

**THE PROBLEM OF REGIONAL "HOLLOWING OUT"
IN JAPAN:
LESSONS FOR REGIONAL INDUSTRIAL POLICY**

Keith Cowling

And

Philip R. Tomlinson

No 625

WARWICK ECONOMIC RESEARCH PAPERS



DEPARTMENT OF ECONOMICS

The Problem of Regional "Hollowing Out" in Japan:

Lessons for Regional Industrial Policy

Keith Cowling

Professor of Economics, University of Warwick, UK

Philip R. Tomlinson*

**Lecturer in Business Economics, School of Management,
University of Bath, UK.**

July 2001

Telephone + 44 (0) 24 76524930

Fax + 44 (0) 24 76523032

Email: K.G.Cowling@warwick.ac.uk

ecrez@csv.warwick.ac.uk

Keywords: Machinery sector, strategic-decision making, strategic failure and industrial policy.

JEL Classification Codes (F21, F23)

Abstract

This paper considers the problems of "hollowing out" using a Case Study of Japan's machinery sector. In doing so, it explores the roots of the present crisis by focusing upon the role played by Japan's large transnational corporations. This is important because these corporations are the "central actors" within the Japanese economy and they control a significant proportion of Japanese manufacturing. It is their strategic decisions - those that determine the level and location of investment, employment and output - which ultimately shape the development path for Japanese industry (see Cowling and Sugden, 1994, 1998). In recent years, Japan's large transnationals have become engaged in the process of *elite globalisation*, pursuing their own interests at the expense of domestic Japanese industry. This is a fundamental insight that is crucial for designing appropriate policy responses to arrest Japan's current industrial decline. It is argued that the lessons from Japan's experience might guide policy-makers in other regions, such as Wisconsin, who are concerned with future industrial development, the effects of globalisation and problems of "hollowing out".

We are grateful to comments and suggestions from participants at the Second L'institute-Milwaukee Workshop on Urban and Regional Prosperity in a Globalised Economy held between 9th - 20th July, 2001. The usual disclaimer applies.

*** Philip Tomlinson acknowledges financial support from the ESRC grant no R00429834718 to conduct this project.**

1. Introduction

As in Wisconsin and the American Midwest, Japan's machinery sector¹ plays a significant role at the centre of the (Japanese) industrial economy. In the post-war period, the sector was regarded as being at the forefront of Japan's international success in manufacturing (see Johnson, 1982). However, while the machinery sector in Wisconsin and the Midwest has recently enjoyed something of a renaissance (see Nichols, 2000), Japan's industrial regions have experienced a long period of serious economic stagnation. During the 1990's, Japan's large transnational corporations continued to pursue strategies towards a greater globalisation of their production. Over the same period, Japan's domestic machinery sector lost in excess of three-quarters of a million manufacturing jobs and over 12% of its business establishments. Real output also fell by approximately 8.3% (Japanese Statistical Yearbook, 2001). As the decade came to a close, both Japan's Ministry of International Trade and Industry (MITI) and economic commentators were seriously concerned that Japanese industry and the machinery sector, in particular, were in a phase of *kudoka* or "hollowing out" (see Cowling and Tomlinson, 2000).

Given the similarities in the industrial composition of both Wisconsin and Japan's major industrial belts, it is useful to consider Japan's recent experiences, as a discourse on regional industrial policy. This is important in the public policy debate, since Wisconsin is currently considering ways forward for its own economic development and has its own particular concerns about outsourcing, "hollowing out" and on the appropriate design of policies to encourage sustainable business clusters. In this respect, a review of Japan's recent problems may provide insights and lessons for the direction of industrial policies in both Wisconsin and other regions.

