade unions, but rather those that are "company sponsored" (Ruigrok and Van Tulder, 1995). It was argued that are these arrangements nullify the union's effective bargaining power. Not surprisingly, the Japanese affiliates tend to be non-unionised transplants. From the sample, only 10 affiliates officially recognised a trade union, while the other 17 did not. This situation is similar to the Japanese affiliates in the USA where, according to Dicken (1998), the majority of automotive transplants do not recognise trade unions. A non-unionised labour force may reduce the potential for conflict at the affiliate level, since employees are less likely to engage in organised protests. At the operational level, the affiliates' management monitor labour relations through regular (monthly) meetings between selected employees and managers to review operations and to resolve any grievances. The Japanese managerial style was also in evidence at 5 of the 7 transplants visited. These transplants had an open office lay out and both senior management and employees wore the same uniform. This was said to create a more informal working environment.

5.3 Affiliate Relationships with OEMs and the Indigenous Supply Base

5.3.1 Relationships along the Value Chain

As we have noted, an important feature of the Japanese automobile industry is the nature of the many close business relationships that exist between the OEMs and suppliers within Japan's domestic vertical keiretsu (Smitka, 1991). In the global economy, it was argued that these relationships are the source of the Japanese automobile industry's specific (competitive) advantages. We now

explore the extent to which these relationships have been replicated, at an operational level, within the *new keiretsu* of the UK.

In this respect, the MDs were first asked to indicate how "close" they regarded their relationship with the affiliate's main OEM. A "very close" relationship is described as one that involves regular discussion(s) between management and employees at the OEM and supplier transplants, on a significant number of operational issues. This would include regular communications, support and advice over component specification, equipment, production processes and "open-book accounting". These are practices that epitomise the (very) close ties in the Japanese automobile industry (see Chapters (2) and (4); Smitka, 1991). Some of these practices may also be part of a "close relationship" although in this case, the OEM has less direct involvement in the supplier's business operations. A "normal relationship" may reflect traditional Western OEM-supplier practice, where the supplier is required to meet the OEMs component specifications, but otherwise the supplier has a greater degree of independence over its own operations.

The nature of the supplier affiliates' relationship with their main OEM, as perceived by the MDs, is highlighted in Figure (5.1). Almost half of the MDs described the relationship with their main OEM as being "very close". The majority of these supplier affiliates had parents who were Group suppliers. Only 4 MDs indicated that their affiliate had a "close relationship" with their main OEM, while 11 MDs (mainly Independent suppliers) believed that their OEM relationship was "normal". A cross tabulation revealed that the Group supplier

affiliates were significantly more likely to be involved in either a "close" or "very close" relationship - with their main OEM - than the Independent supplier affiliates ($r = 0.43$, chi-sq = 5.21, $p < 0.025$)[5]. This is an expected result and is consistent with the strategic role that Group suppliers, in particular, play in Japan (see Chapter (4)). It appears that the close ties between Group suppliers and the OEMs are being sustained within the *new keiretsu*. In contrast, Independent suppliers have built up a wider clientele, which generally involves looser relationships with OEMs (see Chapter (4), Dodwell, 1997)[6].

An interesting extension to the OEM-supplier relationship is to consider relationships along the value chain, particularly those between the Japanese supplier affiliate(s) and their main indigenous input supplier(s). This is important since, for both the Japanese and the indigenous suppliers, the relationship may represent the first business association with a foreign company. In this respect, the relationship may involve some compromise, by both parties, since Japanese industrial organisation differs significantly from Western practices. These business relationship(s) were also examined by asking the MDs to indicate how "close" they regarded their relationship with the affiliate's main input supplier. The categories were the same as before - "very close", "close" and "normal". The responses are shown in Figure (5.1), with the majority of relationships being described as "normal". In these cases, the indigenous supplier has complete

[5] The first statistic is the correlation coefficient, Pearson's r, which provides information on the direction of association between the two variables. The second statistic is the test statistic. The third statistic indicates the level of statistical significance (see Appendix (C), for further details).
[6] As we pointed out in Chapter (4), it is not correct to assert that all Independent suppliers do not build up "close" relationships with OEMs. Indeed, within Japan, some Independent suppliers play an integral part in the domestic keiretsu (Dodwell, 1997). In our sample, for instance, 4 MDs from Independent suppliers indicated that their affiliate was involved in a "very close" relationship with the main OEM.

control over its own operations, with no direct involvement from the Japanese supplier.

Interestingly, the nature of these relationships was significantly different, depending upon whether or not the Japanese supplier belonged to a Corporate Group. A closer look at the data reveals that Group suppliers are more likely to have developed "close or very close" relationships with their main indigenous suppliers compared with Independent suppliers ($r = 0.48$, chi-sq = 6.38, $p < 0.025$, see also Figure (5.1(b))). We have already noted that the Group supplier affiliates have established "close or very close" relationships with their main OEM, and it now appears that they are trying to develop and establish similar relations further down the value chain. Indeed, Japanese suppliers who had a "close or very close" relationship with their main OEM also had a similar relationship with their main indigenous supplier ($r = 0.38$, chi-sq = 4.05, $p<0.05$).

As would be expected, those Japanese affiliates that do establish "close or very close" relationship(s) with their main supplier(s) are also most likely to introduce new Japanese techniques - such as *kaizen*, *Just-In-Time* delivery systems and *"open book accounting"* - to the indigenous supply base ($r = 0.55$, chi-sq = 8.22, $p<0.01$). In this respect, a Senior Manager of a Toyota Group supplier, acknowledged:

"We are in regular contact with our main supplier(s). However, the nature of our involvement often extends beyond product specification. As company policy, we undertake periodic audits of our supply chain. In effect, we provide our suppliers with a free consultancy service to try and identify cost savings. Our experts and those from Toyota review their operations; providing

advice on their equipment, production processes and even their choice of suppliers. Our supplier(s) generally co-operate since, although we do not generally operate a dual-sourcing policy, they realise that we can easily find an alternative supplier. However, the aim is to build a long-term relationship and this requires trust and co-operation on both sides".

It is clear that, in Europe at least, Group suppliers play a strategic role within the *new keiretsu,* particularly in developing and enhancing the close relations between OEMs and suppliers that are reminiscent of the domestic Japanese automobile industry. This helps to maintain and protect the industry's specific (competitive) advantages. We should also note, however, that these "close ties" are re-establishing the OEMs' domestic control mechanisms on an international level. The insistence upon Japanese industrial practices (e.g. *kaizen* and *Just-In-Time* delivery systems), effectively subordinate the supplier affiliates to use production processes, to suit the OEMs' requirements (see also Chapter (2)). The extension of these practices to also include the indigenous supply base would appear to widen the OEMs' span of control.

5.3.2 Affiliate Contracts, Pricing and Global Sourcing

A central characteristic of the OEM-supplier relationships are the negotiations that relate to contracts and prices for auto-components. Japanese contracts are generally less formal and more flexible than those encountered in the Western economies, although they will include some agreement over price and delivery schedules (Smitka, 1991). As we noted in Chapter (2), a system of "open book accounting" is usually employed, where an "agreed" or "target price" is set, after consultations between the OEM and the core supplier. The "target price" is based upon a detailed cost analysis of the supplier's manufacturing operations. There is

usually an expectation that the "target price" will fall over time, which encourages the supplier to reduce costs and generate productivity gains (Aoki, 1988, Smitka, 1991). In short, "open book accounting" and "target pricing" involves the OEM playing a significant role in the business of its core suppliers, with regular monitoring and audits of the latter's manufacturing operations (Smitka, 1991). We have argued, in Chapter (2), that the arrangements would appear to strengthen the bargaining position of the OEMs along the value chain (see also Ruigrok and Van Tulder, 1995).

The bargaining relationship at the affiliate level was examined by asking the MDs how their final bid prices for a contract would affect the "long-term" relationship with their main OEM, particularly when the bid price in question was regarded as being on the "high side". In response, 8 MDs revealed that there would be "no loss of work and that the OEM would provide assistance in trying to lower costs to the desired level". This answer appears consistent with the principles of "open book accounting" and "target pricing", with the OEM taking more responsibility for cost reduction through greater control over the supplier's manufacturing operations. A cross tabulation revealed that this approach was significantly more prevalent among Group suppliers than Independent suppliers ($r = 0.35$, chi-sq = 3.4, $p<0.10$). This would appear to re-enforce the close ties between Group suppliers and the OEMs within the *new keiretsu*.

However, the sample also revealed that 8 affiliates believed that a high bid price would lead to "the contract being lost, although the OEM relationship would remain strong because of other long-term contract work". In these cases, the

nature of the OEM-supplier relationship may be "long-term", but the OEM creates a competitive environment by not guaranteeing the affiliate every possible contract. Finally, 11 affiliates (mainly Independent suppliers) replied that their OEM relationship could not be regarded as being "long-term" and that a high bid price would result not only in "the contract being lost" but could also "place future work with the OEM in jeopardy".

These latter two responses could be described as being closer to Western style competitive bidding processes than the Japanese practice of "open book accounting" and the use of "target prices". In this respect, 70% of the affiliates, in our sample, appeared to indicate that contracts are now ultimately won or lost, on the basis of a competitive bid. The question arises as to whether this represents a change in emphasis from the use of "open book accounting" and "target pricing" towards more competitive bidding amongst rival suppliers within the core Japanese OEM-supplier relationships? This question is particularly relevant given that Japanese OEMs are now said to be considering a greater use of competitive bidding as part of a Western style restructuring of their manufacturing operations[7].

The answer is not so straightforward. In reality, Japan's OEMs now use a combination of "open book accounting", "target pricing" and competitive bidding, as the basis for their global sourcing strategies. With some core (mainly Group) suppliers, the Japanese OEM provides direct assistance to the supplier to meet a "target price"; while with other suppliers it invites a competitive bid.

[7] For instance, Nissan are now considering a sourcing strategy that includes an increased role for competitive bidding (Nikkei Weekly, 25/10/99 and also 21/8/2000).

However, with competitive bidding, it is often the case that the affiliate is competing for a contract against other transplants that belong to its parent firm. Indeed, in a follow up question to the 19 affiliates where it was felt that a competitive bidding process was in place, 12 MDs believed that a lost contract would be retained by their parent firm, but allocated to another transplant, where costs were lower. There were 3 (Independent supplier) affiliates, where the reply was that the contract would be lost to a rival supplier, while 4 MDs were not sure what would happen to the contract and/or did not respond to the question.

The nature of "target pricing" and competitive bidding at the affiliate level, is described succinctly by an MD, of a UK based Honda Group supplier, who was asked about the nature of competition in the industry:

"In general our competitors are (XYZ Ltd)..... However, it is unlikely that Honda would use any of these companies. They set us a "target price", for a particular component, which is based upon the lowest cost of production that our (parent) supplier can achieve around the world. The "target price" includes adjustments for transport costs and there is some leeway for our higher overheads. In the past, Honda has sometimes provided us with some technical assistance to meet the "target price". However, in general, if we are unable to meet the "target price", then the contract work goes to one of our sister plants, probably in either Taiwan or Korea".

These comments and the other MDs' revelations are important insights that indicate the extent to which Japan's OEMs are using the *new keiretsu* to generate a form of intra-firm competition. When an affiliate is unable to meet a "target price", the OEM is likely to retain its core supplier but source its production from the supplier's transplants elsewhere. This avoids the substantial transaction costs and risks that are associated with switching core suppliers. These transaction

costs are particularly high when the OEM-supplier relationship is long standing, and the supplier is responsible for the (often complex) design and manufacture of complete sub-assemblies (see Smitka, 1991; Chapter (2)). When a global sourcing strategy is not feasible - for instance, when there are capacity constraints at certain sites - the OEM will then resort to providing the affiliate with direct assistance to try and meet the "target price".

From the discussion, it is apparent that the *new keiretsu* provides the Japanese OEM with even greater bargaining power, vis-à-vis its supplier affiliates and international labour. In the parlance of game theory, the *new keiretsu* presents the OEM with an "inside option" to switch component production to its supplier affiliates elsewhere around the globe. For the Japanese OEM, this "inside option" acts as an additional control mechanism, which enables it to pursue a "divide and rule" strategy to resolve (labour) conflict and reduce costs within the value chain (see Chapter (3); Cowling and Sugden, 1994). The costs of this "inside option" are the transport costs and any tariff levies that the OEM must incur for sourcing production from elsewhere. Nevertheless, the ability to source globally allows the OEM to generate a form of intra-firm competition among the *new keiretsu* supplier affiliates. These supplier affiliates have to be globally price competitive, in order to gain or retain the component contract. Ultimately, the general equilibrium effect is that the downward pressure upon supplier affiliate costs falls upon the local labour force and the bargained wage. Any labour (or other) conflict at a particular transplant can be resolved by the OEM switching or threatening to switch component production elsewhere (see also Chapter (3)).

5.4 Japanese-European Automotive Joint Ventures

5.4.1 Overview

As we saw in Chapter (4) (see Table (4.9)), approximately 55% of Japanese supplier affiliates in both Europe and North America involve some form of joint venture[8]. In the majority of cases, these joint ventures involve a Japanese supplier and an indigenous supplier (Dodwell, 1997). These joint ventures provide an interesting area for analysis since they represent the first close relationship between a Japanese and an American/European firm, and also, in many cases a Japanese customer. In particular, for our understanding of the command structure of the Japanese transnational corporation and their associated transnational networks, joint ventures raise a number of important questions. These predominantly relate to the degree to which the Japanese TNC can control operations with the involvement of foreign partners, the extent to which it has to compromise objectives (and cooperate) and, finally, the resolution of conflict.

Joint ventures have received considerable theoretical and empirical attention, particularly in the management and international business literature. Much of this research has been based upon various issues that have arisen from actual case studies. The research undertaken here follows a similar approach and is based upon the small number of Japanese supplier affiliates, in the UK sample, that have been or are still involved in a joint venture. Although, we shall again be careful not to generalise our results, the research presented may be indicative of

[8] A joint venture exists when 2 or more legally distinct firms (the parents) pool a portion of their resources within a jointly owned legal organisation (Inkpen, 1994).

the nature of the joint venture relationships between Japanese and European suppliers.

Our results may also be comparable with those of Inkpen (1994), who interviewed managers from 40 North American-Japanese auto-supplier joint ventures, based in North America. Inkpen's (1994) study considered the characteristics and performance of these joint ventures. In particular, Inkpen (1994) studied the differences in performance expectations between the American and Japanese participants and the consequences for joint venture control. Inkpen's (1994, p.105) main conclusion was that a significant number of these joint ventures *"performed far below expectations"*. For Inkpen (1994), this reflected the conflicting objectives of each participant, with American firms being generally geared towards short-term profitability, while their Japanese partners were more focused upon long-term issues, such as improving customer satisfaction and maintaining product quality. Interestingly, when these joint venture conflicts could not be resolved, Inkpen (1994) found that it was usually the Japanese participant that acquired additional equity to assume full control. The main reason for this appeared to be the Japanese participant's determination to use the production facilities to continue to serve their main OEM.

5.4.2 Sample Size

The sample for our study of the Japanese-European joint venture relationships is significantly reduced from the 27 completed questionnaires. This is because only 13 of the questionnaire responses indicated that their affiliate had originally been established as a joint venture (see Table (5.1)). We should note that all 13 of

these joint ventures had involved a Japanese and a European based supplier. In 9 cases, the affiliate's Japanese parent was identified as being a Group supplier in Japan[9]. Similar joint venture arrangements also existed in 4 cases elsewhere in the EU, while 2 affiliates reported that their parents were also involved in a joint venture in the USA. Furthermore, 4 of the 7 interviews were conducted at affiliates where a joint venture had originally been set up.

The ownership details of the 13 affiliates, as at 31/10/2000, are as follows (see also Table (5.1)). There were 5 joint ventures that had ended and were now classified as wholly owned Japanese affiliates. Reasons for the cessation of the joint venture are discussed in further detail below (see Section (5.4.3)). In 4 cases, the Japanese partner held the majority equity holding, while in a further 3 cases there was equal ownership. Only in 1 case, did the Japanese partner have a minority equity holding.

5.4.3 Joint Venture Formation

The response data on reasons for the formation of the joint venture are presented in Table (5.2). Respondents were asked to rank their main formation objectives on a scale of 1 to 5 (with 1 being most important, and 5 being least important). On the questionnaire, the respondents were also given the opportunity to indicate any other specific reasons for joint venture formation, although no affiliate indicated any other particular motive(s). For each formation objective, Table (5.2) shows the rank frequency and also, in the final column, the mean rank.

[9] In terms of Corporate Group, the breakdown was as follows: four Nissan Group, three Toyota Group and two Honda Group suppliers.

The most important reason, as indicated by the rank frequency and the mean rank, was the opportunity "to widen the customer base". For the European participant, the joint venture offered the opportunity to gain (market) access to the new Japanese OEM client base[10]. In all cases, the affiliates' main customers were Japanese OEMs, although the clientele did include Western OEMs. For the majority of Japanese suppliers, this also opened up new markets and, more significantly, allowed the supplier transplants to achieve both economies of scale and scope. This was an important consideration - particularly for the Japanese suppliers - since these economies enhance price competitiveness along the value chain.

The possibility of the joint venture generating production synergies, through the sharing of knowledge and techniques, was also a significant factor (see Table (5.2)). For the European participants, it was an opportunity to gain first hand experience of Japanese production processes such as the *Just-In-Time (JIT)* delivery system and *kaizen* quality control - processes that had been defined as industry "best practice" (see Chapter (2); Womack et.al, 1990; Dicken 1998). From the Japanese perspective, the joint venture also provided learning opportunities. These were particularly related to learning about local working practices, which could enable them to reduce the risks of labour conflict that can occur as a result of a different cultural approach to labour relations.

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[10] This was particularly important for European suppliers since the entry of Japanese OEMs, into the (stagnant) European market, had threatened their market position. Inkpen (1994) makes a similar point about the formation of US-Japanese auto-supplier joint ventures in North America.

The relative importance of the other joint venture formation objectives is less clear-cut. Both "collaboration on Research and Development" and the "joint financing of capital equipment" had an equal mean rank of 3.2, while the role of the Japanese OEMs in "finding their core suppliers suitable joint venture partners" had a slightly lower mean ranking of 3.3. This latter ranking may be rather surprising, given our observations in Chapter (4) about the important (strategic) role of the Japanese OEMs in the development of the *new keiretsu*. However, a closer look at the data revealed that those who regarded the influence of the main Japanese OEM, in the formation of the joint venture, as "most important" had Japanese parents who belonged to either the Nissan or Honda Corporate Group[11]. Those respondents, which regarded this reason as "less important", had Japanese parents who, primarily, could be described as being Independent suppliers. As we noted in Chapter (4), Japanese OEMs generally have less influence in these suppliers' strategic decision-making process.

5.4.4 Strength and Sustainability of the Joint Venture(s)

The questionnaire data revealed that, by October 2000, 5 of the joint ventures had ended with the Japanese participant taking full control of operations (see Table (5.1)). Furthermore, in response to the question "How long do you expect the joint venture arrangements to continue?" only 3 respondents claimed that the joint venture was for the "long term" (10-20 years), while 2 indicated that it was

[11] This was probably expected given the history of the Japanese OEMs entry into the UK. Nissan was the first Japanese OEM to build fully integrated automobile manufacturing facilities in the country and was naturally cautious in establishing supplier linkages. Honda's entry was more gradual and it was initially involved in a joint venture with the UK manufacturer, Rover. As part of this relationship, Honda encouraged its suppliers to work closely with the indigenous supply chain (see Chapter (4)). Toyota's three suppliers all had a majority stake in the joint venture, which would allow them a greater degree of autonomy and control.

for the "medium term" (5-10 years) and 3 were seen as "short term" (less than 5 years). In total, this meant that 8 of the 13 original joint ventures had either ended or were "short-term". For our empirical analysis, we will classify these as "weak joint ventures". The 5 joint ventures that were seen as being for the "medium to the long term" will be classified as "strong joint ventures"[12].

Our raw data indicates that the majority of Japanese-European supplier joint ventures may be regarded as being a "transitional organisational form", with the Japanese participant (usually) acquiring full ownership after a period of time. These incidences of essentially "joint venture failure" may or may not have been intentional on the part of the Japanese participants. However, they do highlight the degree of conflict that can arise in relationships between Japanese and foreign partners.

According to Killing (1983), the sources of joint venture conflict relate to the fact that there is more than one parent firm, each with disparate skills and conflicting objectives. At the corporate level, these conflicting objectives may relate to differing attitudes to the financial performance of the joint venture (see Section (5.4.5); Inkpen, 1994). Conflict and disagreement between the parent firms can then manifest themselves at the operational level of the joint venture, which can also weaken performance. This is particularly the case when the parent firms place their own executives into key management positions to further their own (i.e. the parent firm's) objectives, thus generating factionalism within the joint

[12] We ignore the possibility that the joint ventures were set up for a particular purpose for a specified time-span. This seems reasonable, given the nature of the formation objectives and the firms involved (see Section (5.4.3)).

venture (Pearce, 2001). These problems, coupled with the absence of an appropriate governance structure - through which to build trust and monitor opportunistic behaviour - can raise the possibility of joint venture failure (Buckley and Casson 1988, Brown et.al. 1989).