This paper, therefore, considers Japan's recent experiences and the problems of "hollowing out" using a Case Study of the Japanese machinery sector. In doing so, it explores the roots of the present crisis by focusing upon the role played by Japan's large transnational corporations. This is important because these corporations are the "central actors" within the Japanese economy and they control a significant proportion of Japanese manufacturing. It is their strategic decisions - those that determine the

level and location of investment, employment and output - which ultimately shape the development path for Japanese industry (see Cowling and Sugden, 1994, 1998). In recent years, Japan's large transnationals have become engaged in the process of *elite globalisation* (see Sugden and Wilson's chapter in this volume), pursuing their own interests at the expense of domestic Japanese industry. This is a fundamental insight that is crucial for designing appropriate policy responses to arrest Japan's current industrial decline. It is argued that the lessons from Japan's recent experience might guide policy-makers in other regions, such as Wisconsin, who are concerned with future industrial development, the effects of globalisation and problems of "hollowing out".

The remainder of this paper is as follows. In Section (2), we provide an outline of Japan's domestic machinery sector, focusing upon its development, its major industrial belts and the main characteristics of its industrial structure. Section (3) considers the globalisation of the industry and argues that this process has evolved to suit Japan's Corporate elite. The "hollowing out" of Japan's machinery industries and the effects of this *elite globalisation* upon Japanese manufacturing is discussed in Section (4). In the light of our observations, Section (5) provides some guidelines for the future course of regional industrial policy in Japan, and also briefly considers the implications of Japan's recent experience for Wisconsin and regional prosperity elsewhere. Finally, Section (6) concludes.

2. Japan's Machinery Industries

i) Industrial Policy and Development

Throughout much of the twentieth century, the machinery sector has been at the forefront of Japanese manufacturing industry. Today, the sector accounts for approximately 45% of all manufacturing employment and over 40% of total Japanese output. The machinery industries also provide 75% of the economy's exports (Whittaker, 1997). Moreover, the sector has been the source of Japan's international competitiveness in manufacturing and has provided the economy with global competitors, or "national champions", such as Toyota and Hitachi (See Section (3)).

¹ The machinery sector consists of five industry sub-sectors: 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). See Table (3) for further details.

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 an active industrial policy and an institutional style of capitalism². 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. MITI's industrial policies were also supported by the development of strong institutional arrangements. A *banking keiretsu* of city banks was encouraged by the Bank of Japan, which facilitated low cost, long-term finance for industry. To promote Japanese trading interests abroad, the Japanese External Trade Organisation (JETRO), was established. 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 these measures, MITI has also shielded Japan's machinery industries from foreign competition. This protection has included both tariffs and quotas and until 1971, 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 allowed MITI to sanction all inward and outward FDI proposals, to protect infant domestic industries from the pressures of global competition³. MITI did, however, positively encourage machinery firms to enter into suitable licensing and joint venture agreements with foreign firms. These arrangements were usually subject to MITI's approval, but they enabled Japanese industry to gain access to the latest international technology. For Ozawa (1973), it was the remarkable ability of Japanese manufacturing to successfully adopt

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).

³ The concerns over Foreign Direct Investment were twofold. 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, 1994).

and improve upon these technologies that was critical in Japan's post-war international success.

ii) Japan's "Industrial Districts"

The data in Table (1) and the map in Figure (1) provide some information on the geographical location of domestic Japanese manufacturing and, in particular, the machinery sector. As Table (1) 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 1868, 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 (1)), where the major industries Transport Equipment, Electrical Machinery and Electronics are concentrated.

Table (1) Here

Figure (1) Here

It is within these prefectures that we find Japan's main industrial clusters. These are Japan's "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. 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 Württemberg, 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). Japan's small firms primarily operate in vertical

keiretsu networks, acting as subcontractors to larger firms within a Corporate Group (*the kigyo shudan*). However, 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).

ii) Industrial Structure and Corporate Control

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 majority of these small *keiretsu* firms are allocated specialised tasks and they rely heavily upon the Corporate Group firms for new orders (see also Scher, 1997). In effect, the *keiretsu firms* are "locked in" to a vertical relationship with their main contractor.