Our questionnaire asked respondents to identify the main sources of conflict at the operational level[13]. The majority of respondents indicated that the major problems could be described as "cultural differences". The phrase "cultural differences" does, of course, cover a plenitude of potential differences between the partners. However, the main problems were said to relate to difficulties in "establishing trust" and "developing mutual respect" between the partners, at various levels of manufacturing operations. Invariably, this included tensions between the parties, concerning the imposition of Japanese production techniques and, in particular, "the acceptance (from both parties) that other ways of doing things may be better". Such "cultural differences" could also be exacerbated through "language problems" that lead to "poor communications between partners" (particularly at the transnational level) and/or when "Head Office directives are open to (wide) interpretation". These problems are reflected in comments by a Senior Manager of a joint venture, involving a UK and Japanese supplier, that primarily supplies Nissan:

"On the whole, operations run smoothly. However, we do encounter problems when our Japanese partner insists upon reviewing operations and making changes such as increasing the rate of changeover of machinery or to the order of doing things. Usually, these changes have originated

[13] The questionnaire was addressed to Managing Directors at the affiliate level, and it was felt that their experiences would reflect operational conflict rather than corporate conflict. However, during the interviews, some managers did reflect upon issues of conflict at the corporate level.

from Japan and are designed to suit our main (Japanese) OEM. Unfortunately, it is often the case that little attention is paid to the logistics of the factory here, which is often unable to cope with these new (Japanese) requirements efficiently. We endeavour to make the required changes, but inevitably we end up abandoning them and returning to the original arrangements. Not surprisingly, this generates mistrust and suspicion on both sides".

Despite instances of conflict, the joint ventures did appear to deliver some mutual benefit for the affiliates. The response to the question of "What has been the main benefit of the joint venture?" was favourable, with 12 affiliates indicating that the joint venture had provided some (mutual) benefit and only 1 affiliate noting that the experience had not been beneficial. In this respect, the raw data did not indicate any clear "main benefit". The responses were not ranked and replies were evenly split between the "successful development of new products for the customer", "increased sales for both participants" and the generation of "production synergies" (see Figure (5.2)).

5.4.5 Financial Performance of the Joint Ventures

We have noted above, that one of the main sources of conflict in Japanese and Western joint ventures is the financial performance of the joint venture. It is often the case that the Japanese and Western parent firms have different perceptions on the appropriate level of affiliate profitability. Inkpen's (1994, p97) study, into US-Japanese auto-supplier joint ventures, notes *"short-term financial issues was a common characteristic of the failed joint ventures"*. In particular, the American partners were reported as being *"unprepared for the*

level of profit margins their joint ventures experienced" and *"were generally unwilling to absorb losses to the same extent as their Japanese partners"*.

These differences often reflect the fact that the Japanese supplier is part of a much wider transnational production network than their Western partner. In Chapters (2) and (4), we argued that the ambit of the Japanese OEM is quite extensive and often includes *direct control* over its supplier operations - particularly Group suppliers. In the *new keiretsu*, the Japanese supplier transplants are expected to compete competitively with their sister transplants around the globe and, consequently, component prices are often set at levels to suit the main (Japanese) OEM. These prices are often too low to generate a satisfactory financial return for the Western parent (see also Section (5.3.2); Inkpen, 1994)). The situation creates a paradox for the global Japanese automobile industry. We have argued that one of the main functions of the supplier affiliates, within the *new keiretsu,* is to provide the Japanese OEM with an "inside option" to resolve any potential labour conflict at a particular site (see Section (5.3.2)). However, when such affiliates are involved in a joint venture with a foreign supplier, the use of the *new keiretsu* for competitive tendering is likely to raise conflicts at the managerial and executive levels. These conflicts can then lead to a loss of co-operation and trust, between both participants, which are likely to raise costs.

In our study, there is some evidence to suggest that financial factors afflict the Japanese-European supplier joint venture relationships. For instance, consider the

comments of a Managing Director from a Honda supplier, on the reasons for the cessation of their joint venture with a UK parent:

"Our UK partner became involved in a management buy-out, where the incumbent management purchased the auto-supplier firm. The management buyout was financed through an increase in financial gearing. Suddenly their objectives changed and they demanded a much higher return on their joint venture investment to satisfy their bankers. We were unable to meet this request, since we are primarily trying to build a long-term relationship with Honda in Europe. Our medium term strategy is to provide low cost components to Honda, to enable them to be price competitive and expand their position - and consequently our own position - in the European market. Because of the conflicting financial objectives, our Japanese parent decided to end the joint venture".

In order to test the hypothesis that the sustainability of the Japanese-European supplier joint ventures is related to financial performance, we considered the average profitability of the 13 joint venture affiliates for a three-year period 1998-2000. Profitability is measured by the ratio of Gross Profits to Sales, which is a recognised proxy for the Price Cost Margin (Mueller, 1986). The data was obtained from the recorded Annual Accounts of the affiliates (downloadable from the FAME database). All of the affiliates had been in operation since at least 1995, which reduces the potential bias of significant start-up costs that may lead to some affiliates recording losses. There are other caveats, however, to consider, especially when dealing with affiliate accounts of transnational corporations. In particular, the issue of transfer pricing can sometimes disguise the true extent of affiliate profitability while other firm specific factors may affect the annual accounts. To counteract some of these problems, we use a dummy variable to capture average profitability over the period, rather than a quantitative measure of profits (see Table (5.1)).

We first note, however, that, in quantitative terms, the average profitability for each of the 13 affiliates was less than the average return of 6.7% for the whole of the UK auto-components sector, during the period 1998-2000 (FAME DataBase, 2001). Furthermore, as highlighted in Table (5.1), only 6 joint venture affiliates were profitable, while the other 7 affiliates have recorded losses. This may suggest that the affiliates' main strategy has been to price competitively, sometimes at a loss, to the benefit of their main Japanese OEM. If this is the case, then the European participant may have had to absorb losses or enjoy a lower profit dividend than it would have done as an independent entity. However, for our analysis, the question to consider is whether the profits/losses per se, have contributed to "joint venture failure"?

A simple cross-tabulation tells us that there is a significant association between those affiliates classified as a "strong joint venture" and being profitable ($r = 0.54$, chi-sq $= 4.02$, $p<0.05$)[14]. This would appear to support our preceding analysis and also Inkpen's (1994) observations about US-Japanese supplier joint ventures. Profitability, therefore, appears to matter for a sustainable joint venture. However, we should note that, given our observation that the level of profits for all joint venture affiliates is lower than the UK sector average, actual recorded profit levels may not be as important. This would indicate that a degree of compromise between both parent firms - over the appropriate level of profit margins - is required for a successful, sustainable joint venture.

[14] A similar result is obtained when we considered the profitability of all 27 Japanese affiliates. The cross-tabulation suggested the 5 affiliates involved in a "strong joint venture" were more likely to be profitable than the 22 affiliates who were either involved in a "weak joint venture" or had never been involved in a joint venture ($r = 0.42$, chi sq $= 5.19$, $p < 0.025$).

A related issue is the Japanese participant's membership of a Corporate Group. In the light of our analysis regarding the nature of Japanese OEM-supplier relationships, it may be that Group suppliers are more likely to reduce profit margins and accept short-term losses, to support their main Japanese OEM. This is quite possible if there is significant transfer pricing between Group supplier affiliates and the OEMs. This will then lead to a conflict of objectives within the joint venture. However, the cross-tabulations revealed that there was no significant association between a Japanese participant's membership of a Corporate Group and the profitability of the joint venture (r = -0.05, chi sq = 0.391, n.s.). Similarly there did not appear to be any significant association between the Japanese participant's membership of a Corporate Group and the strength of the joint venture (r = 0.18, chi sq = 0.88, n.s.).

The relationship between the Japanese participant's equity stake in the joint venture and the profitability of the affiliate was also examined. It could be that, with a majority stake in the joint venture, the Japanese participant can use its greater autonomy to decide component prices and the affiliate's level of profit margin. The cross-tabulation, based upon Japanese affiliate equity holdings of less than and/or equal to 50 percent and more than 50 percent, revealed no inter-group differences in financial performance (r = 0.07, chi-sq = 0.39, n.s.)[15]. Interestingly, Inkpen (1994), using a scaled measure of performance (as opposed to profitability), also found no differences in performance on the basis of equity share in US-Japanese auto-supplier joint ventures.

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[15] The exercise was repeated considering only the 8 affiliates that were still involved in a joint venture as at 31/10/2000. Again no significant inter-group differences were found (r = 0, chi-sq=0.5, n.s.).

5.4.6 Importance of Long-term Co-operation for Sustainable Joint Ventures

As we have argued, it is primarily the conflicting objectives of the parent firms that are the source of conflict in the Japanese-European automotive joint ventures (see also Killing, 1983). Disagreements between the parent firms, over corporate strategy and the affiliate's role, ultimately affect both manufacturing operations and performance. This may eventually lead to a cessation of the joint venture. This has certainly been the case in both Europe and North America (see also Inkpen, 1994).

The resolution of conflict, in international joint ventures, requires much further investigation. In this respect, Brown et.al (1989, p.88) have argued that problems of essentially "developing trust" between joint venture partners may be improved through a "greater mutual understanding" of each other's economic practices and cultural ideals. A greater tolerance of each partner's corporate culture may lead to greater stability in the agreement. Of course, such "mutual understanding" and "tolerance" may take some considerable time to nurture. However, it appears that this can be achieved through the cultivation of long-term agreements between the parties involved, across the globe rather than in one particular location. This is because the replication of joint venture relationships, across the globe, encourages co-operation throughout the network. Furthermore, from the Japanese perspective, there is significantly less risk associated with working with established partners than working with new indigenous partners in particular locations.

Our sample appears to support this view. The cross tabulation between a strong Japanese-European automotive joint venture in the UK and similar arrangements existing elsewhere, suggests that there is a significant association between the long-term sustainability of the relationship and experience of the partnership elsewhere in the globe ($r = 0.68$, Chi-sq = 6.1, $p<0.025$). It appears that through global joint ventures - as opposed to just regional joint ventures - there are more opportunities for both parents to develop greater trust, tolerance and co-operation and also to resolve conflict. At this point, we should note that global joint ventures also offer both parties the opportunity to achieve organisational and other scale economies. This in itself enhances sustainability and reduces the potential for conflict, since conflict in one location may have implications for the viability of the joint venture as a whole (see also Buckley and Casson, 1988).

5.5 Concluding Comments

This Chapter has used a Case Study of the experiences of UK based Japanese auto-suppliers to explore various relationships within the *new keiretsu*. The UK transplants are at the centre of the Japanese automobile industry's European operations and, in many ways, are typical *new keiretsu* affiliates. As such, the results reported in this Case Study might provide insights, into the experiences of *new keiretsu* affiliates elsewhere. The affiliates were mainly involved in manufacturing components, which have been designed and developed within Japan. The managerial teams (which include Japanese expatriates) have significant operational control, but they have little influence on their parent firm's strategic objectives - an observation which is consistent with our view that

the Japanese transnational corporation is typically controlled from a centre of strategic decision-making (see Chapter (2)).

At the operational level, there was evidence to suggest that Group supplier affiliates are more likely to form "close or very close" relationships with their main Japanese OEM, than Independent supplier affiliates. This supports our observations in Chapter (4), concerning the nature of the "close ties" between Japanese OEMs and their Group suppliers. It appears that the OEM Corporate Groups are successfully replicating their domestic relationships at the operational level, within the UK (and Europe). Along the value chain, relations between Japanese suppliers and the indigenous supply base can generally be described as being "normal". However, Group suppliers are more likely to establish "close or very close" relations, and encourage the adoption of Japanese industrial practices. This is an important distinction and illustrates the extent to which Japan's OEM Corporate Groups have attempted to widen their ambit and extend their span of control to include indigenous suppliers. In this respect, the Corporate Group's insistence upon indigenous suppliers to adopt Japanese industrial practices (e.g. *kaizen* and *Just-In-Time* delivery systems), may be regarded as effectively subordinating and "locking in" the latter, to the requirements of the *new keiretsu*.

One of the main results in this Case Study, is the determination of contract prices for components. These are set by the Japanese OEMs, through a combination of "open-book accounting", "target pricing" and "competitive bidding". In this respect, there was significant evidence to suggest that the *new keiretsu* affiliates

offer the Japanese OEM an "inside option" to (globally) outsource component production. This "inside option" enables the OEM to adopt a "divide and rule" strategy to generate lower component prices through a form of intra-firm competition. Each affiliate has to compete on price, with its sister transplants, in order to earn and retain new contracts. The *new keiretsu* enhances the bargaining power of the OEMs vis-à-vis the supplier affiliates and international labour, with the (credible) threat of global outsourcing allowing the OEM to resolve labour conflict.

However, our Case Study also revealed that the "divide and rule" strategy could also raise conflict at the executive level when supplier affiliates are involved in a joint venture. From our sample, almost half of the 27 affiliates involved a joint venture between Japanese and European component manufacturers. Of the 13 joint ventures, only 5 could be described as being "strong joint ventures". Further analysis revealed that the main sources of joint venture conflict related to manufacturing operations and, most importantly, to financial performance. It appears that, in many cases, the participants' had conflicting objectives, particularly over profitability. In general, the profits, prices and financial performance of the joint ventures were unsatisfactory for the European participants.

The Japanese participants were more likely to accept lower profit margins, than their European partners. We argued that the Japanese participants were compelled to accept lower profit margins, since they were part of the *new keiretsu* and were engaged in some form of competitive bidding. This appeared

to be a major source of conflict between participants. When the joint venture broke down, it was the Japanese participant that acquired full control, taking advantage of the production facilities to maintain an operational relationship with their main OEM at the local level. Our results were comparable with those of Inkpen (1994), who found similar evidence for Japanese-American automotive joint ventures in the USA. Interestingly, where the joint venture could be described as being "strong", there appeared to be a degree of compromise over profitability, between both Japanese and European participants.

Although our Case Study relates only to the experience of Japanese affiliates in the UK, the results are indicative of what we may expect in the other regions where the *new keiretsu* has been established. In particular, the research presented here has underlined the fact that the affiliate is very much a small satellite in the Japanese transnationals' global operations. The affiliate is in regular communication with company headquarters, in Japan, but ultimately it accepts the company's directives and product designs. Its managerial team have little impact upon corporate strategy. The affiliate is also forced to compete on price, within the *new keiretsu*, with its sister transplants, to win new contracts.

The analysis appears to support the view that the *new keiretsu* provides the Japanese OEM and the Corporate Group with even greater control over its (global) operations. The credible threat of global sourcing allows the OEM to resolve conflict with supplier affiliates. The successful replication of "close ties" with Group supplier affiliates, extended to include indigenous suppliers, facilitates the adoption of Japanese industrial practices. These allow the OEM to

use its traditional control mechanisms to maintain and protect its specific (competitive) advantages, in international production. When conflict does arise, as in the case of joint ventures, some degree of compromise may be required but, where it does not, it is the Japanese participant that assumes full control.

As we pointed out at the beginning of Chapter (4), the Japanese automotive transnational is representative of Japanese transnational corporations. In the other machinery industries - such as electronics and consumer durables - Japan's leading corporations have been developing similar transnational networks, or *new keiretsu*. In the aggregate, their continuing offshore activities will have real effects upon Japan's domestic manufacturing base. It is this issue that we now consider in Chapter (6).

Table (5.1) Main Characteristics of Japanese Auto-Suppliers' Affiliates

Affiliate	Main activity	Japanese equity holding in affiliate (as at 31/10/00)	Is the Japanese Parent a Group supplier?	Does the supplier have R&D facilities in Europe?	On average, was the affiliate profitable during 1998-2000?	Has the affiliate been part of a Joint Venture?	Is the affiliate still part of a Joint Venture?	Do these Joint Venture relations exist elsewhere?
S1	Vehicle Bodies	Wholly Owned	Yes	No	No	Yes	No	No
S2	Transmission Components	Equal Share	Yes	No - expected within 5 years	No	Yes	Yes	No
S3	Air Induction Systems	Majority Share	Yes	Yes - in UK	No	Yes	Yes	No
S4	Air Conditioning	Majority Share	Yes	Yes - in UK	Yes	Yes	Yes	Yes
S5	Control Cables	Wholly Owned	No	Yes - in UK	Yes	Yes	No	No
S6	Battery	Wholly Owned	No	Yes - in UK	No	Yes	No	No
S7	Auto-Glass	Minority Share	No	Yes - in UK	No	Yes	Yes	Yes
S8	Vehicle Lighting	Wholly Owned	Yes	Yes - in UK	No	Yes	No	No
S9	Stamping & Sub Assembly	Equal Share	Yes	No	Yes	Yes	Yes	No
S10	Vehicle Interiors	Equal Share	Yes	Yes - in Germany	Yes	Yes	Yes	Yes
S11	Air Conditioning	Majority Share	Yes	Yes - in Germany	Yes	Yes	Yes	Yes
S12	Plastic Components	Wholly Owned	No	No - expected within 5 years	Yes	Yes	No	No
S13	Steering Systems	Majority Share	Yes	No - expected within 5 years	No	Yes	Yes	Yes

Table (5.1 (cont)). Main Characteristics of Japanese Auto-Suppliers' Affiliates

Affiliate	Main activity	Japanese equity holding in affiliate (as at 31/10/00)	Is the Japanese Parent a Group supplier?	Does the supplier have R&D facilities in Europe?	On average, was the affiliate profitable during 1998-2000?	Has the affiliate been part of a Joint Venture?	Is the affiliate still part of a Joint Venture?	Do these Joint Venture relations exist elsewhere?
S14	Plastic Components	Wholly Owned	Yes	No	No	No	N/A	N/A
S15	Electrical Components	Wholly Owned	No	No - expected within 5 years	No	No	N/A	N/A
S16	Bearings	Wholly Owned	No	Yes - in UK	Yes	No	N/A	N/A
S17	Car Aerials	Wholly Owned	No	Yes - in UK	Yes	No	N/A	N/A
S18	Electrical Components	Wholly Owned	No	Yes - in UK	Yes	No	N/A	N/A
S19	Auto Pressings and Tools	Wholly Owned	No	No	No	No	N/A	N/A
S20	Plastic Components	Wholly Owned	No	Yes - in UK	No	No	N/A	N/A
S21	Engine Components	Wholly Owned	No	Yes - in UK	No	No	N/A	N/A
S22	Transmission Components	Wholly Owned	No	No	Yes	No	N/A	N/A
S23	Bearings	Wholly Owned	Yes	Yes - in UK	No	No	N/A	N/A
S24	Castings	Wholly Owned	No	No - expected within 5 years		No	N/A	N/A
S25	Plastic Components	Wholly Owned	Yes	No	No	No	N/A	N/A
S26	Auto Paints	Wholly Owned	No	Yes - in Germany	No	No	N/A	N/A
S27	Engine Components	Wholly Owned	Yes	No - expected within 5 years	No	No	N/A	N/A

Source: Survey Questionnaire of 27 Managing Directors/Senior Managers from Japanese auto-suppliers, based in the UK.

Figure (5.1) Relationships Along the Value Chain

Figure (5.1 (a))

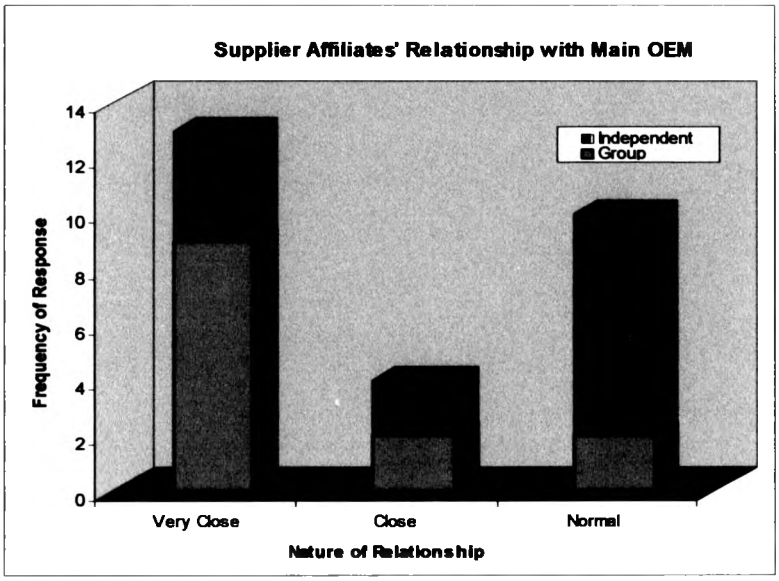
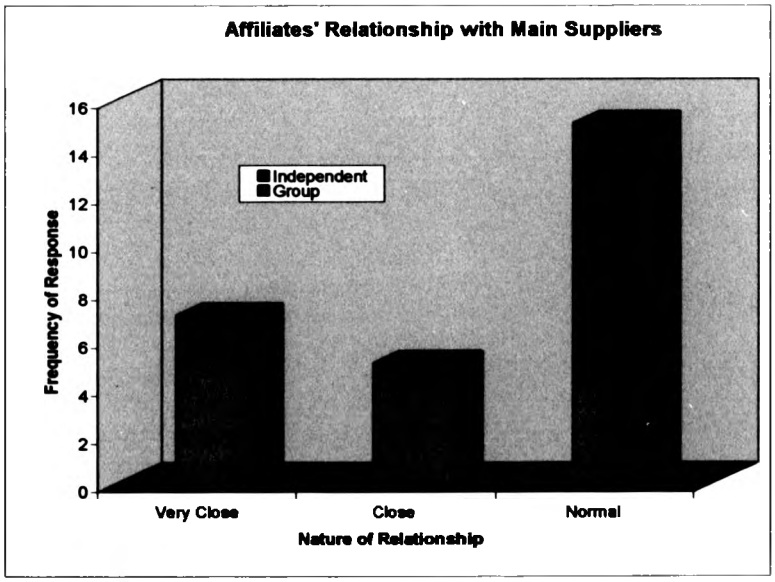


Figure (5.1 (b))



Source: Survey Questionnaire of 27 Managing Directors/Senior Managers from Japanese auto-suppliers, based in the UK.

Table (5.2) Reasons for Japanese-European Automotive Joint Venture(s)

Ranking (R_i) / Reason Given (F_i)	Most Important 1st	2nd	3rd	4th	Least Important 5th	Mean Rank $\Sigma(R_i)(F_i)\lozenge n$
1. To finance the capital expenditure of new plant & equipment	1	5	1	3	3	3.2
2. Actively encouraged by main Japanese OEM	4	0	2	2	5	3.3
3. To widen the customer base for both parties	5	2	3	1	2	2.5
4. To collaborate on Research and Development	1	3	3	5	1	3.2
5. To benefit from production synergies	2	3	4	2	2	2.9

Source: Survey Questionnaire of 27 Managing Directors/Senior Managers from Japanese auto-suppliers, based in the UK.

Notes:

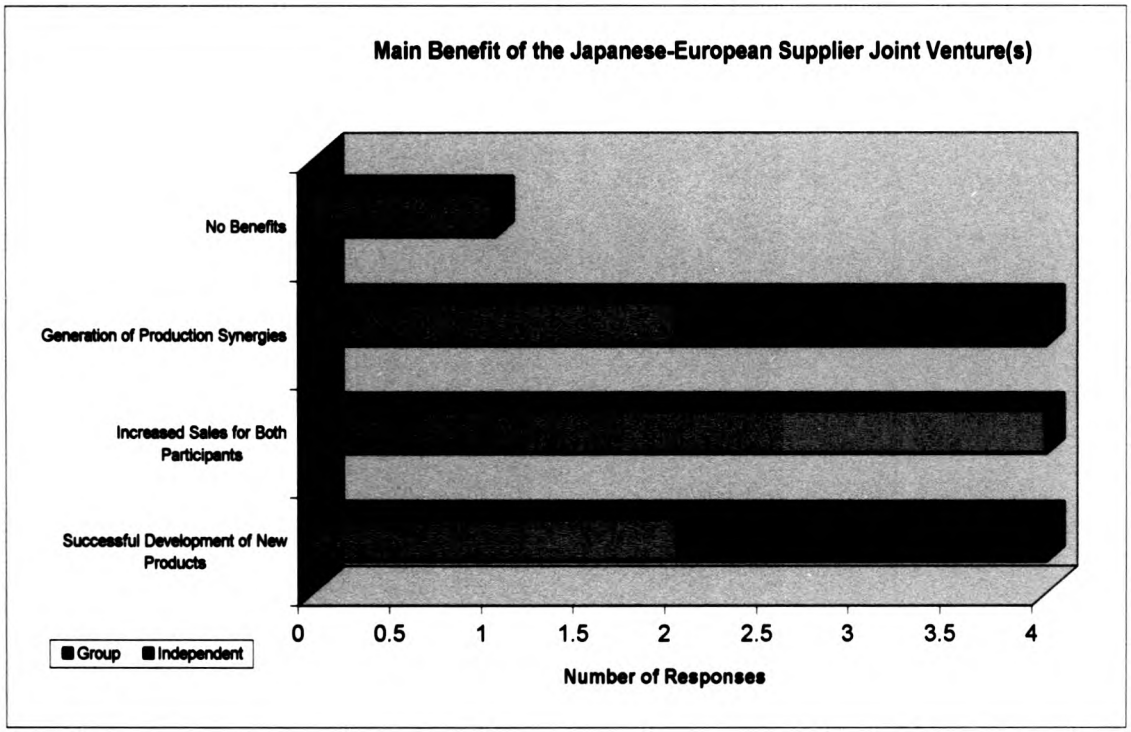
i) Thirteen respondents had been involved in a joint venture of some form.

ii) The figures represent the frequency of responses.

iii) The final column provides the mean rank, an indication of the overall most important reason.

Figure (5.2)

Main Benefit of the Japanese-European Supplier Joint Venture(s)



Source: Survey Questionnaire of 27 Managing Directors/Senior Managers from Japanese auto-suppliers, based in the UK.

Chapter 6

The Real Effects of Transnational Activity Upon Japan's Domestic Machinery Sector: Theory and Evidence[1]

6.1 Introduction

Throughout this thesis, we have examined the global role of Japan's large transnationals and the expansion of their overseas activities, particularly through their involvement in transnational production networks - the *new keiretsu*. The *new keiretsu* has, of course, contributed to a significant increase in Japanese global outsourcing, particularly in the machinery sector (see Table (3.2), Chapter (3)). The importance of these networks is further reflected in the fact that MITI (2001) now estimate that 48.7% of trade flows, involving Japan's transnationals, are intra-firm.

One real effect of the *new keiretsu* is that it has altered the nature of traditional *keiretsu* relations, within Japan. In particular, Japan's large transnationals now have greater leverage in bargaining negotiations with their domestic suppliers and their labour force. We saw, in Chapter (5), how Japan's automotive transnationals have been able to use the *new keiretsu* to generate intra-firm competition and exert *direct control* over an international divisional of labour. In the long run, such "divide and rule" strategies will have a real effect upon Japan's domestic industrial structure, as domestic activities become more peripheral to the large transnationals' global requirements. This may lead to a

[1] A shorter version of this Chapter forms the basis of Tomlinson (2002). Arguments from Cowling and Tomlinson (2000, 2002) are also included and, where applicable, these are indicated in the text.

situation where Japan's domestic industry experiences relative economic decline or is "hollowed out" (*kūdoka*), as foreign sites become more attractive for (Japanese) transnational production (Fujita and Hill, 1989; Cowling and Tomlinson, 2000).

This Chapter examines the real effects of transnational activity upon Japan's domestic machinery sector. In doing so, we recognise the important role that transnational networks and the *new keiretsu* now play in Japanese transnational production. Japan's large transnationals have used these networks to create interdependent links between their transplants around the globe, in order to control their (international) cost functions through "divide and rule" strategies. This has meant that domestic Japanese manufacturing is now more sensitive to the behaviour of international (cost) conditions than at any time since the liberalisation of FDI, in the early 1970's. The consequent increase in global outsourcing has also had implications for the performance of Japan's small firm sector, the vitality of Japan's industrial districts and domestic employment.

In the remainder of this Chapter, we first formulate a partial equilibrium model of investment and labour demand - for each of Japan's five machinery industries - in the context of a global economy. Both of these variables are key indicators of the performance of the (Japanese) economy. Indeed, during the 1990's, Japanese firms curbed their domestic capital spending, which, according to Yoshikawa (2000), was the fundamental factor in explaining Japan's declining growth rates of Total Factor Productivity (TFP). Over the same period, Japanese manufacturing employment also fell by approximately 20% (Japanese Statistical

Yearbook, 2001). In this respect, there are increasing concerns that Japanese firms are substituting foreign investment for investment and labour demand within Japan (Nikkei Weekly, 13/8/2001). Furthermore, Japan's domestic capital stock is not being replenished by inward flows of FDI. Indeed, in 1997, the ratio of Japan's outward to inward stock of FDI was 12:1 (OECD, 1999).

In the light of these trends, this Chapter estimates the sensitivity of both Japanese machinery investment and labour demand to international cost conditions. The approach taken closely follows that proposed by Hollingsworth (1997), who argued that, in order to capture the real effects of transnational activity, within any one economy, it was important to augment foreign wage variables into the economy's domestic production function. This is because transnationals take a global perspective for production decisions and foreign wage costs will, therefore, affect the domestic investment rate (and also employment).

The theoretical model for this approach is presented in Section (6.2). In Section (6.3), an empirical specification is set out and estimated, using a simultaneous equations estimator. For each industry, the results indicate the sensitivity of domestic Japanese investment and employment to international wages and also the degree of substitutability between Japanese and foreign production. Section (6.4) then considers some further evidence of the real effects of global outsourcing within the machinery sector, particularly at the regional level. The macro economic implications of transnational activity are then also (briefly) discussed. Finally, Section (6) concludes.

6.2 Transnationals, Investment and Labour Demand: Theoretical Considerations

6.2.1 *Measuring Transnational Activity - An Indirect Approach*

In attempting to capture the real effects of transnational activity, this Chapter adopts an indirect approach by including foreign wage variables in Japan's domestic production function. It is, perhaps, first important to justify this approach, since it is very different from traditional models of transnational behaviour, which rely heavily upon published FDI data. The majority of these studies use FDI data to describe either the foreign activities of "domestic" transnationals or the domestic activities of "foreign" transnationals. However, while such studies have provided some useful insights, they do not capture the effects of all transnational activity within an economy since they implicitly ignore, either the activities of "home" or "foreign" transnationals. A similar approach would, therefore, be unsuitable for considering the importance of all transnationals in the determination of investment and labour demand within Japan's machinery industries.

A possible solution to such a problem may be to include data on both inward and outward flows/stocks of FDI in any empirical specification. This may allow us to take account of the presence of both "home" and "foreign" transnationals in an economy. However, there are also potential problems in using FDI data to capture the real effects of transnational activity - particularly when investigating the effects upon domestic investment. For instance, the majority of FDI flows relate to mergers and acquisitions, and this may be misleading when considering the determinants of new physical investment and/or labour demand. Although

FDI outflows may divert investment funds away from Japan, any inflows are unlikely to add to the existing capital stock. In addition, FDI statistics relate to the ownership of foreign assets and yet transnational control over production, investment and employment has wider implications than ownership. The Japanese case is a particular example since, as we have seen in earlier Chapters, *keiretsu* networks of small firms are often subjected to the control of Corporate Japan.

6.2.2 Recent Research using Indirect Approaches

The problems associated with traditional studies have led a small group of authors to consider a more indirect approach, in an attempt to estimate the real effects of transnational activity within an economy. This has typically involved the inclusion of foreign variables in a domestic country's production function, on the basis that they indicate the attractiveness of alternative sites for production, investment and employment. The papers argue that economies have become more open to transnational activity and so, in a global market, the behaviour of domestic variables will also be sensitive to foreign conditions. This reflects the influence of transnationals and their ability to re-allocate their resources between international locations.

In the few published studies of this kind, the emphasis has focused upon estimating aggregate macro economic effects. Examples include Bradley and Fitzgerald (1988, 1990) who found that, for Ireland, between 1964 and 1982, there was a constant elasticity of substitution between Irish production and production elsewhere, which was dependent upon Irish unit costs relative to a

measure of the world's unit costs. For the USA, Koechlin (1992) found that a weighted average of foreign profits and foreign output were significant in determining the domestic demand for the US capital stock. In Young (1999), UK average costs relative to OECD countries were found to be statistically significant in explaining UK investment.

More recently, Hatzius (2000), using data for the UK and Germany, finds evidence, for both countries, that the elasticity of domestic investment with respect to unit labour costs has risen significantly since the liberalisation of FDI, which began in the early 1970's. Interestingly, Hatzius (2000) concluded that these trends will consequently lead to a flatter labour demand curve, with implications for both workers' bargaining power and the level of employment. Finally, Hollingsworth (1997) estimated a partial equilibrium model of aggregate investment behaviour - taking account of foreign wage conditions - for four countries, over the period 1967-1991: the UK, the USA, Canada and Japan. Hollingsworth (1997) found that, for each country, foreign wages were significant in explaining domestic investment behaviour and he took this as indicative of the real effects of transnational activity within these economies. Interestingly, in the case of Japan, the only significant foreign wages were those of South Korea, where a 10% fall in real wage growth was found to decrease Japanese domestic investment by 3%. Hollingsworth (1997) argued that, in the Japanese case, the insignificance of OECD wages may reflect MITI's post-Second World War industrial policies and its close control of transnational corporations. These may have nullified the impact of changes in international wages (and transnational activity) within the Japanese economy.

6.2.3 Interdependent Linkages

Hollingsworth's (1997) model is particularly relevant to our own study. This is because Hollingsworth's (1997) approach was the first attempt to capture, empirically, the real effects of interdependent transnational networks and the "divide and rule" strategies of transnationals upon the behaviour of domestic variables. For Hollingsworth (1997), the basic premise was that, since a transnational can use such strategies to depress (international) labour costs, it creates interdependent linkages between its global transplants. As we first noted in Chapter (3), the credible threat of a global relocation of production, allows the transnational to control its international labour force and reduce its wage costs. However, in addition and given integrated global product markets, the transnational would also regard a lower bargained wage - in any particular location - as the fundamental factor, in determining the location of new investment. This then implies that the behaviour of investment, in a particular location, is affected by the outcome of the transnational's wage bargains at other (global) locations[2].

Our own direct observations in Chapter (5) indicated that Japanese automotive transnationals have adopted a "divide and rule" strategy to generate intra-firm

[2] In many respects, there is a certain degree of endogeneity within Hollingworth's (1997) model. The transnational's use of international wage bargaining depresses wage costs across locations and, in turn, particular locations may attract new capital investment, where the bargained wage is lower. However, if we consider a particular location, then any new investment may subsequently raise the demand for labour and put upward pressure upon the bargained wage at that site. This is, of course, to some extent, nullified by the transnational's credible threat of being able to switch production to alternative sites. However, any new investment, at a particular location, will also put downward pressure on real wages elsewhere, since the new investment increases the transnational's "inside option" to source from that particular transplant. Unfortunately, an insufficient number of observations meant that Hollingsworth (1997) was unable to specify an endogenous system using a so-called Vector Auto Regression (VAR) framework, and so he only estimated a partial equilibrium model. This is a problem we also encounter.

competition. It, therefore, appears particularly appropriate to use Hollingsworth's (1997) framework to investigate, empirically, the real effects of transnational activity upon the behaviour of investment and employment within Japan's domestic machinery sector[3]. More formally, this means that we include relevant foreign wage variables within the sector's domestic production function. This is justified because transnationals have created interdependent linkages between transplants around the globe and those in Japan.

At this point, we should note that, while Hollingsworth's (1997) approach relies exclusively upon the international wage bargaining process to generate such interdependent linkages, this is not the only mechanism whereby such interdependencies are created. For instance, interdependent linkages will exist when the transnational integrates both its home and foreign plants as part of a vertical production chain - such as the linkages between domestic Japanese transplants and their export platforms in East Asia (see Chapter (3), Wells, 1993). Interdependent linkages may also occur if the transnational faces capital market constraints. Since the early 1970's, the majority of Japanese and other Western firms have relied extensively upon retained earnings as the major source of net finance for new industrial investment (see Corbett and Jenkinson, 1996; Yaginuma, 1997). Stevens and Lipsey (1992) have shown that, when there are imperfect capital markets, transnational firms are likely to distribute their internally generated funds between competing international locations.

[3] Hollingsworth (1997) only estimated investment equations.

6.2.4 A Formal Model of Investment and Labour Demand

The formal modelling of investment and labour demand for Japan's machinery industries, follows - in a domestic context - the format proposed in Denny and Nickell (1992) and Dinenis and Funke (1994). The actual derivations presented here are adapted from Hollingsworth (1997), who placed the model of investment, into an international context by including relevant foreign wages.

The model considers a representative transnational firm that operates in the machinery sector, and owns n manufacturing plants located in Japan and across the globe. In theory, the transnational could allow each subsidiary to operate as a separate entity that takes decisions on output, new investment and employment, and maximises profits independently. However, because of the international wage bargaining process, there are interdependent linkages between the transplants. This means that a transnational's strategic decisions, relating to a particular plant, will have an effect upon the production functions of other plants.

At each plant, the transnational employs a variable input, labour (L_i), and a quasi-fixed input, capital (K_i), which depreciates geometrically at a constant rate of δ. The transnational is assumed to have a degree of market power, in a global, integrated market and sells its total output at a price of P_t. The assumption of a global integrated product market seems reasonable, given that we are modelling a sector characterised by global component sourcing, with a high proportion of trade-flows being intra-firm. In addition, the transnational uses the same basic technology at each plant and purchases investment goods (I_t), at a uniform price

of p^I. However, each plant will have a different wage structure, which is defined by

$$w_1 = w(K_1 \ldots K_n, \hat{w}_1) \tag{1}$$

where K represents the capital stock and $\hat{w}$ represents the local outside wage. The bargained wage at plant 1 is increasing in K_1, because of increased revenues generated at that site by higher capital and it is also increasing in $\hat{w}$. However, the bargained wage is decreasing in K at the other plants, since capital elsewhere strengthens the transnationals "inside option" to source production elsewhere.

The transnational is free to alter its capital stock and employment at any of its plants, although it faces internal non-separable adjustment costs when it undertakes new capital investment (see Lucas, 1967; Gould, 1968). When there are non-separable adjustment costs, the level of variable inputs (labour) will influence the cost of changing the quasi-fixed variable, capital (see Dinenis and Funke, 1994). Internal adjustment costs represent lost output when new capital is installed and reflect a requirement to switch a proportion of the labour force from production to expanding the firm. The model assumes convexity in adjustment costs, which implies that the cost of adjustment is higher, the faster the adjustment of the capital stock. This will lead the firm to undertake investment over a longer period (see Brechling, 1975; Chirinko, 1993). The possibility of employment adjustment costs is ignored, since these are likely to be small (see Pindyck and Rotemberg, 1983).

There is a production function F, for each plant, which includes capital and labour inputs and an investment variable to account for the existence of internal non-separable adjustment costs. For simplicity, we assume that this net production function has constant returns to scale, is continuous and fully differentiable (see Dinenis and Funke, 1994). Following Hollingsworth (1997), the transnational's net present value includes the aggregated output and costs from all its plants and is then defined by the objective function:

$$\max_{\{K(t),L(t)\geq 0\}} V_t = \int_{t=0}^{\infty} e^{-rt} \sum_{i=1}^{n} (1-\tau_i)\{P_t F[K_i, L_i, I_i] - w_i(K_1..K_n)L_i - p^I I_i\}dt \qquad (2)$$

where r is the discount factor and τ is the effective tax rate, net of capital allowances and subsidies. The time path of investment, employment and the capital stock is obtained by maximising equation (2) subject to the capital accumulation constraints:

$$\dot{K}_i = I_i - \delta K_i \qquad \forall\ i = 1...n. \qquad (3)$$

Using equations (2) and (3), the Hamiltonian is given as:

$$H = e^{-rt} \sum_{i=1}^{n} (1-\tau_i)\{P_t F[K_i, L_i, I_i] - w_i(K_1..K_n)L_i - p^I I_i\} + \lambda_i(I_i - \delta K_i) \qquad (4)$$

where, in the optimal control terminology, the state variables are K_i and the control variables are L_i, I_i. The λ's represent the co-state variables, which provide a measure of the effect upon the transnational's net present value, for a small increase in K_i at time t. The problem is solved using the Maximum principle and

the first-order Hamiltonian conditions are:

$$\frac{\partial H}{\partial L_i} = e^{-rt}(1-\tau_i)\{P_t(1-1/\varepsilon)F_{Li}[K_i, L_i, I_i] - w_i\} = 0\ ;\ \forall\ i = 1\ldots n \tag{5}$$

$$\frac{\partial H}{\partial I_i} = e^{-rt}(1-\tau_i)\{P_t(1-1/\varepsilon)F_{Ii}[K_i, L_i, I_i] - p^I\} = -\lambda_i\ ;\ \forall\ i = 1\ldots n \tag{6}$$

$$\frac{\partial H}{\partial K_i} = e^{-rt}\{P_t(1-\tau_i)(1-1/\varepsilon)F_{Ki}[K_i, L_i, I_i] - \sum_{i=1}^{n}(1-\tau_i)w_{Ki}L_i\} - \delta\lambda_i = -\dot{\lambda}_i$$

$$\forall\ i = 1\ldots n \tag{7}$$

where ε is the price elasticity of demand.