The literature emphasises the long-standing close relationships, co-operation and the mutual trust that exist between *keiretsu* firms and their main contractors (see Gerlach, 1992, Scher, 1997). These close relations include the practice of large corporations guaranteeing their sub-contractors' income streams, particularly in periods of fluctuating demand. In addition, the Corporate Group can often obtain low-cost, long-term finance for its suppliers through the *banking keiretsu*. The larger corporations 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 are given responsibility for the design and manufacture of complete sub-assemblies. The "close ties" are extended through extensive cross-shareholdings, where firms hold reciprocal equity stakes with their trading partners and affiliated firms, which include banks, insurance companies, suppliers and trading companies. It is these arrangements that have led Aoki (1990, 1994) to argue that the Japanese firm and the nature of inter-firm relations represent a nexus of treaties, with a non-hierarchical mode of production. This is because all firms recognise their mutual interdependence, their responsibilities and that long-term co-operation can lead to mutual benefit and corporate success.

However, while mutuality and trust are an important characteristic of Japanese industrial organisation, when it comes to corporate governance, they should not be equated with equal power in decision-making processes (Sachetti and Sugden, 2000). This is an important distinction, since certain (hierarchical) governance structures are an important mechanism by which a corporate elite can control production activities, in order to pursue their own interests. We would argue, in particular, that (hierarchical) governance structures and their associated control mechanisms allow the elite to pursue their own prosperity, often at the expense of other actors within the industry or locality (see Sugden and Wilson, op.cit). In the case of Japan's machinery industries, this is apparent in the pyramidal structure of industrial production where, effectively, a "formal command structure" exists. The result is that the smaller *keiretsu* firms are often subordinate to the strategic decisions and interests of Japan's large machinery corporations – the dominant firms within the Corporate Group (Cowling and Tomlinson, 2000, 2001, and Ruigrok and Van Tulder, 1995).

We can consider this point further, by referring to the example of Japan's automobile industry. The industry has the largest number of inter-firm relationships in Japan and "close ties" are said to exist between the large assemblers and their first, second and lower tier suppliers (Smitka, 1991). However it is the large assemblers that dominate the relationships, through the use of various control mechanisms. These control mechanisms may include an insistence upon their suppliers to comply with a *Just-in-Time (JIT)* delivery system and *kaizen* quality control measures⁴. Such directives effectively force suppliers to subordinate their production operations entirely to suit their main contractor's requirements, since a failure to comply may lead to a loss of custom. In some cases, *Just-in-Time* allows the assembler to shift the burden of inventories onto their upstream suppliers, whilst tightening quality control measures, subject the suppliers' production processes to increased monitoring and effectively raise their dependency upon their main contractor (Ruigrok and Van Tulder, 1995). A related issue is the practice of open-book accounting, where the price and cost structure of a particular component is analysed by the assemblers in great detail before a price is eventually "agreed upon". Usually the "agreed price" or "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 (Aoki, 1988, Smitka, 1991). The assembler will then accrue most of these productivity gains. Ruigrok and Van Tulder (1995, p83) have described the system as one where "the supplier is required to bargain with the assembler literally with all its cards open on the table".

In addition to these control mechanisms, the large assemblers also use their substantial equity holdings in their core suppliers, to appoint their former executives into key positions within their supply chains. This has the effect of establishing direct lines of communication and allows the assemblers to disseminate and carry out corporate strategy. Reciprocal shareholding arrangements do exist, with some keiretsu suppliers even holding stakes in their main contractors. However, firms and sub-contractors, lower down the industry's pyramidal structure, have smaller equity stakes in their trading partners and their influence is minimal (see Dodwell, 1997). The assemblers can also use personnel exchanges, supplier associations, and technology sharing to

⁴ The Just-in-Time delivery system is where suppliers are expected to deliver batches of finished components at scheduled times, to suit their contractor's production operations. Kaizen refers to the process of total quality control at each stage of the production process (see Womack et.al, 1990).

exert direct control over their *keiretsu* networks. In this respect, Piore and Sabel (1984) give the example of how Nissan, in the early post-war period, were able to use such channels to control the rationalisation and re-organisation of automobile production.