There is also a tranversality condition that ensures a stable solution and non-negativity of the capital stock:

$$\lim_{t\to\infty} (\lambda_i K_i)\, e^{-rt} = 0; \quad \forall\ i = 1\ldots n \tag{8}$$

In addition, the derivative of the value function with respect to the state variables relates the capital stock, at each site, with the co-state variables (λ_i):

$$\frac{\partial V}{\partial K_i} = \lambda_i\ ;\ \forall\ i = 1\ldots n \tag{9}$$

Equation (9) defines λ as the shadow price of an additional unit of capital at each site. This means that Equation (6) provides the transnational with the standard rule for investment: the marginal cost of investment must equate to its present value. In equilibrium, the transnational will equate the shadow prices at all of its

plants, so that the co-state variables will all be equal. Following Dinenis and Funke (1994), the implicit function theorem implies the existence of both an investment equation and a labour demand equation at each plant:

$$I_i = \varphi [\, w_i/p \ldots w_n/p,\ q] K_i \quad \forall\ i = 1 \ldots n \tag{10}$$

$$L_i = \Omega [\, w_i/p \ldots w_n/p,\ I_i/K_i] \, K_i \quad \forall\ i = 1 \ldots n \tag{11}$$

where q = (λ/p). Equations (10) and (11) represent a system of simultaneous equations for Japan's domestic machinery industries. The investment equation (10) implies that gross investment is a function of Japanese real wages, the real wages at the overseas sites and Tobin's q. The foreign wages are present because of the existence of interdependent linkages between all plants. The inclusion of Tobin's q captures the transnational's optimal investment rule given in equation (6) (see Hayashi, 1982). In line with standard investment theory, it is expected that gross investment, in Japan's machinery industries, will be negatively related to Japanese real wages, but positively related to q. The sign of the coefficient on the foreign wages will depend upon what Hollingsworth (1997) calls the *organisational elasticity*. If the transnational regards foreign investment as a substitute for production in Japan, then a positive sign on the foreign wages would be expected which would indicate the direct substitutability of foreign for Japanese labour. However, if the overseas site is seen as complementary to domestic production, then a negative sign is plausible, since the effect of an increase in foreign wages will lead the transnational to raise the capital stock - and adjust (reduce) the L/K ratio - at the foreign site.

The labour demand function (equation (11)) follows a similar format with the inclusion of Japanese and overseas real wages. It is expected that the demand for labour, in Japan's machinery industries, will be negatively related to Japanese real wages but positively related to the foreign wages, which reflects the direct substitutability of Japanese and foreign labour. Equation (11) also includes the investment rate, which reflects the fact that there are adjustment costs in changing the capital stock. The investment rate will have a positive effect on labour demand if, to maintain a given output, the firm has to raise employment to compensate for the non-separable adjustment costs. However, there may be a negative effect if the increase in investment leads the firm to substitute capital for labour (see Dinenis and Funke, 1994).

6.3 Empirical Specifications and Econometric Estimation

6.3.1 *Empirical Specification*

The model defined by equations (10) and (11) provides a framework to assess the real effects of transnational activity upon the behaviour investment and employment within Japan's machinery industries. The inclusion of the foreign wages, in both the investment and labour demand functions, provide an opportunity to estimate directly, the extent to which overseas sites have become viable and attractive, alternative sites – compared to Japan - for investment and production. This section now considers the empirical implementation of the model, for each of the five industries that comprise Japan's machinery sector. The data used are annual observations for the years 1968-1994. This time-interval captures the whole period since Japan's FDI restrictions were relaxed in 1971.

Given the duality of investment and labour demand decisions, the general specification is a simultaneous system as given in equations (12a) and (12b) for industry i:

$$\Delta \ln (I_{i,t}/K_{i,t-1}) = \alpha_1 + \sum_{j=1}^{2}\beta_j \Delta \ln q_{t-j} + \sum_{k}\sum_{j=1}^{2}\vartheta_j \Delta \ln (w/p)^k_{t-j} + \delta_j D_t + \mu_{1t} \tag{12a}$$

$$\Delta \ln (L_i/K_i)_t = \alpha_2 + \sum_{j=0}^{2}\eta_j \Delta \ln(L_i/K_i)_{t-j} + \sum_{j=0}^{2}\varphi_j \Delta \ln (I_{i,t}/K_{i,t-1})_{t-j} + \sum_{k}\sum_{j=0}^{2}\phi_j \Delta \ln (w/p)_{t-1} + \sum_{j=0}^{2}\varpi_j \Delta \ln Y_{t-j} + \mu_{2t} \tag{12b}$$

where k is the index of real product wages with k=1 representing Japanese wages and k>1 being overseas wages. The lag structures are denoted by j. The system includes domestic and foreign wages, a measure of Tobin's q, output (Y) and a dummy variable (D) to capture the effects of the oil shocks. The variables are all discussed below. The system is in logarithmic form and is written in first differences, which allows for the estimation of both the growth rates of investment and labour demand. There are no error correction terms, which is consistent with the view that transnationals do not establish any long-run equilibrium over production locations. This seems realistic, given that new (global) sites continually emerge as alternative sites for production, while existing ones become redundant.

The investment equation (12a) follows a distributed lag of past variables to allow for the existence of internal non-separable adjustment costs. The dependent

variable ($I_i/K_{i,t-1}$) is the ratio of real investment to the capital stock for each of the Japanese machinery industries. The data is obtained from the OECD's International Sectoral Database (1997). The dummy variable is included to account for the effects of the oil shocks in 1973 and 1979. During the 1970's, the Japanese Diet encouraged domestic firms to invest in new energy saving equipment[4]. These energy saving measures are believed to have had a positive effect upon investment in the machinery sector, particularly in the capital goods industries responsible for producing industrial and electrical machinery (see OECD, 1980).

The wages variables are the indices of Japanese and foreign real wages, which are chosen in preference to traditional International Labour Office (ILO) measures of unit labour costs. The latter take account of productivity differences between countries but, for a transnational firm, it is the hourly wage rate that is the most appropriate measure of labour costs. This is because the transnational can impose the same, basic technology at any location, which, in turn, will determine the level of labour productivity at each site. It is, therefore, the local industry wage, which is relevant in attracting investment flows. The indices of the real product wages are calculated, separately, for each industry, using data provided by UNIDO (1998) and the ILO (1998). They represent the average, hourly industry wage, in US dollars, which is paid to an employee in each country. In constructing these wages, salaries are assumed to form part of the transnational's variable costs, which is consistent with the view that, with

[4] An example is the 1979 Energy Conservation Act. This set Japanese industry specific targets for energy conservation. MITI supported the policy with a range of fiscal incentives and the imposition of fines for non-compliance (see OECD Economic Surveys, 1980).

transnational production, all labour costs are (potentially) variable. Given an international market for finished goods, the wages are deflated by an international average of industry specific producer price indices, each weighted by output at purchasing power parity.

The choice of foreign wages needs some further clarification. It is important to include the industry wages of those countries that are most likely to have offered all transnationals, in Japan's machinery sector, with a viable alternative site for production. The most likely sites will be those that have received the greatest proportion of outward Japanese FDI in the machinery sector and also those countries, which have provided Japan's machinery industries with the largest stock of inward FDI. Unfortunately, the relevant data on sectoral FDI flows are unavailable. However, given the prominence of Japanese transnationals in Japan's machinery sector, it seemed sensible to choose foreign wages - for which there are available data - based upon what appeared to be the most important sites for the location of Japanese affiliates. These foreign wages were, therefore, chosen on the basis of the aggregate dispersion of Japanese manufacturing FDI (see Table (1.1), Chapter (1)) and, for Transport Equipment, on the basis of the location of Japanese affiliates, as reported in Chapter (4). This approach appears reasonable, given the data restrictions and the fact that over 60% of Japanese manufacturing FDI emanates from Japan's machinery sector.

The final variable in the investment function is a measure of Tobin's q. For investment purposes, the focus should be upon marginal and not average q but, for a transnational firm, only average q is observable. In this respect, it could be

considered that the inclusion of both Japanese and foreign wages captures the effects of a change in marginal q abroad on investment in Japan. This is because changes in international labour costs will, indirectly, affect the marginal benefit of investment in Japan. However, in addition to labour costs, Tobin's q should also account for future expectations and, for a transnational firm, reflect differences in international tax rates. The real Japanese share price index, for each industry, was, therefore included, using data taken from The Japanese Statistical Yearbook (various issues). Barro (1990) has argued that stock market prices perform better, empirically, to conventional measures of average q and provide a closer approximation to marginal q. Barro (1990) also suggests that share prices capture new information faster. The empirical superiority of using share prices rather than conventional measures of q is also supported by Blanchard et.al. (1993). The vast majority of transnationals, operating in Japan, are quoted on the Tokyo Exchange and it can be expected that rational market traders will fully discount changes in global conditions – such as changes in international taxation and oil prices - into the share price.

The dependent variable in the labour demand function (12b) is the ratio of total hours worked to the real capital stock (L_i/K_i). The wage variables and the investment rate correspond to those in the investment equation. In addition, the domestic output, for each industry is also included to capture cyclical effects. The output variable is expected to have a positive effect upon labour demand. Japanese wages and the output variable are considered to be contemporaneous with the dependent variable (L_i/K_i), and are treated as endogenous. Similarly, if there is sufficient capacity at each site, the foreign wages are also

contemporaneous, since the transnational will be able to alter the demand for labour at each plant, in order to maintain a given output during each time period.

For each industry, the variables entering the system were tested for unit roots and were I(0). The equations (12a) and (12b) were estimated using the full information system estimator, Three Stage Least Squares (3SLS). This estimator was chosen on the basis that it is asymptotically efficient in minimising the variance-covariance matrix and provides unbiased estimates (see Greene, 1997). The exogenous variables and the lags of the endogenous regressors were utilised as appropriate instruments. In order to find a simple, satisfactory model specification, general to specific modelling was applied with the residuals being tested to check for the desirable properties of a white noise process. Finally, systematic testing was used to find the model's most parsimonious representation.

6.3.2 Empirical Results

The estimated equations, for each industry, are presented in Tables (6.1 (a) to 6.1 (e)). The final results are very interesting and appear to provide strong support for the view that transnational activity has had a real effect within Japan's machinery sector. In particular, the international investment functions appear well specified with the coefficients having the correct *a priori* signs and highly significant t-ratios. Furthermore, the adjusted R^2 values are high and all diagnostic tests are passed[5]. For all industries, there are significant foreign wage variables from each of the North American, European and East Asian economies.

[5] Where the DW statistic is inconclusive, the Ljung-Box statistics indicate no residual autocorrelation.

The significance of the Western wages is particularly interesting as it compares with Hollingsworth's (1997) result, which found that OECD wages were not significant in determining aggregate Japanese manufacturing investment - a result Hollingsworth (1997) attributes to MITI's post Second World War industrial policy, which controlled the activities of transnationals (see Section (6.2.2). Hollingsworth's (1997) conclusions are valid, since, even after the liberalisation of FDI restrictions in 1971, institutions were still in place to monitor and possibly influence transnational activity (see Bailey et.al., 1994a). In this respect, the results in Table (6.1) may indicate that, after 1971, MITI adopted a more liberal policy towards transnationals within the machinery sector. This is quite plausible, since the sector was the Japanese economy's major source of exports and it was also the sector from which Japan's "national champions" originated (see also Chapter (3)). The reasonable conclusion from both Hollingsworth's (1997) study and the results in Table (6.1) is that, in the aggregate, Japanese industrial policy may have been successful in nullifying transnational activity and reducing relative international wage effects. However, the more liberal policy in the machinery industries has resulted in the sector becoming more global and open to transnational activity than Japanese manufacturing as a whole.

The results, for each industry, will now be compared and discussed. As expected, Japanese wages have had a significantly negative effect upon investment in all of Japan's machinery industries. The Japanese own wage elasticities range from –0.782 in Transport Equipment to –0.385 in Agricultural and Industrial Machinery (see Table (6.1)). The sign and size of the foreign wages indicate the nature and

scale of transnational production linkages that have been created between Japan and other economies, in each industry. Given Japan's low inward stock of FDI, these linkages are probably more reflective of the activities of Japanese, rather than foreign, transnationals.

Throughout the machinery sector, the US and European wages have had a positive effect upon Japanese investment, which indicates the direct substitutability of Western and Japanese production. These economies have a long manufacturing tradition within the machinery sector and it would appear that transnationals have been able to exploit both the experience and technological capability, at each location, to develop alternative sites of production. The East Asian economies were late to industrialise but in Fabricated Metal Products, Agricultural and Industrial Machinery and Electrical Machinery and Electric Goods, the positive wage coefficients also indicate that transnationals have also created similar industrial linkages between Japan and the region. These industries produce standardised products and are relatively labour intensive (see Table (2.1), Chapter (2)) and the results probably capture the activities of those Japanese transnationals who have used the Pacific Rim as a direct source of cheap labour.

In contrast, the East Asian wage coefficients are significantly negative for Transport Equipment and Precision Tools. These results are entirely consistent with the respective industry's logistics and would indicate that production at each site is regarded as being complementary. In the case of Transport Equipment, over two-third's of Japan's output is in automobile production which is highly

automated. We have already pointed out, in Chapter (4), that the imposition of high import tariffs on finished cars, throughout the region, meant that it was not cost effective for Japanese manufacturers to operate full car production, in any East Asian economy. However, there is a long history of a vertical production chain, between Japan and the region in the automobile industry (see Dicken, 1998). This is reflected by the significant negative coefficient of –0.379 attributed to Indonesian wages in column (1b) of Table (6.1 (d)). Similarly, column (1b) of Table (6.1 (e)) indicates that, in Precision Tools, significant long-term vertical linkages exist between Japan and, respectively, Indonesia, Singapore and Taiwan. A possible explanation for these vertical linkages is that although the Precision Tools industry is relatively labour intensive, the industry is small and the nature of the output is highly specialised, with many products designed for niche markets such as professional and scientific research. It is quite conceivable that transnationals carry out product development in Japan, and utilise plants in East Asia as part of their downstream operations.

In terms of magnitude, the highest foreign wage coefficients - across the machinery sector - are those of the USA. The US wage elasticities range from 0.985 in Fabricated Metal Products to 2.16 in Transport Equipment. These results suggest a high degree of substitutability of investment between Japan and the USA. We have noted in earlier Chapters the strategic importance of the USA for Japan's machinery transnationals and the results, reported here, would suggest that they have successfully integrated their production operations between the two economies.

The European wage coefficients are rather more inelastic. These wage elasticities range from an estimate of 0.204 for UK wages in Transport Equipment to 0.619, again for UK wages, in Precision Tools. The low elasticities possibly reflect the fact that Japan's transnationals did not start to significantly expand into the region until the early 1980's. In this respect, the fragmented nature of European markets encouraged the early Japanese transnationals to develop a vertical production chain, with final products often being assembled in "screwdriver" facilities, using parts sourced in East Asia. It is only since the subsequent growth in the European single market - and the rise in regional trade barriers - that Japanese transnationals have moved towards full production within the region (see MacKinnon, 1990; Gittelman and Dunning, 1992). Consequently, although strong industrial linkages have now been created, it is quite likely that, over the period estimated, Japanese manufacturing capacity, in Europe, was insufficient, to provide transnationals with a perfect substitute for production in Japan.

The magnitudes of the East Asian wage coefficients are also quite inelastic and, in general, they are lower than the European estimates. This may appear surprising, given the large presence of Japanese transnationals within East Asia and the region's close proximity to Japan. From an empirical perspective, this may reflect the fact that there is a fairly even distribution of Japanese machinery affiliates within East Asia (MITI, 1998). This may have resulted in estimates, which indicate that individual Asian locations are imperfect substitutes for Japanese investment although, for the region as a whole, this may not be the case. In addition, the early strategies of Japan's transnationals were to vertically link domestic production with their offshore plants in East Asia, which were used

as export platforms to Western markets (see Wells, 1993). It is only since the mid-1980's that Japanese transnationals have begun to invest extensively in full production facilities - particularly in the consumer goods industries - within the region (MITI, 1998).

It is interesting to note that the q-variable is very significant and fairly similar in value across the machinery sector, which suggests that the Tokyo stock market is a good indicator of future investment opportunities. The actual size of the q coefficients' range from 0.488, in Transport Equipment, to 0.726 in Electrical Machinery and Electric Goods. These estimates are on the high side when compared with other q studies of investment behaviour (see Galeotti and Schiantarelli, 1991). However, the greater volatility in the results presented here are more a reflection of the international investment environment that transnationals now face, which, of course, is also captured by the significance of the foreign wage variables. Finally, the dummy variable to account for the oil shocks of 1973 and 1979 is, as expected, significant and positive across the machinery sector. This indicates that Japanese policy, to encourage investment in new energy–saving capital goods, had the desired effect.

In comparison to the investment functions, the labour demand estimates are less impressive but, nevertheless, offer support to the conclusions above. In all industries, current Japanese wages are, as expected, negatively related to domestic labour demand, while current output has a significantly positive effect. The lag of investment has a significant negative effect across the sector, which indicates that new capital has been used as a substitute for labour. However, the

magnitude of these coefficients range from –0.068 in Transport Equipment to –0.176 in Agricultural and Industrial Machinery, which suggests that the effect is quite small.

For both Agricultural and Industrial Machinery and Electrical Machinery and Electric Goods, it was found that Japanese labour demand responded to the lag of foreign wages. A possible reason for this is that both of these industries are labour intensive and rely upon large-scale production technologies. It could be that transnationals required a longer time period to install additional capacity in their overseas plants, to facilitate the substitution of foreign for Japanese labour. In the other machinery industries, there was an instant adjustment of Japanese labour demand to foreign wage changes, which would indicate spare capacity at each location.

The most important foreign wages are those of the USA, which is consistent with the conclusions drawn from the investment equations. Across the machinery sector, the US wage elasticities for Japanese labour demand are positive but inelastic, suggesting there is not perfect substitutability. The size of the European and East Asian wage coefficients are lower and, in some cases, it appears that whilst these wages may have affected Japanese investment, they do not appear to have correspondingly affected labour demand. These low foreign wage elasticities may reflect capacity constraints at overseas sites, although longer lag structures did not appear to be significant. Another possibility is that the existence of labour market institutions may have diminished the possibility of labour substitution between these economies and Japan. With regards to the East

Asian wages, the fact that only those from South Korea, in the case of Fabricated Metal Products, and Malaysia, in Electrical Machinery and Electric Goods, were significant may indicate the existence of collinearity between these wage variables. The unexpected (significant) negative signs on Indonesian wages in the labour demand equations for Transport Equipment and Precision Tools is a concern, although the coefficient's small value suggests it is not important.

6.4 Some Further Evidence of the Real Effects of Global Outsourcing

6.4.1 Overview

The sensitivity of Japan's machinery sector's domestic investment and labour demand to changes in international cost conditions, reflect the dominance of transnationals and the significance of transnational production networks within Japanese manufacturing. The results in Section (6.3) also reflect the direct substitutability of Japanese and foreign production. In this respect, the results are also supported by survey evidence from Japanese manufacturers, who are increasingly sourcing production from overseas sites, because of lower production costs (Nikkei Weekly, 13/8/2001).

In Chapter (3), Table (3.2) highlighted the extent to which Japan's transnationals have increased their global outsourcing. This increase in global outsourcing has raised a number of concerns about the real effects of overseas production upon Japan's domestic industry. For instance, we noted in Chapter (3) that the Japanese Electronics Industry Association has raised concerns that global outsourcing has been a substitute for domestic production and has led to domestic stagnation (EIAJ, 1997). Furthermore, in Chapters (4) and (5), we

noted a similar trend within the automobile industry. Given the nature of Japanese transnational networks and the move towards substituting overseas for Japanese production, this Section now considers some anecdotal evidence, to examine the real effects of global outsourcing within the machinery sector. The evidence presented considers the real effects upon Japan's small firms, problems of regional "hollowing out" and also possible macro-economic effects.

6.4.2 The Isolation of Japan's Small Keiretsu Firms

The first observation is that due to their increasing involvement in transnational production networks, Japan's large corporate firms have established a stronger bargaining position vis-à-vis their smaller (domestic) *keiretsu* partners. In this respect, surveys consistently show that Japan's smaller firms have experienced a significant fall in order books and have felt under severe pressure to accept lower profit margins because of their main contractor's threat of global sourcing (see for instance, JSBRI, 1996). An indication of this new environment is, of course, Nissan's greater emphasis upon global sourcing and its ultimatum to its smaller keiretsu partners to reduce costs or lose future contracts (see Chapter (5) and also Nikkei Weekly, 25/10/99, 21/5/2001).

The increased global activities of Japan's corporate firms have led to a weakening of the traditional Japanese *keiretsu* relationships, and has left many of Japan's smaller firms feeling isolated. The procurement of intermediate goods, from Japan, for instance, fell by a third in the decade between 1986 and 1996, while there was a notable increase in component sourcing from East Asia (MITI,

1998)[6]. For Japan's small *keiretsu* firms, the problems posed by global sourcing are particularly acute, since over 80% of them are "locked in" to vertical relationships with their main contactor (see Chapter (2)). Consequently, global outsourcing has created a demand crisis for the *keiretsu*, often leaving small firms with insufficient revenue to repay long-term loan commitments. Furthermore, the inability of Japan's small firm sector to diversify, and its over-reliance upon the Corporate Group, has been a key contributor to their faltering financial performance and the unprecedented rise in the number of small firm bankruptcy cases during the 1990's (JSBRI, 1996, Nikkei Weekly, 19/10/1998). In this respect, the profitability of Japan's small firms was significantly lower throughout the 1990's - when the Japanese economy was more sensitive to transnational activity - than in earlier periods (see Table (6.2)). Furthermore, the decline was particularly profound within the machinery industries - Japan's most global sector - where small firms have seen their Gross Profit Margins fall by almost 60% and the Return on Capital fall by approximately 45% since the mid-1980's (see Table (6.2))[7].

At this point, we should note that while we have emphasised the negative consequences of outsourcing for Japan's small firms, Whittaker (1997, p.60) maintains *"small firms are not simply passive victims of internationalisation..... such pressures act as a spur for further innovation"*.

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[6]Procurement from Japan is on a downward trend. In 1986, Japanese offshore affiliates procured 55% of all inputs from Japan. In 1996, this had fallen to 37% (MITI, 1998). MITI (2000) has noted that procurement rates from Japan continue to fall. In 1998, reverse imports accounted for 14% of all Japanese imports, compared with 4.5% in 1986. Japan's East Asian affiliates account for over 80% of all reverse imports and have increased four-fold during the 1990's (MITI, 2000).

[7] To some extent, the data in Table (6.2) reflects Japan's long cyclical downturn since the late 1980's. However, it is highly probable that the problems for Japan's small firms have been exacerbated by the global activities of Japan's transnational corporations (see Cowling and Tomlinson, 2000).

He notes that Japan's small firms *"have established their own regional division of labour (within Asia) through trading and manufacture abroad, either individually or in consortia"* (p. 60). Yet further on, Whittaker (1997, p.60) is aware that *"surveys show that many small firms either pull out or "fade out" (i.e. divest) their foreign investments, with serious consequences for the company"*. It seems fairly clear then, that moving offshore is a very different proposition for the small Japanese firm than it is for the corporate giant.

6.4.3 Regional "Hollowing Out"

The problems experienced by Japan's small firms and the growth in overseas production has raised the prospect of a "hollowing out" (*kūdoka*) of Japanese industry. This occurs when the higher profitability of overseas production reduces the relative importance of Japan's core domestic industrial base. This eventually leads to a decline in Japanese international competitiveness, de-industrialisation and the problem of "structural holes", where once prosperous manufacturing regions experience long-term social and economic decline.

A clear example of "hollowing out" can be seen in the Ota-ku Ward of Tokyo, once a large urban industrial area, which thrived upon promoting "specialist networks" of *keiretsu* firms within the machinery sector. In recent years, the area has experienced a dramatic contraction in industrial activity, as small firms have struggled to sustain demand, while others have followed their main contractor(s) overseas, in order to maintain their vertical supply chains (as clearly evident in the automobile industry). Reports suggest that Ota-ku will lose its "specialist

networks" completely, reducing the area's functional vitality and raising the spectre of long-term economic decline (JSBRI, 1996).

More generally, the "hollowing out" of Japanese manufacturing industry and the machinery sector can be seen in Table (6.3). In all prefectures and across industrial sectors, Japan has experienced a significant decline in real output, the number of business establishments and employment during the 1990's. The depression appears to have affected both the machinery and non-machinery sectors with equal magnitude, particularly in terms of lost jobs and factories (see Table (6.3)). At the regional level, the large industrial belts of Kanagawa, Tokyo, Osaka and Saitama, which all rely heavily upon Japan's large (global) machinery corporations, have particularly seen a significant fall in industrial capacity and now experience higher than the national average rate of unemployment.

Interestingly, the decline of the machinery sector in the neighbouring Aichi and Shizuoka prefectures was less marked than in the other major industrial belts - although the non-machinery sector has suffered considerably (see Table (6.3)). The relative insulation of Aichi's machinery sector may reflect the fact that it still remains at the core of Toyota's global operations, particularly for research and development and the testing of new products (Ruigrok and Tate, 1996). Similarly, Shizuoka prefecture contains the city of Hamamatsu, which remains at the centre of Honda's global motorcycle business. In addition, Hamamatsu is regarded as a high-tech industrial city that, to some extent, has successfully been able to take advantage of regional assistance through MITI's Technopolis Program (see Chapter (7); Whittaker, 1997, p48-49). It could be that, in the

machinery sector at least, Toyota's continuing commitments in Aichi and the relative success of Hamamatsu City have, so far, been partial antidotes to the effects of globalisation. However, as the pace of globalisation continues, it is likely that both the strategic importance of Toyota City, in Aichi and Hamamatsu City, in Shizuoka, to Toyota and Honda will weaken, as offshore production becomes more attractive. If this occurs, the machinery industries in both Aichi and Shizuoka prefectures will face serious long-term decline.

At this point, we should note that Ozawa (1991, 1992) has argued that the growth in outsourcing is an opportunity for Japanese industry to restructure and upgrade its manufacturing technology by re-deploying resources into the development of higher value added products, while traditional, declining industries are moved offshore. The theory is that this will lead to a "flying geese formation" of production, where advanced technological work is done in Japan, medium value added work is done in the Newly Industrialised Economies (NIEs) and so on throughout Asia. The benefits of this pattern are seen as a combination of rising technological standards and the extension of product life cycles beyond Japanese and Western markets.

However, in the 1990's, Ozawa's arguments would appear to have lost their validity. Japanese offshore affiliates are increasingly being used as a direct substitute for production and, in some cases, for product development (JSBRI, 1996). In this respect, Beamish et.al (1997, p.26) report a notable change in the strategy of Japanese transnationals, from establishing offshore "*assembly (plants), using parts sourced in Japan, to full manufacturing, to, in some cases,*

R&D located in the host country". According to the Nikkei Weekly (18/6/2001, p.4), the rising technological competence of the NIEs has led "*to an increasing number of (Japanese) firms transferring research and development activities, once considered the epitome of Japanese excellence, to (Asian) offshore affiliates*". Whittaker (1997, p58) has also noted that, in production, it now only takes a matter of months before the latest Japanese designed, sophisticated products are able to be manufactured offshore - in East Asia - to serve both the Japanese and Western markets. Furthermore, as these trends continue, it is only a matter of time before similar outsourcing takes place in Japan's new higher value-added industries, particularly in higher technology and computer research. Indeed, in a 1996 JSBRI survey, it was predicted that, by 2001, the proportion of overseas production in these more profitable sectors, would increase by 150%, while the comparable prediction for lower value-added products was an increase of 30% (JSBRI, 1996).

These trends have become widely apparent in Japan's machinery industries, raising genuine concerns of a "hollowing out" of Japanese industry. De-industrialisation in Japan's industrial belts hampers the country's long-term prospects for economic recovery and a revival in manufacturing employment (EPA, 1995). At the regional level, the decline of Japan's small firm base and the loss of industrial vitality in the industrial districts, weaken the capability for self-regeneration. The contraction of Japan's *keiretsu* networks also reduces the potential for agglomeration economies, which contribute to Total Factor Productivity (TFP) and economic growth. Indeed, in the latter respect, studies have shown that Japan's TFP growth, has been declining in all of Japan's major

industrial sectors during the 1990's (Jones, 1995, JETRO, 1997). The decline in Japanese TFP growth appears to correspond with the growth in globalisation and the deterioration in Japan's domestic, manufacturing base.

6.4.4 Possible Macro-economic Effects

At the aggregate level, the growth in Japanese transnational activity will have a real effect upon both the short and long-term performance of Japan's macro economy. Initially, the growth in global outsourcing might adversely affect Japan's current account in the Balance of Payments, which, in turn, will lower both domestic output and manufacturing employment. Furthermore, as we noted in Section (6.4.3), the demise of the *keiretsu* relationships and the transfer of higher value added activities overseas will, in the long run, reduce both total factor productivity and economic growth.

In this respect, MITI (1998) provide some (preliminary) empirical evidence, which may suggest a causal link between Japan's current economic stagnation and global outsourcing. Based on information from their annual surveys of Japanese transnationals, MITI occasionally publish estimates of the net effects of overseas production upon Japan's trade balance. These calculations are then extrapolated to provide estimates of the real effects of global outsourcing for both Japan's domestic production and employment. The calculations take account of both the positive and negative aspects of global outsourcing and include both export induction effects, such as the procurement of capital and intermediate goods from Japan, along with estimated export substitution and reverse import effects.

In Figure (6.1), the net real effects of Corporate Japan's overseas production, on both the trade balance and domestic output, are shown. The graphs clearly show that, since 1992, there has been an increasingly negative impact upon the domestic Japanese economy. With regards to the trade balance, there are particular concerns about the significant rise in the proportion of reverse imports, from overseas affiliates, into Japan. In 1996, these accounted for 11.2% of Japan's total imports, of which 80% were from Asia (MITI, 1998). This negative impact of Japanese outsourcing may (partially) explain the recent decline, in both nominal and real terms, of Japan's persistent long running trade surplus which has, in turn, contributed to the stagnant growth in domestic output (Japanese Statistical Yearbook, 2001).

MITI (1998) have also estimated that the impact of global outsourcing upon output weakens Japanese GDP growth by 0.66% per annum. These trends also reduce the level of Japan's domestic employment as foreign labour is increasingly used as a substitute for Japanese production (see Figure (6.2)). Between 1992 and 1996, Japanese manufacturing employment fell by over one million, and according to Figure (6.2), approximately 35% of lost jobs were due to global outsourcing. It is worth noting that, over the same period, the number of workers employed in Japanese overseas (manufacturing) subsidiaries more than doubled to 2.22 million (see Table (3.2), Chapter (3)).

6.5 Concluding Comments

This Chapter has considered the real effects of transnational activity and, in particular, the significance of transnational production networks - *the new keiretsu* - for Japan's domestic machinery sector. We have argued that, by adopting "divide and rule" strategies, Japan's transnationals have had a real effect upon the behaviour of domestic economic variables, small firm performance and the structure of industrial production. There have also been particular concerns that the increasing move towards overseas production has exacerbated a "hollowing out" of Japanese industry. These concerns are real, given the disproportionate balance between Japan's outward and inward stock of FDI.

In order to capture the real effects of transnational activity, this Chapter employed an indirect approach, which was adapted from a model proposed by Hollingsworth (1997). This involved including relevant foreign wage variables in a domestic production function. The empirical results suggested that, for each of Japan's machinery industries, both investment and labour demand are highly sensitive to international wage effects. These results illustrate the ability of transnationals to substitute foreign for Japanese production. The results differed from Hollingsworth's (1997) aggregated study, in that both US and European wages were found to be significant in determining Japanese machinery sector investment. Indeed, in our study, changes in US wages appeared to have the largest effect upon Japanese investment. Both sets of results do, however, appear consistent, when considered in the light of Japanese industrial policy. At the aggregate level, industrial policy may have nullified the effects of changes in

international wages. However, this is not the case in the machinery sector, where a more liberal policy was adopted.

The empirical results were also important in that they allowed us to identify the nature and scale of industrial linkages, which have been created through transnational production networks. It appears that, for all industries, there is a direct substitutability of production between Japan and the Western economies and similarly between Japan and East Asia in Fabricated Metals, Agricultural and Industrial Machinery and Electrical Machinery and Electric Goods. The foreign wage elasticities indicated the degree of substitutability between Japan and the other economies. In Transport Equipment and Precision Tools, there appeared to be strong vertical linkages between Japan and East Asia.

The Chapter also considered the implications of diverting investment away from Japan and substituting foreign for Japanese labour through global outsourcing. In particular, we noted the isolation of Japan's important small firm sector, particularly within the machinery sector. There are also serious concerns about de-industrialisation and the regional "hollowing out" of Japan. At the aggregate level, the real effects of transnational activity also appear to manifest themselves in contributing to lower output and TFP growth and higher unemployment. Such economic problems warrant an appropriate policy response. In the light of our results in this and previous Chapters, we will now consider possible policy options, for the Japanese State and MITI, in the final Chapter.

6.6 Data Sources

The data is annual for the period 1968-1994. All indices are defined equal to 100 in the base year 1990. Where applicable, data is converted into US dollars ($), at current exchange rates quoted in the International Monetary Fund's IFS Yearbook. For each industry, data was collated for the following variables:

K – *Real Gross Capital Stock.* Source: OECD (1997).

I - *Real Gross Investment. Source:* Source: OECD (1997).

L – *Total Labour Hours Worked.* Defined as Number of employees * Total Hours Worked per employee (assuming 52 weeks in a year). Sources: UNIDO (1998), ILO (various years).

w – *Index of Hourly Wages.* Defined as Total Labour Compensation/Total Labour Hours Worked. Sources: UNIDO (1998), ILO (various years).

p – *Average of Producer Price Indices for USA, UK and Japan* (weighted by output at purchasing power parity). Sources: US Bureau of Labour Statistics, UK Office for National Statistics and Statistics Bureau, Government of Japan.

q – *Real Stock Price Index.* Source: Statistics Bureau, Government of Japan.

Y – *Index of Real Japanese Output.* Source: UNIDO (1998).

Table (6.1a)

Investment and Labour Demand Estimates for Japan's Machinery Sector 1968-1994

Fabricated Metal Products Industries

Three Stage Least Squares (Simultaneous Equations) Estimation

	Investment Estimates		Labour Demand Estimates	
Variable	$\Delta \ln I_t/K_{t-1}$ (1a)	$\Delta \ln I_t/K_{t-1}$ (1b)	$\Delta \ln L_t/K_t$ (2a)	$\Delta \ln L_t/K_t$ (2b)
Constant	-0.106*** (-4.57)	-0.11*** (-4.617)	-0.0536*** (-3.644)	-0.0507*** (-3.729)
Japan $\Delta \ln (I_{t-1}/K_{t-2})$	0.123 (1.30)		-0.095** (-2.13)	-0.079* (-1.89)
Japan $\Delta \ln (L_{t-1}/K_{t-1})$			0.496*** (3.90)	0.493*** (3.92)
Japan $\Delta \ln (w/p)_t$			-0.088 (-1.58)	-0.093* (-1.88)
Japan $\Delta \ln (w/p)_{t-1}$	-0.637*** (-4.62)	-0.665*** (-4.679)		
USA $\Delta \ln (w/p)_t$			0.217** (2.165)	0.2037* (2.21)
USA $\Delta \ln (w/p)_{t-1}$	1.048*** (3.43)	0.985*** (3.16)		
UK $\Delta \ln (w/p)_t$			0.029 (0.506)	
UK $\Delta \ln (w/p)_{t-1}$	0.438*** (2.82)	0.435*** (2.70)		
South Korea $\Delta \ln (w/p)_t$			0.0589 (1.457)	0.063 (1.61)
South Korea $\Delta \ln (w/p)_{t-1}$	0.380*** (3.53)	0.388*** (3.486)		
Singapore $\Delta \ln (w/p)_{t-1}$	0.191* (1.80)	0.197* (1.82)	0.019 (0.533)	
Japan $\Delta \ln q_{t-1}$	0.477*** (5.42)	0.492*** (5.482)		
Japan $\Delta \ln Y_t$			0.231** (2.27)	0.237** (2.36)
Oil Shock(s) Dummy	0.126** (2.08)	0.106* (1.729)		
R-Bar Squared	0.72	0.71	0.57	0.61
Durbin Watson	2.02	2.01	2.60	2.69
Jarque-Bera $\chi^2(2)$	0.92 [0.63]	0.99 [0.61]	0.37 [0.83]	0.55 [0.75]
Ljung-Box Q(4)	4.31 [0.36]	4.47 [0.48]	6.35 [0.17]	7.55 [0.11]
Heteroscadasticity	0.48 [0.89]	0.64 [0.78]	1.11 [0.47]	1.57 [0.23]
Wald		1.69 [0.19]		0.49 [0.78]

Notes: The results were estimated by Eviews (version 3.1). The associated t-ratios are in parenthesis beneath the estimated coefficients and *** indicates statistically significant at the 1% level, ** at 5% and * at 10%.
The test for normality is the Jacque-Bera $\chi^2(2)$ test. Q(n) is the Ljung-Box χ^2statistic, for serial correlation, with n degrees of freedom. The test for heteroscadasticity is White's test (1980), which asymptotically follows a χ^2 distribution, with degrees of freedom equivalent to the number of slope coefficients in the test regression. Finally, these diagnostic tests have computer-generated probabilities (in parenthesis) indicating the probability of accepting the null hypothesis of no model misspecification. The Wald test is used as a variable deletion test, imposing a linear restriction that coefficient values are zero.

Table (6.1b)

Investment and Labour Demand Estimates for Japan's Machinery Sector 1968-1994

Agricultural and Industrial Machinery Industries

Three Stage Least Squares (Simultaneous Equations) Estimation

	Investment Estimates		Labour Demand Estimates	
Variable	$\Delta \ln I_t/K_{t-1}$ (1a)	$\Delta \ln I_t/K_{t-1}$ (1b)	$\Delta \ln L_t/K_t$ (2a)	$\Delta \ln L_t/K_t$ (2b)
Constant	-0.127*** (-4.669)	-0.125*** (-4.903)	-0.057** (-2.39)	-0.050*** (-2.818)
$\Delta \ln (I_{t-1}/K_{t-2})$ Japan	0.218* (1.78)	0.262** (2.30)	-0.138 (-1.507)	-0.176 (-2.809)
$\Delta \ln (L_{t-1}/K_{t-1})$ Japan			0.277 (1.215)	0.379** (2.417)
$\Delta \ln (w/p)_t$ Japan			-0.396** (-2.46)	-0.296** (-2.519)
$\Delta \ln (w/p)_{t-1}$ Japan	-0.369* (-1.94)	-0.385** (-2.121)		
$\Delta \ln (w/p)_{t-1}$ USA	1.808*** (3.29)	1.964*** (3.83)	0.918** (2.35)	0.716*** (2.91)
$\Delta \ln (w/p)_{t-1}$ UK	0.158 (0.917)		-0.060 (-0.605)	
$\Delta \ln (w/p)_{t-1}$ Germany	0.236 (1.379)	0.326** (2.27)	0.074 (0.599)	
$\Delta \ln (w/p)_{t-1}$ Malaysia	0.057 (0.298)		-0.039 (-0.400)	
$\Delta \ln (w/p)_{t-1}$ Singapore	0.293 (1.565)	0.334** (2.015)	0.048 (0.439)	
$\Delta \ln q_{t-1}$ Japan	0.546*** (6.18)	0.525*** (6.208)		
$\Delta \ln Y_t$ Japan			0.202* (1.96)	0.218** (2.91)
Oil Shock(s) Dummy	0.365*** (4.81)	0.390*** (5.466)		
R-Bar Squared	0.69	0.72	0.34	0.59
Durbin Watson	1.52	1.58	2.06	2.12
Jarque-Bera $\chi^2(2)$	1.10 [0.57]	1.33 [0.51]	4.73 [0.09]	1.52 [0.47]
Ljung-Box Q(4)	2.04 [0.73]	2.41 [0.66]	6.10 [0.19]	2.9 [0.57]
Heteroscadasticity	1.34 [0.36]	1.09 [0.44]	0.45 [0.91]	0.89 [0.57]
Wald		0.84 [0.66]		0.67 [0.95]

Table (6.1c)