Finally, it may be argued that institutions, such as the MITI sponsored Public Testing and Research Centres (PTR), could offer smaller suppliers the opportunity to diversify, innovate and become more independent from their main contractors. However, even these institutions - which are exclusively designed to assist Japan's small firms - can be manipulated to suit the larger corporation's 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, p397), 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 pyramidal and formal command structures of Japan's machinery industries, therefore, place the large corporations in a dominant position. Through the utilisation of various control mechanisms, it can be argued that the boundaries of the large Japanese corporation are much wider than its legal frontiers. In effect, the *keiretsu* firms' fall under the ambit of the Corporate Group (see Cowling and Tomlinson, 2000, 2001) and control is exercised from one centre of strategic decision-making (see Cowling and Sugden, 1994, 1998). In the global economy, this has implications for Japan's small machinery firms, who are effectively "locked in" to their main contractor's supply chain. We will return to this issue in Section (4).

3). The Globalisation of Japan's Machinery Industries

i) The Emergence of Japan's Transnational Corporations

The emergence of Japan's large dominant corporations and the structure of production were the result of MITI's industrial policy. Within MITI's policy of targeting strategic industries, Piore and Sabel (1984) note a clear prejudice in favour of promoting the Corporate Group. Japanese industry was encouraged to adopt a system of mass production based around the large corporations, who were to be supported by networks of *keiretsu* sub-contractors. In addition, MITI approved a program of cartelisation in which failing firms were allowed to merge, which also raised the level of industrial concentration (Piore and Sabel, 1984). MITI's industrial policies effectively enabled Japan to develop her own "national champions", who were seen as being able to compete, on the global stage, with international rivals from the USA and Europe.

As Japan's large corporations adopted mass production, there were pressures upon MITI to relax the restrictions upon overseas FDI (Mason, 1994). Large-scale production had led to demand deficiencies within Japan, as domestic markets became saturated with consumer durables. Firms sought to overcome falling domestic consumption through the export market. However, this eventually led to large trade surpluses and retaliatory trade barriers, particularly from the USA. With future export growth uncertain, Japan's large corporations began to consider the transnational option⁵. The growing importance of large corporations, within the Japanese economy, placed MITI under strong pressure to liberalise the regulations on FDI. In 1971, MITI removed all the FDI restrictions that applied to Japanese corporations (Mason, 1994).

Since the 1970's, Japanese industry has experienced a significant increase in outward FDI. Between 1981 and 1995, outward Japanese FDI amounted to \$470 billion, a four-fold increase in real terms and the highest average growth in overseas investment of any G7 industrial nation (UNCTAD, 1997). Japan's machinery sector, in particular, has been most affected by globalisation. By 1998, it accounted for almost 60% of Japan's total outward stock of manufacturing FDI (OECD, 1999). The dramatic increase in Japanese FDI is a result of many factors. These primarily relate to the growth of regional trading blocs - such as the European Union and North American

⁵ Pitelis (1996, 2000) argues that deficient domestic demand initiates outward FDI.

Free Trade Area (NAFTA) - which have tried to protect indigenous industries from foreign imports, the Yen's appreciation following the 1985 Plaza Accord and higher labour costs in Japan relative to other countries. These have all made it relatively more expensive to export from Japan, and so Japan's transnationals have reacted by increasing their offshore activities to protect and expand their regional and global market shares (Dunning, 1993).

ii) Global Actors

In the modern, global economy, Japan's transnationals have emerged to play a dominant role. 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 - a position second only to that of the corporate sector of the USA (see UNCTAD, 2000). Table (2) provides some details of these 17 transnational corporations, ranking them in terms of their ownership of foreign assets. Over two-thirds of these transnationals operate in the machinery sector; the others are Japan's large trading companies (see Table (2)). Toyota is Japan's largest transnational corporations and, in the global economy, it now rivals the large American automobile manufacturers, Ford and General Motors. 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 (2)).

Table (2) Here

Japan's transnationals have used their offshore activities to gain significant market shares in the global economy. In the mid-1960's, Toyota was the only Japanese automobile manufacturer amongst the world's top ten producers. By the mid-1990's, it had quadrupled its market share and was joined in the top ten, by Nissan, Honda and Mitsubishi. Honda is also the world's largest manufacturer of motorcycles. Within the sub-continental markets of Asia, the large Japanese automotive transnationals have combined market shares in excess of 90% (Dicken, 1998). In the production of rubber tyres, Bridgestone is second only to Michelin. Similarly, 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, 1999).

To support their overseas activities, Japan's large transnationals have also been strategically establishing a *new (overseas) keiretsu* - a transnational network - by actively encouraging their core domestic suppliers to follow them offshore. The rationale behind the *new keiretsu* is that it enables Japan's transnationals to replicate the close domestic inter-firm relationships, in overseas locations. These close relations are an important part of Japanese competitiveness, which could be lost when production is shifted offshore. This is particularly the case if Japan's large transnationals have to establish new supply chains with indigenous suppliers, who are generally unfamiliar with Japanese industrial practices (Gittelman and Dunning, 1992). The *new keiretsu*, therefore, reduces the risks associated with international production since it enables Japan's transnationals to continue working with their acknowledged suppliers around the globe.

The *new keiretsu* also provides the opportunity for Japanese transnationals to develop industrial linkages across national boundaries. For instance, international personnel exchanges, research and educational linkages are common features of a typical *new keiretsu* network. However, these linkages are totally different to the proposals outlined in Sugden and Wilson's chapter, where it was argued that regions should aim to embrace a more inclusive approach to globalisation, including the possibility of developing multinational linkages. Rather, the linkages created in the *new keiretsu* effectively transverse localities, since they are designed and imposed by (Japanese) transnational corporations, to serve the interests of Japan's corporate elite. The *new keiretsu* can, therefore, be regarded as part of the elite globalisation process (see Sugden and Wilson, op.cit).

In this respect, the elitist nature of the *new keiretsu* can be seen, by considering the distributional consequences of the transnational network. For instance, the *new keiretsu* allows Japan's transnational corporations greater leverage in their bargaining position with their subsidiaries and enables them to exert direct control over an international division of labour. By using their core Japanese suppliers and employing similar technology as in Japan, Japan's large transnationals can now directly compare international production costs, along the value chain, within a transnational network. In effect, Japan's transnationals have been able to use the threat of re-locating production, within the *new keiretsu*, to reduce labour militancy and depress labour

costs. This allows the (Japanese) transnational to capture a greater degree of the production surplus - a strategy known as "divide and rule" (see Cowling and Sugden, 1994, Peoples and Sugden, 2000). James (1989) has also noted that, by locating new production units in areas, characterised by high unemployment and low wages, Japanese transnationals have successfully been able to play the international wage game throughout Asia, Europe and North America.

The expansion of overseas affiliates has also led to a significant rise in the proportion of Japan's corporate output produced offshore. Not surprisingly, this is particularly the case in the machinery sector, where the highest overseas production ratios are recorded (see Table (3)). At the industry level, between 1992 and 1996, Japan's overseas production ratio more than doubled in Fabricated Metal Products, Agricultural and Industrial Machinery and Precision Tools (see Table (3)). The most prominent industries were Electrical Goods (19.7%) and Transport Equipment (24.9%) and, within these sectors, the level of overseas production has become even higher. For instance, in consumer electronics, offshore production now exceeds domestic output (EIAJ, 1997), whilst, in automobiles, the larger manufacturers - notably Toyota, Honda and Nissan - have adapted a similar strategy (Dicken, 1998).

Table (3) Here

4. Small Firm Isolation and the "Hollowing out" of Japanese Industry

i) Small Firm Isolation

The continued growth in outsourcing and the increasing involvement of Japan's large corporations in transnational networks threatens the traditional "close ties" between the Corporate Group and the smaller *keiretsu* firms. Globalisation effectively places Japan's smaller domestic firms in a weaker bargaining position vis-à-vis their main contractor, since the latter has access to a global supply chain from which to outsource production. In this respect, procurement rates of intermediate goods, from Japan, 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). Furthermore, recent surveys have consistently shown 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). Nissan's recent greater emphasis upon global sourcing and its ultimatum to its smaller keiretsu partners to reduce costs or lose future contracts is indicative of the new environment in which Japan's small firms now find themselves (see Nikkei Weekly, 25/10/99 and also 21/5/2001).