Investment and Labour Demand Estimates for Japan's Machinery Sector 1968-1994

Electrical Machinery and Electric Goods Industries

Three Stage Least Squares (Simultaneous Equations) Estimation

	Investment Estimates		Labour Demand Estimates	
Variable	$\Delta \ln I_t/K_{t-1}$ (1a)	$\Delta \ln I_t/K_{t-1}$ (1b)	$\Delta \ln L_t/K_t$ (2a)	$\Delta \ln L_t/K_t$ (2b)
Constant	-0.297*** (-13.89)	-0.296*** (-13.76)	-0.092*** (-3.069)	-0.0957*** (-5.228)
Japan $\Delta \ln (I_{t-1}/K_{t-2})$	-0.006 (-0.128)		-0.179*** (-3.102)	-0.137*** (-3.438)
Japan $\Delta \ln (L_{t-1}/K_{t-1})$			0.196 (0.921)	
Japan $\Delta \ln (w/p)_t$			-0.285* (-1.895)	-0.333*** (-3.132)
Japan $\Delta \ln (w/p)_{t-1}$	-0.598*** (-5.96)	-0.613*** (-6.426)		
USA $\Delta \ln (w/p)_{t-1}$	1.806*** (6.07)	1.897*** (7.436)	0.343 (1.022)	0.452* (1.65)
UK $\Delta \ln (w/p)_{t-1}$	0.079 (0.80)		0.022 (0.179)	
Germany $\Delta \ln (w/p)_{t-1}$	0.527*** (5.41)	0.556*** (6.89)	0.112 (0.809)	
Malaysia $\Delta \ln (w/p)_{t-1}$	0.359*** (2.85)	0.329*** (2.875)	0.366** (2.27)	0.180* (1.810)
Singapore $\Delta \ln (w/p)_{t-1}$	0.288*** (3.96)	0.286*** (4.01)	-0.033 (-0.412)	
South Korea $\Delta \ln (w/p)_{t-1}$	0.161*** (2.53)	0.172** (2.703)		
Taiwan $\Delta \ln (w/p)_{t-1}$	0.531*** (7.17)	0.532*** (7.267)	0.049 (0.692)	
Japan $\Delta \ln q_{t-1}$	0.741*** (13.34)	0.726*** (14.67)		
Japan $\Delta \ln Y_t$			0.149 (0.966)	0.351** (2.035)
Oil Shock(s) Dummy	0.408*** (11.61)	0.415*** (12.79)		
R-Bar Squared	0.94	0.95	0.44	0.59
Durbin Watson	2.08	2.19	1.63	1.42
Jarque-Bera $\chi^2(2)$	0.25 [0.88]	0.27 [0.87]	0.19 [0.90]	0.42 [0.81]
Ljung-Box Q(4)	4.26 [0.37]	2.86 [0.58]	4.77 [0.31]	11.6 [0.07]
Heteroscadasticity	1.27 [0.48]	0.47 [0.90]	4.54 [0.12]	0.77 [0.65]
Wald		0.65 [0.72]		2.55 [0.77]

Table (6.1d)

Investment and Labour Demand Estimates for Japan's Machinery Sector 1968-1994

Transport Equipment Industries

Three Stage Least Squares (Simultaneous Equations) Estimation

	Investment Estimates		Labour Demand Estimates	
Variable	$\Delta \ln I_t/K_{t-1}$ (1a)	$\Delta \ln I_t/K_{t-1}$ (1b)	$\Delta \ln L_t/K_t$ (2a)	$\Delta \ln L_t/K_t$ (2b)
Constant	-0.048** (-2.469)	-0.048** (-2.513)	-0.088*** (-4.440)	-0.901*** (-13.25)
Japan $\Delta \ln (I_{t-1}/K_{t-2})$	-0.032 (-0.343)		-0.087* (-1.984)	-0.0686** (-2.502)
Japan $\Delta \ln (L_{t-1}/K_{t-1})$			0.026 (0.131)	
Japan $\Delta \ln (w/p)_t$			-0.192*** (-4.30)	-0.171*** (-4.168)
Japan $\Delta \ln (w/p)_{t-1}$	-0.810*** (-5.914)	-0.782*** (-6.993)		
USA $\Delta \ln (w/p)_t$			0.653*** (3.05)	0.699*** (3.553)
USA $\Delta \ln (w/p)_{t-1}$	2.22*** (3.122)	2.16*** (3.70)		
UK $\Delta \ln (w/p)_{t-1}$	0.218 (1.511)	0.204* (1.939)	0.048 (1.13)	
Indonesia $\Delta \ln (w/p)_t$			-0.0466* (-1.77)	-0.046* (-1.95)
Indonesia $\Delta \ln (w/p)_{t-1}$	-0.398*** (-5.467)	-0.379*** (-6.068)		
Malaysia $\Delta \ln (w/p)_t$			0.027 (0.321)	
Malaysia $\Delta \ln (w/p)_{t-1}$	-0.0048 (-0.025)			
Japan $\Delta \ln q_{t-1}$	0.499*** (5.039)	0.488*** (7.335)		
Japan $\Delta \ln Y_t$			0.284*** (3.215)	0.309*** (3.849)
Oil Shock(s) Dummy	0.199*** (4.507)	0.203*** (4.786)		
R-Bar Squared	0.82	0.84	0.70	0.75
Durbin Watson	1.54	1.51	2.04	1.86
Jarque-Bera $\chi^2(2)$	2.63 [0.27]	3.42 [0.18]	0.77 [0.68]	0.16 [0.92]
Ljung-Box Q(4)	1.11 [0.89]	1.47 [0.83]	4.38 [0.35]	4.03 [0.40]
Heteroscadasticity	1.14 [0.45]	0.49 [0.87]	2.11 [0.18]	2.6 [0.10]
Wald		0.19 [0.90]		1.31 [0.72]

Table (6.1e)

Investment and Labour Demand Estimates for Japan's Machinery Sector 1968-1994

Precision Tools Industries

Three Stage Least Squares (Simultaneous Equations) Estimation

	Investment Estimates		Labour Demand Estimates	
Variable	$\Delta \ln I_t/K_{t-1}$ (1a)	$\Delta \ln I_t/K_{t-1}$ (1b)	$\Delta \ln L_t/K_t$ (2a)	$\Delta \ln L_t/K_t$ (2b)
Constant	-0.026 (-0.849)	-0.030 (-0.965)	-0.149*** (-11.49)	-0.161*** (-15.474)
Japan $\Delta \ln (I_t/K_{t-1})$			-0.168*** (-2.92)	-0.166*** (-3.702)
Japan $\Delta \ln (I_{t-1}/K_{t-2})$	0.009 (0.114)		-0.097** (-2.571)	-0.077** (-2.589)
Japan $\Delta \ln (L_{t-1}/K_{t-1})$			0.0899 (1.018)	
Japan $\Delta \ln (w/p)_t$			-0.078* (-1.80)	-0.100** (-2.313)
Japan $\Delta \ln (w/p)_{t-1}$	-0.342** (-2.298)	-0.403*** (-3.003)		
USA $\Delta \ln (w/p)_t$			0.354* (2.019)	0.336** (2.262)
USA $\Delta \ln (w/p)_{t-1}$	1.314*** (4.29)	1.317*** (4.356)		
UK $\Delta \ln (w/p)_t$			0.171*** (2.846)	0.151*** (3.666)
UK $\Delta \ln (w/p)_{t-1}$	0.730*** (4.94)	0.619*** (4.597)		
Germany $\Delta \ln (w/p)_t$			-0.027 (-0.57)	
Germany $\Delta \ln (w/p)_{t-1}$	-0.161 (-1.302)			
Indonesia $\Delta \ln (w/p)_t$			-0.044** (-2.26)	-0.045** (-2.284)
Indonesia $\Delta \ln (w/p)_{t-1}$	-0.397*** (-5.633)	-0.417*** (-5.946)		
Singapore $\Delta \ln (w/p)_t$				
Singapore $\Delta \ln (w/p)_{t-1}$	-0.546*** (-3.299)	-0.496** (-3.022)		
Taiwan $\Delta \ln (w/p)_t$			-0.0344 (-1.316)	
Taiwan $\Delta \ln (w/p)_{t-1}$	-0.229** (-2.199)	-0.221** (-2.103)		
Japan $\Delta \ln q_{t-1}$	0.483*** (5.925)	0.492*** (6.008)		
Japan $\Delta \ln Y_t$			0.608*** (7.056)	0.617*** (8.456)
Oil Shock(s) Dummy	0.414*** (5.143)	0.429*** (5.233)		
R-Bar Squared Durbin Watson Jarque-Bera $\chi^2(2)$ Ljung-Box Q(4) Heteroscadasticity Wald	0.81 2.11 0.59 [0.75] 3.26 [0.52] 0.51 [0.84]	0.83 1.97 0.91 [0.63] 3.04 [0.55] 1.04 [0.51] 1.71 [0.43]	0.82 2.24 0.01 [0.99] 4.77 [0.31] 3.87 [0.38]	0.84 1.68 0.19 [0.91] 4.63 [0.33] 0.64 [0.77] 3.24 [0.36]

Table (6.2) The Financial Performance of Japan's Small Firms, in the Machinery Sector

	All Manufacturing	Fabricated Metal Products	General Machinery	Electrical Machinery	Transport Equipment	Precision Tools
Gross Profit Margin						
1980-1984	2.5	2.9	3.8	2.8	2.3	4.0
1985-1989	3.1	4.2	3.6	3.5	2.9	3.7
1990-1994	2.4	3.2	2.2	2.2	2.6	2.7
1995-1998	1.7	1.8	2.2	2.0	1.3	3.1
Return on Capital Employed						
1980-1984	5.3	5.5	6.4	6.3	5.0	7.5
1985-1989	5.4	6.0	5.5	6.1	5.1	5.4
1990-1994	4.3	4.9	4.3	4.5	4.5	4.7
1995-1998	2.9	2.9	3.3	3.4	2.6	4.1

Source: Japanese Statistical Yearbook (various issues).
Notes: Small Firms relate to companies with less than 300 employees.
Gross Profit Margin = Ratio of Gross Profit/Sales.
Return on Capital Employed (ROCE) = Ratio of Recurring Profits to Total Capital.

Table (6.3)
The "Hollowing Out" of Japanese Manufacturing Industry (By Prefecture) 1990-1998

		Total Machinery Sector			Total Non Machinery Sector		
Prefecture	**Unemployment Rate % (1995)**	**% Decline in Real Output (1990-1998)**	**% Decline in Number of Establishments (1990-1998)**	**% Decline in Employment (1990-1998)**	**% Decline in Real Output (1990-1998)**	**% Decline in Establishments (1990-1998)**	**% Decline in Employment (1990-1998**
Aichi (1)	3.7	2.9	7.6	7.5	15.5	17.0	14.8
Kanagawa (19)	4.6	3.7	14.6	23.1	11.7	10.8	11.0
Shizuoka (38)	3.5	5.4	6.4	6.7	11.8	10.3	9.6
Tokyo (41)	4.9	16.7	21.0	25.3	13.2	12.5	14.2
Osaka (33)	6.2	4.5	18.7	19.8	23.7	12.6	17.3
Saitama (35)	4.4	10.1	16.0	21.8	11.7	13.3	9.1
Hyogo (13)	5.1	2.1	11.7	12.1	17.1	20.1	18.3
Gumma (10)	3.7	1.3	10.9	10.2	3.7	12.2	7.2
Nagano (26)	2.5	17.6	19.0	14.6	6.7	12.3	11.9
Tochigi (39)	3.7	7.9	9.8	12.2	+1.8*	11.6	9.1
Mie (23)	3.4	1.1	8.3	5.6	14.3	13.8	14.9
Hiroshima (11)	3.7	1.1	6.7	13.0	22.5	17.1	19.1
Ibaraki (14)	3.7	10.1	10.3	13.8	17.0	8.3	5.0
Chiba (4)	4.3	7.4	8.4	15.0	9.0	7.2	9.6
Fukuoka (7)	5.5	2.2	2.5	10.4	14.8	10.1	12.7
Rest of Japan	3.9	7.7	8.5	8.7	9.2	14.4	13.7
Japan	4.2	8.3	12.3	13.1	11.3	13.7	13.4

Source: Japanese Statistical Yearbook (Various Issues)

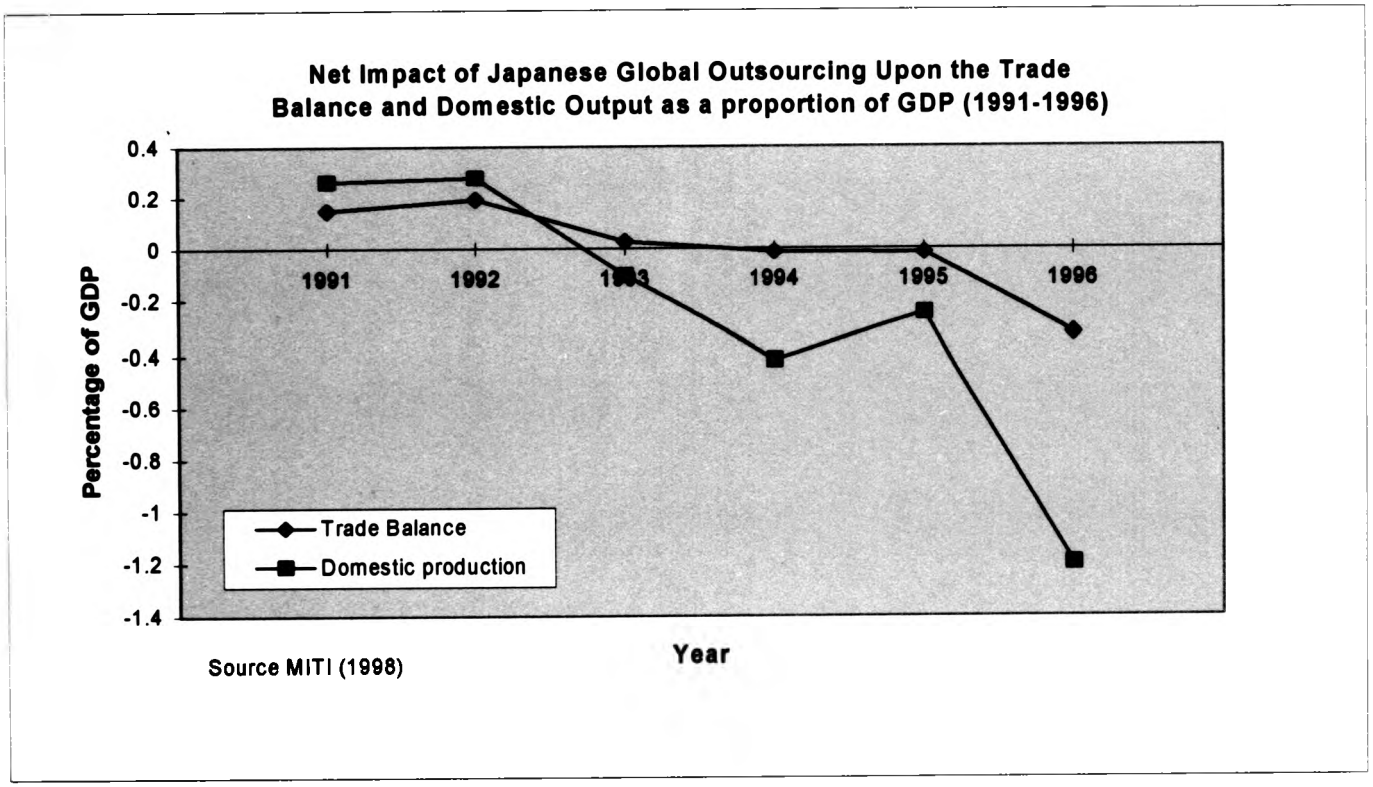
Notes:

i). The Administrative Division is listed in parenthesis (see the map in Figure (2.1)).

ii) The table shows the 15 main Japanese Prefectures, where the machinery sector is concentrated.

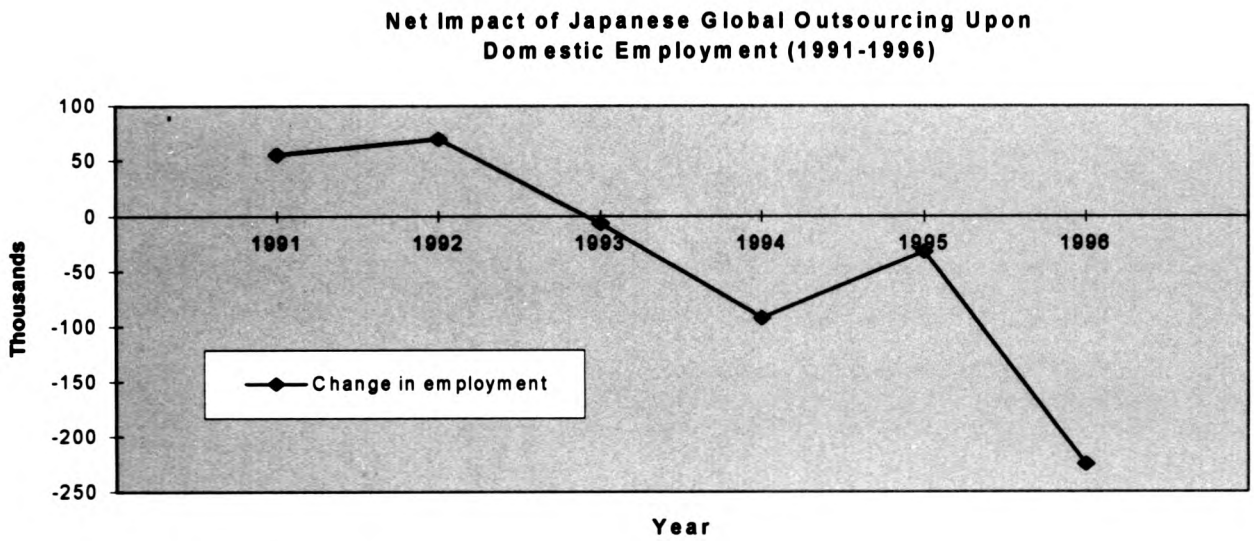
iii) * Tochigi actually recorded positive real output growth in non-machinery sector industries over the period.

Figure 6.1



Source MITI (1998)

Figure 6.2



Source: MITI (1998)

Chapter (7)

Review, Ways Forward for Industrial Policy and Future Research Possibilities[1]

7.1. Review

This thesis has examined the nature of the Japanese transnational corporation and considered some of the real effects of globalisation within Japan's machinery sector. One of the main arguments in this thesis is that the activities of Japan's large transnationals have precipitated a "hollowing out" of industrial Japan. This thesis has examined this argument using a mixed methodological approach, drawing upon a synthesis of the existing literature and using both qualitative and quantative techniques. In particular, we have argued that the roots of Japanese transnationality, the globalisation of the machinery sector, the nature of the *new keiretsu* networks and the "hollowing out" of Japanese manufacturing are intrinsically linked to Japan's domestic industrial structure. We now briefly review the main arguments, before considering possible ways forward for Japanese industrial policy and a possible future research agenda.

The main characteristics of Japan's industrial structure were reviewed in Chapter (2). The nature of Japanese industrial organisation primarily consists of *keiretsu* networks of subcontractors, who provide intermediate goods and services to larger corporations, in so-called "company castle towns". Interestingly, this pyramidal structure was actively encouraged through Japanese industrial policy,

[1] The policy proposals in this Chapter are also pursued in Cowling and Tomlinson (2002).

which contained an inherent bias towards promoting the activities of Japan's "national champions". Although Japanese industrial organisation is said to embody "trust", "co-operation" and "close ties" between partners, it was argued that, through their various control mechanisms, Japan's large Corporate Groups dominate the machinery sector. These control mechanisms are clearly illustrated in the automobile industry, where Japan's corporate elites exercise their authority over a transactional hierarchy of their *keiretsu* partners.

The analysis in Chapter (2) led us to view Japanese corporations as hierarchical entities, which are controlled from a centre of strategic decision-making (Cowling and Sugden, 1994, 1998). This position, of course, contrasts sharply with an influential body of literature, initiated by Aoki (1984, 1988, 1989, 1990, 1994), which considers Japanese industrial organisation as being a "non-hierarchical" mode of production and the (Japanese) firm as a *nexus of treaties.* Nevertheless, the arguments espoused in Chapter (2) appear consistent with other (independent) observations of Japanese industrial structure, where control is seen as being concentrated among a few large players (see Ruigrok and Van Tulder, 1995). Aoki's (1990) view of the Japanese firm might, therefore, be viewed as being somewhat superficial.

The oligopolistic description of Japanese firms and industrial structure is not only realistic, but it also provided a framework for analysing the evolution of Japan's transnational corporations (Chapter (3)). It can be argued that an oligopolistic structure, characterised by mass production and industry-wide collusion, may have, in the aggregate, led to a climate of deficient domestic

demand (Pitelis, 1996, 2000). This general business environment may then have precipitated a move overseas by Japan's larger corporations, who sought to overcome both domestic and external demand constraints. The regression results reported in Chapter (3) suggested that there is some empirical support for the view that deficient domestic demand may have stimulated the growth in outward Japanese FDI.

For the Japanese firm, the actual decision to become a transnational corporation, as opposed to relying upon licensing/subcontracting or exporting, reflects supply side factors. In this respect, Chapter (3) also considered Hymer's (1976) arguments that transnational firms possess a specific (oligopolistic) advantage and seek to use their international operations for the removal of conflict. In the Japanese case, these specific advantages may relate to their technological flexibility and organisational efficiency. The transnational option allows Japanese firms to directly control and protect their specific advantages, in the international market. In addition, the development of transnational networks of production allows Japan's transnationals to pursue "divide and rule" strategies with international labour and world governments.

These supply side factors are clearly visible in the globalisation of the Japanese automobile industry (Chapters (4) and (5)). Domestic oligopolistic rivalry between the large Japanese assemblers (referred to as Original Equipment Manufacturers (OEMs)) at the domestic level is also seen at the international level, with evidence of a Knickerbocker (1973) effect in overseas entry patterns. Furthermore, Chapter (4) also revealed the extent to which Japan's large OEMs

have been strategically developing their own transnational production networks, the *new keiretsu,* which primarily involves their core domestic suppliers. The Japanese automobile industry's specific (competitive) advantages primarily relate to the "close ties" between OEMs and suppliers, and the *new keiretsu* is an attempt to replicate these relationships at the international level.

The nature of *new keiretsu* relations was investigated in Chapter (5), using a Case Study of UK based Japanese suppliers. The UK is at the centre of the Japanese automobile industry's European operations and the transplants are typical *new keiretsu* affiliates. One of the main results from this Case Study was the extent to which the supplier affiliates were engaged in intra-firm competition to set and meet designated "target prices". The supplier affiliates appear to have provided the Japanese OEMs with an "inside option", that facilitates a "divide and rule" strategy, through which they can resolve potential conflicts with their labour force. However, this weapon may actually become a source of conflict at the executive level, particularly when supplier affiliates are involved in joint ventures with indigenous manufacturers. In this respect, the Case Study revealed that the Japanese and European participants had conflicting objectives, particularly with regards to the determination of prices and profits. When the joint venture broke down, it was usually the Japanese participant that acquired full control to maintain the OEM-supplier relations at the local level.

The global activities of Japan's transnationals appear to have had real effects upon Japan's domestic machinery industries (Chapter (6)). In this respect, the econometric evidence suggested that both investment and employment had

become sensitive to international cost conditions. Furthermore, as the large transnationals have begun to outsource production from offshore affiliates, Japan's small firm sector has become isolated, which has raised concerns of a "hollowing out" of the economy's traditional manufacturing regions. At the macro level, there is also some evidence to suggest that these trends appear to have contributed to lower output and total factor productivity growth and higher unemployment.

7.2 Industrial Policy - Suggestions for Renewal in Japanese Manufacturing

7.2.1 The Anglo-US model?

The continuing stagnation in Japan and the problems of "hollowing out" in Japanese manufacturing lead us to consider an appropriate policy response to aid economic revival. In this respect, we should first note that, over the past decade, Japan has engaged in much debate and introspection about its economy, its industrial structure and the relevance of the "Japanese model" in the global economy. The current policy debate appears to revolve around Japan abandoning its traditional Japanese values and institutions and moving towards an Anglo-US style of capitalism (Noguchi 1996, 1998). The proponents of this view argue that Japan should reduce both protectionism and State intervention, and pursue policies for greater de-regulation in both financial and industrial sectors. Moreover, some Western commentators argue that traditional *keiretsu* structures may also need to be dismantled, since they are regarded as being an impediment to encouraging both inward investment and foreign competition (see, for instance, Katz, 1998).

At face value, the arguments in favour of Western style restructuring have some considerable appeal. The Japanese economy has been stagnant for over a decade and Japan has found it difficult to encourage inward FDI (OECD, 1999). It is argued that "opening up" the Japanese economy to greater foreign competition may reduce these imbalances and aid economic recovery. For instance, Katz (1998) argues that a reduction in protectionism and subsidies towards Japan's declining firms and industries would weaken the Yen, and ease the pressure upon Japan's more competitive exporters in the machinery sector. It is also argued that an increase in foreign competition may spur Japanese firms towards greater innovation, particularly in sectors where Japan has fallen behind, such as software development and information technology. Finally, it is envisaged that by encouraging inward FDI, Japanese manufacturing could replenish its capital stock and nullify the harmful effects of "hollowing out".

7.2.2 Strategic Failure

While the Anglo-US approaches to policy have become fashionable and appear to be gaining a consensus within Japan (Katz, 1998, Noguchi, 1996, 1998), they should not be regarded as a panacea. Indeed, this thesis would argue that there are no guarantees that such policies would stem or even reverse the "hollowing out" of industrial Japan (see also Cowling and Tomlinson, 2000, 2002). There are two related reasons for this concern. First, the Anglo-US model is based upon a pre-conceived notion that free market capitalism is inherently superior to the Japanese model and the notion of the Developmental State. In Japan, such an ideological approach may prove counter-productive (Higgott, 1998). Furthermore, since advocates of the Anglo-US approach often ignore Japan's

polity, culture, history and industrial structure, it is unlikely that relying upon the Anglo-US model will yield any helpful, long-term policy proposals for Japanese manufacturing.

Moreover, Anglo-US approaches appear to contain a fundamental flaw in that they often favour the continued dominance of a corporate elite and the concentration of strategic decision-making. One of the main tenets in this thesis is that it these characteristics of Japan's industrial structure and the dominance of the large transnationals, which are at the roots of Japan's current malaise (see Chapter (6)). Consequently policy initiatives that further the dominance and interests of a corporate elite could even exacerbate Japan's crisis. For instance, consider Renault's purchase of a controlling interest in Nissan and General Motors increased equity participation in Isuzu. Both are recent examples of major inward FDI into Japan; examples of investments that Western commentators often purport that Japan requires for economic revival. However, both of these "investments" have led to major automobile plant closures, a dismantling of *keiretsu* ties and significant redundancies in Japan's major industrial belts (see Nikkei Weekly, 25/10/99 and 21/8/00, 21/5/01)[2].

These cases may be seen as an example of "strategic failure". Indeed, in Cowling and Tomlinson (2000) we have described the "hollowing out" of the Japanese economy in such terms. "Strategic Failure" is a situation that occurs when elite, centralised corporate hierarchies make strategic decisions on key economic variables, such as investment, output and employment, and that these decisions

[2] I am grateful to John Connor, of Purdue University, for the point about GM and Isuzu.

conflict with society's broader interests. There is then no market mechanism available for society to redress the balance and achieve a socially desirable outcome (Cowling and Sugden, 1994). The arguments in this thesis would concur that it is the concentration of strategic decision-making in Corporate Japan and the ever-increasing global interests of Japan's large corporations that has precipitated a "hollowing out" of Japanese manufacturing and raised the spectre of a "strategic failure". It is only through recognising the roots of Japan's "strategic failure" that policy-makers will be able to suggest directions for the renewal of Japanese manufacturing and, in particular, the machinery sector.

In order to reverse the current decline, it is necessary for Japan and MITI to engage in a strategic response and perhaps, once again, pursue an active industrial policy. However, a pre-requisite for such a policy is not only to learn from the experiences and mistakes of previous industrial policies, but also to be fully aware of the dominant role played by transnational corporations and the corporate elite. It can be argued that MITI's apparent post-war favouritism towards the establishment of the Corporate Group and the promotion of "national champions" was misplaced, and has not been conducive to sustainable, long-term industrial success. These concerns lead us to consider alternative proposals for the future direction of industrial policy, with a particular emphasis upon a greater diffusion of strategic decision-making.

7.2.3 Regional Policies and Small Firms

Given the extent of regional "hollowing out" in Japan (see Chapter (6)), it is reasonable to suggest that the main focus of Japanese industrial policy should

primarily be towards the regeneration of the prefectures. In this respect, it is perhaps first important to re-consider the Technopolis Project, which was an early attempt by MITI to counteract the effects of outsourcing and avoid problems of "hollowing out" (see Broadbent, 1989).

The Technopolis Project was launched in 1983, with the aim of establishing a number of high-tech cities throughout Japan's prefectures. In many respects, the Technopolis Project reflected Japan's determination to build and develop "world cities", each of which could attract and retain major investors and modern industry in the global economy (for further details of the "world cities" concept, see Friedman, 1986). The emphasis was upon the creation of science parks, or advanced technological production sites with close linkages with universities and other research centres. By the mid-1990's, approximately 30 projects had begun under the scheme (Whittaker, 1997). At best, the Technopolis Project has been only partially successful. In the early days, some smaller prefectures, such as Oita, were able to use their Technopolis status to regenerate industry within its towns and villages (Broadbent, 1989). Hamamatsu City, in Shizuoka prefecture, is also regarded as being a relatively successful high-tech, Technopolis city (Whittaker, 1997). However, as we saw in Chapter (6) (Table (6.3)), on the wider scale, the project has not been sufficient to negate the effects of globalisation and the problems of "hollowing out".

In this respect, a closer look at the Technopolis Project might provide a reason for its relative failure to avert the "hollowing out" of industrial Japan. Under the scheme the main instruments of policy were tax breaks, depreciation allowances

and special loan rates (Broadbent, 1989). These types of subsidy are all policies that generally favour the attraction of large-scale corporations rather than the development of an independent small firm base (Armstrong and Taylor, 2000). In the global economy, this policy bias is unlikely to encourage long-term investment that is embedded within the local economy. As we have seen, large-scale corporations take a global perspective and their regional operations are likely to be regarded as being nothing more than footloose investments. Indeed, Broadbent (1989) first recognised this potential problem during the early stages of the Technopolis Project. Broadbent's (1989, p250) study of Technopolis concluded "*the Japanese State (and the Technopolis Project) is not very strong in the face of broad world economic trends, (which) affect the investment logic of individual companies, causing them to respond in ways similar to that in the West, leading to ever greater international investment*" (own additions in parenthesis).

The inherent bias towards large firms within the Technopolis Project is very similar to MITI's other post-war industrial policies, which have contributed to a concentration of strategic decision-making within Corporate Japan. In the light of Japan's "strategic failure" and the recent experiences of "hollowing out", perhaps it would be advisable for Japan to move towards less hierarchical modes of production, with strategic decision-making becoming more devolved at a local level. This might lead us to favour policies that strengthen Japan's small firm base, with a specific focus upon nurturing independent small firm entities rather than subsidising a small firm base that is subservient to the interests of the large-scale transnationals.

In particular, industrial policy could (primarily) be targeted towards the development and extension of horizontal small firm networks within Japan's traditional *sanchi* regions. It is the expansion of Japan's *sanchi* regions, which possibly offers Japanese manufacturing the best opportunity to arrest the current decline. The development of these small horizontal networks may provide the basis for what Best (1990) has described as "collective entrepreneurialism". Here, co-operative clusters of small firms engage in a mode of flexible specialisation, where they are able to innovate, diversify and eventually emerge to compete with the large transnational corporations. These small firm networks are sometimes referred to as the "new competition", and are best exemplified in the Italian industrial districts of Emilia-Romagna. It is, therefore, perhaps encouraging that MITI have been studying the Italian experience as a way forward for the revitalisation of Japanese manufacturing (JSBRI, 1996).

It is important to recognise that a wider role for Japan's *sanchi* will require a significant change of emphasis within Japan. This is particularly the case within the machinery sector, where transactions are pre-dominantly vertical. Policies should be geared towards reducing the dependence of small firms upon their main contractors. They should also favour close co-operation both within and between small firm networks. At a practical level, the Japanese State could target aid to smaller firms to enable them to upgrade their technological capability. This may provide Japan's small firms with an opportunity to become more independent from their main contractors, since it may allow them to diversify

their product range and target niche markets[3]. In addition, MITI could also undertake substantial investment in the upgrading of public infrastructure and expand Japan's public research and development facilities. These facilities should be designed to serve whole networks of small firms and would, therefore, be very different from some of the Public Testing and Research Centres (PTRs) that are currently controlled by Japan's transnational corporations (see Ruigrok and Tate, 1996; Chapter (2)). Small firms should also be encouraged to foster closer links between themselves, both within and between prefectures. Such linkages could also be allowed to develop at an international level, between Japan's *sanchi* firms and small firms elsewhere, effectively creating multinational webs, which embrace a true sense of multinationalism (Cowling and Sugden, 1999). These webs could be supported with appropriate institutional arrangements at a regional, national and supra-national level, involving industrial and commercial bodies, educational linkages and mutual research centres.

7.2.4 Increased Monitoring of Transnational Activity

An important adjunct to these policies would be for Japan to undertake greater, and perhaps more effective, monitoring of its transnational corporations. This is important, since transnationals develop and extend linkages with many actors and small firms throughout the globe. Tensions arise when transnationals decide (or threaten) to re-locate production, and small firms may become isolated,

[3] It was suggested to me that the hierarchical nature of Japan's industrial structure might have actually stifled the potential for the Japanese economy to produce sufficient entrepreneurs, which would facilitate the promotion of such activities. In this respect, it may therefore be advantageous for MITI to encourage a greater entrepreneurial spirit amongst the wider Japanese small business community perhaps through trade associations and enterprise clubs. I am grateful to Marco Bellandi of Florence University for this point. For an in-depth review of Japan's small firm sector, see Whittaker (1997).

particularly if they are "locked in" to a long-term relationship with their main contractor (see Chapter (6)). Part of the problem may be that small firms have insufficient information about the extent of their main contractor's global activities, and so they often do not appreciate their own vulnerability. Insufficient information also prevents actors (such as small firms and labour) who are involved with transnationals from co-ordinating a response to strategies such as "divide and rule".

If Japan's industrial policy is to focus upon revitalising the small firm sector, as outlined above, then greater transparency is required so that small firms are more aware of their main contractor's "inside options" and the dangers of becoming "locked in" to contracting relations. Such transparency may also improve co-ordination between Japanese and other actors who encounter the same transnational corporation. In addition, increased monitoring of the activities of transnational corporations will also be required to ensure that public resources are directed towards their intended target - an *independent* small firm sector - as opposed to supporting a network of small firms, subservient to transnational interests.

At this point, it is worth noting that MITI conducts an annual survey of Japanese transnationals, publishing data of affiliates' activities and occasionally estimating some of the effects of offshore production upon the Japanese economy (see Chapter (6)). In addition, the international offices of the Japanese External Trade Organisation (JETRO) also publish survey information about Japanese affiliates in North America, East Asia and Europe. This is useful data and can used for

future research and to guide policy-makers. However the surveys have been criticised on the grounds that there is a wide variance in their coverage and response rates (Ramstetter, 1996). Consequently, the surveys can only provide a partial insight into the activities of transnational corporations. Interestingly, an independent research company, Toyo Keizai (TK), publishes annual data on the yearly operations of Japanese overseas subsidiaries, providing details of affiliate equity arrangements, overseas sales and employment levels. Ramstetter (1996) has argued that the Toyo Keizai (TK) publications are a more reliable source of information than the MITI surveys. Unfortunately, the Toyo Keizai's high retail price confines it away from the wider public domain (Ramstetter, 1996).

The MITI, JETRO and Toyo Keizai (TK) surveys provide a benchmark for the collation of information about (Japanese) transnationals. Each survey is based upon voluntary information, provided by "willing participants". To obtain more detailed information on transnational activity, it may be appropriate for Japan to establish a regular census of its domestic transnational corporations. This may be undertaken through the establishment of a transnational monitoring unit, with a remit for the accumulation and dissemination of information concerning the activities of Japanese transnationals (see Bailey et.al, 1994b).

There is a caveat with undertaking such a policy initiative in that, for its successful implementation, Japan will require wide international support. There is a danger that by adopting a unilateral policy to establish such a unit, Japan may become isolated both politically and economically. For instance, if transnationals view the monitoring unit as being over-intrusive, then they may reduce their

investments in Japan even further by relocating to countries where the unit has no jurisdiction. This will, of course, exacerbate the "hollowing out" of Japanese industry. In this case, it would be preferable for Japan to effectively "close off" the transnationals' option of relocating to regimes where there are no monitoring units. Perhaps Japan could use her international influence to encourage an international agreement on the establishment of several transnational monitoring units around the globe. The geographical coverage of a country's transnational unit should match the geographical extension of that country's transnational corporations. The units themselves could be policed by the United Nations, whose annual conferences and reports have provided researchers with invaluable, although limited, information on transnational corporations (see UNCTAD reports for further details).

7.3 Future Research Possibilities

Before we draw our final conclusions, we should note that there remain a number of unresolved questions, which open up possible avenues for future research. These primarily relate to both the Case Study and potential econometric work. It is my intention to consider some of these issues further in later work.

7.3.1 Extended Case Study Analysis

One of the limitations of the analysis in Chapter (5) is that it is based upon a Case Study of Japanese supplier affiliates based in the UK. Although the experiences of the Managing Directors and Senior Managers of UK based suppliers were said to be typical of *new keiretsu* affiliates, an interesting extension would be to conduct a similar Case Study of Japanese supplier

affiliates in the USA. Such a study would allow for a direct comparison between the experiences of Japanese affiliates based in the UK and the USA. A US Case Study could be seen as being complementary to Inkpen's (1994) earlier research, but would focus more directly on the issues raised in Chapter (5). In particular, a US Case Study might reveal more details on the nature of transnational linkages between the affiliates and the extent to which Japanese OEMs engage in "divide and rule" strategies with their North American workforce.

At this point, we should note that in compiling this thesis, an attempt was made to survey Japanese supplier affiliates based in the USA. Indeed, in late September 2000, a similar questionnaire was also sent out to Japanese affiliated auto-suppliers in the USA (see Appendix (A), for further details). However both the cost and logistical considerations restricted the survey to a small sampling frame. Perhaps, not surprisingly, there was a poor response rate. In survey work, non-response combined with a small sample size is a "dangerous failing" and raises questions as to the legitimacy of any (US) results obtained (Moser and Kalton, 1971). Consequently, it was decided to ignore the results from the US survey. Nevertheless, this pilot US study offers the potential for future field research in this area.

7.3.2 Future Econometric Studies

The analysis in Chapter (6) may also be extended. The econometric work in Chapter (6) followed Hollingsworth's model (1997), in taking an indirect approach to estimating the real effects of transnational activity upon the

behaviour of investment and employment. We also reported survey data to gauge the extent of regional "hollowing out" in Japan.

In future research, it may be a useful extension to consider using econometric techniques to explore further issues related to the "hollowing out" of Japanese manufacturing. We might, for instance, wish to consider estimating, directly, the real effects of transnational activity upon other key economic indicators, such as Japanese productivity and real output growth. These studies could be done at the aggregate and, preferably, at the regional level, thus allowing researchers to identify the full extent of regional "hollowing out" in Japan. Given the nature of Japan's *keiretsu* groupings, and concerns about small firm isolation, it would also be interesting to examine the effects of transnational activity upon small firm performance.

An implicit assumption behind these proposals is that we can accurately measure transnational activity. Chapter (6) used an indirect measure, since we were not satisfied with the properties of FDI data. Future research may also be geared towards constructing appropriate indices of transnational activity. In this respect, Davies and Lyons (1996) have begun to initiate work in this area. These authors have constructed a firm level transnationality index, which is based upon a weighted measure of a firm's total output, in each of the markets in which it operates. The Davies and Lyons (1996) data set is based upon an extensive Case Study of transnationals in the European Union. Unfortunately, because of the enormity and complexity of data collection, their data set only relates to one year, 1987. The authors recognise the limitations of their time-span, but they

report that they intend to replicate their studies in further research. This is a welcome step in the right direction. We should, however, note that transnationality indices based upon output might not always be the relevant measure to use. For instance, as with FDI data, such indices may not capture the transnational's span of control or the extent of their "inside options" (see Chapter (6)).

These issues raise interesting questions and offer a challenging and exciting future research agenda. The main impediment to such research appears to be accessibility to appropriate data sets. In particular, econometric investigation requires access to wider and more extensive data sets, with the most appropriate data being at the firm or cluster level. Unfortunately, this type of data is not published and is not easy to accumulate. For the questions raised in this thesis, further Case Study work - in Japan itself - may alleviate some of the data problems.

7.4 Conclusion

For a long period in Japan's post-war economy, the success of the machinery sector and the cultivation of Japan's large-scale corporations appeared congruent to Japan's industrial development. This thesis has explored the nature of the Japanese transnational corporation and the recent problems of "hollowing out" within Japan's machinery industries. We have argued that the current problems of de-industrialisation are linked to the hierarchical nature of Japan's industrial structure and also a misguided industrial policy that appeared to favour the development of large-scale corporations. This has led to a concentration of

strategic-decisions within Corporate Japan. In the global economy, this elite group now regards its future as being increasingly involved in transnational production networks to such an extent that it has precipitated a "hollowing out" of Japan's industrial base, raising the prospect of "strategic failure".

At a fundamental level, it is only through recognising the roots of Japan's "strategic failure" that we are able to suggest directions for the renewal of Japanese manufacturing and, in particular, the machinery sector. In this final Chapter, we have advocated that Japan move towards a less hierarchical mode of production, with a policy emphasis towards the extension of the Japanese *sanchi* and the development of horizontal small firm networks. Such a shift in industrial policy-making is more likely to lead to sustainable industrial development and serve the wider public interest. For industrial policy-makers elsewhere, Japan's recent experiences serve as an important lesson for the consideration of new policy initiatives.

Appendix A

Data Sources for the Automotive Case Study (Chapters (4) and (5))

Chapters (4) and (5) considered a Case Study of the Japanese Automobile Industry, using data and information from three sources: The Dodwell Report (1997), Interviews and a Questionnaire. The following is a description of these data sources.

A 1.1 The Dodwell Report (1997)

In Chapter (4) the primary data source used was the latest Dodwell Report (1997) into the Japanese Auto-Parts Industry. In Japan, Dodwell Marketing Consultant's have become renowned for publishing English translated reports about various Japanese industries. Dodwell's Report into the structure of the Japanese Auto-Parts Industry is usually published every 5 years, and the 1997 report was the sixth edition. The Dodwell Reports have become a standard reference for previous academic research into the Japanese automobile industry (see for example, Smitka 1991, Sako 1996).

The Dodwell Report (1997) provides a range of information collated from annual company reports, surveys and questionnaires and also selected data from some of renowned Toyo Keizai's annual publications. The 1997 report contains short profiles of each of the 11 Japanese OEMs; including a summary of both their domestic and overseas activities and details of their *keiretsu* supply structures. The report also publishes details of approximately 660 First and Second Tier

Japanese auto-suppliers. Such information is provided in a typical Directory format and includes the name of the Company President, Year of Formation, the Head Office and main Japanese Factory Address, Shareholder Details, Product Range and Main Customers, Corporate Grouping and Supplier Association Memberships. The report also provides some information on 756 overseas subsidiaries and joint ventures of these Japanese automobile manufacturers and auto-suppliers. Information on these offshore affiliates is limited to details of the Date of Entry, the Parent's Equity Stake, Names and Equity Stakes of Joint Venture Partners (if applicable) and the Type of Overseas Activity Engaged (i.e. sales, manufacturing and/or R&D).

While the Dodwell Report (1997) is the most comprehensive (English translated) source for data on the Japanese automobile industry, its limitations should also be noted. The first anomaly is that, for Japanese auto-suppliers, only the company's main domestic factory and/or head office are listed, along with its major offshore affiliates. This is unfortunate, since it rules out the possibility of distinguishing between suppliers who have more than one plant in Japan and those that have several domestic plants. It also precludes the possibility of performing a "truly global count" of a firm's supply plants across the globe. In addition, the report gives no details of the capacity or size or output and performance of subsidiaries. Another drawback is that the report does not provide any quantitative data on sales procurement between assemblers and suppliers, which limits the possibility of measuring "contract dependence" between firms.

A final point is that the data in the Dodwell Report (1997) represents the position of the industry as at 31/12/1996. This means that the analysis and data presented in Chapter (4) is very much concerned with published information up to and including that date. Given the pace of globalisation, it is quite likely that the global position and strategies of Japan's automobile companies have changed considerably since then[1]. Where possible, the Case Study updated some of the Dodwell data from other sources such as company reports, trade journals, the internet and newspaper articles. This is indicated in the text[2].

A1.2 Interviews

To supplement the Dodwell (1997) data, interviews were carried out with Managing Directors and/or Senior Managers at Japanese affiliated auto-suppliers based in the UK. The aim of the interviews was to obtain direct insights from these Japanese auto-suppliers particularly about their experiences in Europe. The UK was the most suitable sampling frame for both logistical reasons and the fact that the European manufacturing operations of Japanese OEMs and auto-suppliers are concentrated in the country (see Chapter (4)).

According to the FAME database, by June 2000, there were 38 Japanese affiliated auto-suppliers with manufacturing operations in the UK. However, the choice of interviewees was dictated by those firms, which were willing to

[1] For instance, in 1998, the French OEM, Renault, purchased a controlling 37% stake in Nissan. This has led the company to begin reviewing its global operations and supply network.

[2] It should be noted that - in this line of research - the use of historical data, from secondary sources, is usually the only feasible means of analysis. For instance, Davies and Lyons' (1996) study on the position and importance of transnationals in the European Union relates to data from 1987, while Beamish et.al's (1997) book describes data on the global activities of Japanese transnationals in 1993.

participate. In total, only seven interviews were conducted, with the sample consisting of three firms that primarily supplied Toyota, three firms closely connected to Honda and one firm associated with Nissan. There were no firms that produced the same type of component and products ranged from the production of wheels to air-conditioning units. Finally, four of the firms were involved in some form of joint venture, while a Japanese parent solely owned the other three.

The interviews took place in offices at the firm's main UK factory. Each interview was recorded, and the total interview time ranged from fifty minutes to one and a half hours. The interviews followed a semi-structured format, based on guidelines laid out in Moser and Kalton (1971). The questions were generally open-ended with interviewees being encouraged to express their views on a range of specific issues. The topics related to the company's history in Europe, their relationships with the Japanese OEMs and other OEMs, production processes, the nature of competition, corporate decision-making, personnel and training issues and also opinions upon how the firm has adapted within the European Union.

A1.3 Questionnaire

The final set of data was collated from a questionnaire of Japanese auto-suppliers based in both the UK. In contrast to the interviews, the questionnaire was more focused upon seeking specific answers for evaluation. It also had the benefit that - in the UK at least - more firms were willing to participate and so more of the population was covered. This probably reflected the fact that questionnaires were

less time-consuming for firms to complete than, say, arranging an interview. A sample questionnaire is included in Appendix (B).

The first questionnaires were sent out, in September 2000, to all 38 Japanese auto-suppliers with UK subsidiaries. A covering letter asked for the questionnaire to be completed by either the Managing Director or a Senior Manager, and for them to state their company position on the completed form. Each respondent was promised complete confidentiality, although the firm could be identified by a serial number on the stamped addressed return envelope. This facilitated the monitoring of responses and enabled the "chasing up" of non-respondents by telephone. By mid-November 2000, 27 completed questionnaires had been received - an impressive 71.1% response rate. From the 27 responses, 13 were from subsidiaries involved in a joint venture of some form. In addition, the Japanese parent of 13 of the 27 firms were identified as belonging to a particular Japanese OEM Corporate Group, while the parents of the other 14 could be classified as Independent suppliers. In response to the question of as to whom was their most important customer, eight respondents indicated it was Nissan, six went for Toyota and five for Honda. There were two firms that replied that all three Japanese OEMs were equally important, while six firms suggested other non-Japanese OEMs were their most important customer. These six firms all had Japanese parents who could be identified as Independent suppliers. As expected, the affiliates' main customers are the Japanese OEMs: Nissan (9 affiliates), Toyota (7) and Honda (6). There were 3 (Independent) supplier affiliates that regard all the major Japanese OEMs as equally important,

while 2 (Independent) suppliers suggested other non-Japanese OEMs were their most important customer.

Of the 11 UK non-respondents, 7 firms were identified as being involved in some form of joint venture. In addition, 8 of the subsidiaries were identified as having parents belonging to Japanese OEM Corporate Groups, while the other 3 had Japanese parents who were Independent Suppliers. This may suggest that there was a small proportionate bias towards responses from firms not involved in a joint venture, and also those from Independent suppliers. However, the questionnaire did include a separate section for joint venture firms to consider issues specific to those firms.

In late September 2000, a similar questionnaire was also sent out to Japanese affiliated auto-suppliers in the USA. The aim was to compare the experiences of US based affiliates with those in the UK. According to Dodwell (1997), there were 140 Japanese affiliated auto-supplier firms with 188 manufacturing plants in the USA. However, both cost and logistical considerations restricted the survey to a smaller sampling frame[3]. A reasonable sampling frame may have been to consider the US affiliates of the same 38 Japanese companies that were based in the UK. This seemed sensible and would facilitate a reasonable comparison of Anglo/American experiences. However, only 30 Japanese auto-suppliers were identified as having production facilities in both countries. There were also concerns about obtaining an adequate response rate, given the

[3] The average cost to send out a single questionnaire to the USA was £5.00. This included a covering letter, an 8 page questionnaire, UK outward international postage and a US international postage for the return envelope.

geographical distance between the UK and the USA - it being more difficult to "chase" non-respondents across the Atlantic. Given these concerns it was decided to take a *survey sample* of 70 US affiliates and these were chosen randomly - from the Dodwell Report (1997) - using a process of random numbers (see Moser and Kalton, 1971). The 70 firms were deliberately evenly split between Group and Independent Suppliers and, in the final sample, 19 had production facilities in both the UK and the USA. The 70 questionnaires were sent out to the US Head Offices of Japanese auto-suppliers.

Not surprisingly, the US response rate was disappointing. In total, only 17 questionnaires were returned, a response rate of 25% from an adjusted survey population of 68 (two questionnaires were returned as "*unknown at this address*"). From the 17 responses, 10 were identified as being subsidiaries of Japanese parents who were Independent Suppliers and 7 had parents who were Group suppliers. Only 7 respondents also had production facilities in the UK. The poor US response rate, combined with the small sample size, is a "dangerous failing". It was felt that any statistical comparison between the UK and US results would therefore raise serious questions as to its validity (Moser and Kalton, 1971). The US survey was, therefore, not considered any further, although the possibility remains of future research in this area (see Chapter (7)).

Appendix B

University Research into the Global Japanese Automobile Industry

Questionnaire

This Questionnaire forms the main basis of a PhD Research project, investigating globalisation and international business relationships within the Japanese automobile industry. The project is being overseen by Professors' Michael Waterson and Keith Cowling at the University of Warwick, and is sponsored by both the Economic and Social Research Council (E.S.R.C) and The Royal Economic Society (R.E.S). The project has also received written support from the Japanese Auto-Parts Industry Association (JAPIA).

The Questionnaire is anonymous and all answers and information provided will be treated as confidential. Any information provided is for University research purposes only. If requested, a copy of the final (collated) research results will be made available.

The Questionnaire has 25 questions split into six sections (A-F). Please answer all questions in each section. The Questionnaire should take approximately 15 minutes to complete. If there are any questions or enquiries regarding any aspect of the Questionnaire, then please do not hesitate to contact me at the address below. On completion of the Questionnaire, please return it in the stamped addressed envelope provided, as soon as possible.

Thank you for your time and kind co-operation.

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Section (A) - Entry into the European market

1). In entering the UK market, what was the type of investment made by the company?
Please place a tick next to the most appropriate response.

a). Acquired an equity stake in an existing UK (or European) supplier's facilities (i.e. Plant and/or Equipment).

b). Invested in a new, purpose built plant on a green/brown-field site.

c). Other (please explain).

2). In your opinion, what were the most important reasons for the company to locate in your geographical area? PLEASE RANK 1 to 7 (with 1 being MOST important and 7 being LEAST important).

a). Close geographical proximity to the company's main automobile manufacturer.

b). The opportunity to establish a "joint venture" with an established "local" supplier.

c). Close geographical proximity to the industry's supplier base (in order to benefit from industry synergies).

d). The availability of a skilled labour force.

e). Lower production costs than other locations.

f). Actively encouraged by the local authority/investment agency.

g). The region has a good infrastructure, service sector and communications and transport network.

h) Other (please specify).

Section (B) - Joint Ventures

The following questions relate to JOINT VENTURES only. Please answer ONLY if your company is/or has been involved in a Joint Venture (i.e. between Japanese and European firms). Otherwise please go onto Question 8 in Section C (Page 3):

3). What were the main reasons for both firms to agree to set up a joint venture? Please RANK 1-5 (1 being MOST important, 5 being LEAST important).

a). To finance the capital expenditure of new plant and equipment.

b). Actively encouraged by the main (Japanese) assembler.

c). The potential for all participants to widen their customer base.

d). The potential for all participants to "pool" resources for Research and Development.

e). The possibility that participants may obtain efficiency gains by sharing knowledge/techniques and making appropriate changes in working practices.

f). Other (please specify).

4). Do these joint venture arrangements exist elsewhere within and/or outside the European Union ? YES/NO

If YES, please (briefly) provide further details.

5). What would you say have been the main benefits of the Joint Venture? Please place a tick next to the most appropriate response.

a). Successful development of new products that meet the customer's requirements.

b). A significant increase in sales growth for all participants.

c). Greater efficiency savings achieved through changes in organisational behaviour.

d). There have been no obvious benefits from the joint venture.

e). Other (please specify).

6). What would you say have been the main difficulties in the operation of the Joint Venture so far? Please provide brief details.

7). How long do you expect the Joint Venture arrangements to continue? Please place a tick next to the most appropriate response.

a). For the long-term (i.e. 10-20 years and beyond)

b). For the medium term (5-10 years)

c). For the short-term (less than 5 years)

d). Uncertain - will depend upon winning future contracts.

Section (C) - Relationships with other Companies within the Industry

8). Who is your most important customer?

a). Honda

b). Nissan

c). Toyota

d). Other (please identify)

9). How "close" a working relationship do you have with your main customer? Please place a tick next to the most appropriate response.

a). A "*very close*" relationship, which involves regular discussion with the assembler on all aspects of the your firm's business (i.e. upon products, raw material suppliers, production processes and an acceptance of "open-book" accounting or "cost-down").

b). A "*close*" relationship, where the assembler has a "limited" involvement in the "running" of your firm's business.

c). A "*normal*" business relationship, where the assembler has no direct involvement in the "running" your firm's business.

d). Other (please specify).

10). If, in negotiating a new contract with your main customer, your final bid price is regarded as being "on the high side", how is this likely to affect the "long-term" relationship with the assembler? Please place a tick next to the response that best describes the situation.

a). The contract is lost. There is no "long-term" relationship.

b). This particular contract is lost, but the relationship remains strong through other contract work that we do for the assembler.

c). We lose this contract, and feel under pressure that the assembler will look elsewhere when other contracts become available.

d). There is no loss of work - the assembler accepts the initial price and we accept assistance in trying to lower costs. The relationship is for the "long-term".

e). Other (please specify).

If you answered either (a), (b) or (c) to Question 10, please now answer Question 11. Otherwise please move onto Question 12.

11). If you lose a contract with your main customer because your bid price is "too high" what happens to the contract?

a). The contract work is still retained by our parent firm, but is carried out by another plant elsewhere, where costs are lower (possibly elsewhere around the globe).

b). A rival firm will usually win the contract.

c). We are not sure what happens to the contract.

12). How do you see your future relationship with your most important customer? Please place a tick next to the most appropriate response.

a). Maintain current relations.

b). Reduce the dependence upon the main assembler (through winning new contracts with other assemblers).

c). Strengthening the relationship with the main assembler.

d). Other (please specify)

13). How "close" a working relationship do you have with your suppliers? Please place a tick next to the most appropriate response.

a). A "*very close*" relationship, which involves regular discussion with the suppliers on all aspects of their business activities (i.e. upon products, production processes and an acceptance of "open-book" accounting or "cost-down").

b). A "*close*" relationship, where your firm has a "limited" involvement in the "running" of your suppliers' businesses.

c). A "*normal*" business relationship, where your firm has no direct involvement in the "running" of your suppliers' businesses.

d). Other (please specify).

14). Have you encouraged, or do you expect to encourage, your suppliers to adopt "Japanese style" business practices (such as "open book" accounting)? YES/NO

If YES, please give brief details.

Section (D) - Product Development and Production Processes

15). Does your company have an active Research and Development Centre in the European Union? YES/NO

If YES, please say where it is located and then go onto Question (17).

If NO, please answer Question (16)

16). How likely do you think your company will invest in Research and Development facilities in the European Union? Please place a tick to next to the most appropriate response.

a). Very Likely - within the next 1-2 years.

b). Quite Likely - within the next 5 years.

c). Not in the medium term, but maybe in 10 years.

d). Unlikely.

17). Are your production processes similar to those carried out in Japan? Please briefly highlight any major differences (If necessary, please feel free to continue overleaf).

Section (E) - Decision-Making and International Linkages

18). In the formulation of the company's "global strategies" *(in particular strategies concerning the location of new investment, new production processes and product development)*, to what extent are the management of the UK factory in "communication" with their counterparts at the company's other factories in Japan and elsewhere? Please place a tick next to the most appropriate response.

a). There is close and regular "communication" on these issues (i.e. more than once a month).

b). There is regular "communication" on these issues (i.e. once or twice every three months).

c). There is occasional "communication" on these issues (every six months or more).

d). There are usually no "communications" between management teams on these issues.

e). Other (please specify).

19). On a scale of 1-7, how much influence does the management team at the UK factory have upon the company's "global strategies"? Please circle the most appropriate response.

1	2	3	4	5	6	7
Little Influence			**Some Influence**		**Very Influential**	

20). Are there regular exchanges of management and/or staff between the company's factories around the globe? YES/NO

If YES please give a reason for the main purpose of these visits.

Section (F) - Personnel Issues

21). On a scale of 1-7, how would you describe the average "skills base" of your geographical recruitment area? Please circle the most appropriate response.

1	2	3	4	5	6	7
POOR			AVERAGE			EXCELLENT

22). Does your firm experience problems in recruiting and retaining staff? YES/NO
If YES, please give brief details.

23). Does your firm offer "support" (such as the payment of course fees/study leave) to employees who wish to obtain relevant external qualifications? YES/NO

If YES, is the employee "obliged" to remain with your firm for a specific time period after the course has finished? YES/NO

24). Are employees offered the possibility of "training" in Japan? YES/NO
If YES, what proportion of your workforce take up this opportunity?

25). Does your firm recognise and/or negotiate with trade union representatives? YES/NO
If YES, what proportion of your workforce are trade union members?

Position in the Company: **Date:**

THANK YOU FOR YOUR TIME AND CO-OPERATION IN COMPLETING THIS QUESTIONNAIRE.

PLEASE RETURN THE COMPLETED FORMS IN THE STAMPED ADDRESSED ENVELOPE PROVIDED.

Appendix C

Statistical Techniques Involved in the Automotive Case Study (Chapters (4) and (5))

In Chapter (4), much of the Dodwell (1997) data is presentational and is not suitable or is insufficient to even consider using linear regression techniques to explore various hypotheses relating to the globalisation of the Japanese automobile industry. Nevertheless the Directory style information contained in the Dodwell Report (1997), has allowed a *new* data set to be collated and the graphs and statistics presented in Chapter (4) are *both original and innovative* attempts to show *new evidence* on the *scale* and *pattern* of globalisation within the industry. Throughout the Chapter, the data is used to supplement and substantiate various arguments.

The main statistical technique employed in Chapters (4) and (5) is the calculation of correlation coefficients between relevant variables. The aim of the correlations is to detect any *statistically significant associations* between variables in the Case Study. We do not generalise the results to make inferences about the entire population. Rather, on the basis of statistical regularities that hold for the data set, we only generalise to theoretical propositions. We are aware that small-sample significance tests cannot fully eliminate the problems of small-sample bias. As such, levels of 10% significance should be treated with caution and should not serve as the basis for any strong conclusions. The main interest in the study is:

a) the existence of an association

b) its direction

*c) its statistical significance, but **not** in assigning a precise numerical value for economic interpretation*

The correlation coefficients are based upon Pearson's r and are calculated using Excel. Pearson's r is essentially a measure of a linear association between two variables, which are assumed to follow a joint normal distribution (Newbold, 1995). In this case, the Student's t distribution is used, with the null hypothesis being that there is no association between the two variables. The test statistic is calculated as:

$$t = r / \sqrt{(1-r^2)/n-2)}$$

and the null hypothesis is rejected if $t_{n-2} > | t_{\alpha}|$, where α is the level of statistical significance.

In Chapter (5), the correlations were based upon the bivariate regression of two dummy (qualitative) variables. The test of significance in this case is a chi-square test of independence using a cross-tabulation (or contingency table). The chi-square distribution is non-parametric and requires no assumption about the exact shape of the distribution. The null hypothesis is of no association between the two variables. The null hypothesis is rejected when χ^2 (Obtained/Corrected) > χ^2 (critical), and in this case, the association between the two dummy variables is unlikely to have been generated by chance alone.

In all cases the data set generated - in the cross-tabulation - at least one cell where the expected frequency was less than 5. The test statistic was, therefore, calculated using Yate's correction:

$$\chi^2 \text{ (Corrected)} = \sum [|f_o - f_e| - 0.5]^2 / f_e$$

A two-times-table has 1 degree of freedom, regardless of the number of cases in the sample.

An example of a correlation coefficient reported in Chapter (5) can seen as follows:

($r = 0.43$, chi-sq = 5.21, $p < 0.025$)

The first statistic is the correlation coefficient, r. In this case it tells us that there is a positive correlation between X and Y. The second statistic is the chi-square test statistic. The third statistic indicates that the association between X and Y is statistically significant at the 2.5% level (where there is no significance between two variables, this is denoted by n.s).

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