For Japan's smaller *keiretsu* firms, the problems posed by global sourcing are particularly acute, given that the majority of them are "locked in" to vertical relationships with their main contractor. Indeed, MITI (1999) report that 81.6% of Japan's small firms - the majority from the machinery sector - have never changed their main contractor. In the 1990's, Japan's large corporations have sought to pursue their own global interests, leaving their smaller *keiretsu* partners to face falling order books resulting in an unprecedented rise in the number of small firm bankruptcy cases (Nikkei Weekly, 19/10/1998).

The inability of Japan's small firm sector to diversify and its over-reliance upon main contractors, in the global economy of the 1990's, has been a key contributor to their faltering financial performance (JSBRI, 1996). As Table (4) shows, the profitability of Japan's small firms was significantly lower during the 1990's - when the Japanese economy was more sensitive to transnational activity - than in earlier periods. In this respect, 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 (4)).

Table (4) Here

ii) Regional Hollowing Out

The problems experienced by Japan's small firms and the growth in overseas production has raised serious concerns of a "hollowing out" (*kudoka*) 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.

The "hollowing out" of Japanese manufacturing industry and the machinery sector, in particular, can be seen in Table (5). 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 (5)). 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.

Table (5) Here

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 (4)). 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 also Section (5), 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.

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.

5. Industrial Policy - Suggestions for Renewal

i) Strategic Failure

In Cowling and Tomlinson (2000), we argued that the "hollowing out" of the Japanese economy could be seen in terms of a "strategic failure". This 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 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). We believe that the concentration of strategic decision-making in corporate Japan and the ever-increasing global interests of Japan's large corporations has precipitated a "hollowing out" of Japanese manufacturing, raising the spectre of "strategic failure".

In order to reverse the current decline, it is necessary for Japan and MITI to engage in a strategic response and, 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. In our view, 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 offer some of our own proposals for the future direction of industrial policy, with a particular emphasis upon a greater diffusion of strategic decision-making.

ii) Regional Policies and Small Firms

Given the extent of regional "hollowing out" in Japan (see Table (5)), 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 (see also Friedman, 1986, on the "world cities" concept). 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). We have already noted that Hamamatsu City, in Shizuoka prefecture, is also regarded as being a relatively successful high-tech, Technopolis city (Whittaker, 1997). However, as Table (5) illustrates, 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. 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", we would therefore advocate a

move towards more non-hierarchical modes of production, with strategic decision-making becoming more devolved at a local level. This would 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. We would particularly welcome policies that primarily aid the development and extension of those horizontal small firm networks within Japan's traditional *sanchi* regions.

In our view, the expansion of Japan's *sanchi* regions offers Japanese manufacturing the best opportunity to arrest the current decline. In particular, the development of these small horizontal networks may provide the basis for what Best (1992) 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 markets⁶. In addition, MITI could also undertake substantial investment in the upgrading of public infrastructure and expand Japan's public research and development facilities. These

⁶ It was suggested to us 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. For an in-depth review of Japan's small firm sector, see Whittaker (1997).

facilities should be designed to serve whole networks of small firms and would, therefore, be very different from some of the PTR centres that are currently controlled by Japan's transnational corporations (see Ruigrok and Tate, 1996). 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, and also Chapter (1)). 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.

Finally, we should note that our approach to Japanese industrial policy is different from the conventional policy proposals, advocated by Anglo-US commentators. These commentators typically argue that Japan should engage in a further de-regulation of its economy and encourage more inward FDI to avoid the problems of “hollowing out”. However, we would argue that there are no guarantees that such policies would stem or reverse the “hollowing out” of Japan. Indeed, such measures may even exacerbate the crisis, since they encourage the process of elite globalisation and the concentration of strategic decision-making. In this respect, it is interesting to note that both Renault’s purchase of a controlling interest in Nissan and General Motors increased equity participation in Isuzu have led to automobile plant closures and significant redundancies in Japan’s major industrial belts⁷.

iii) Lessons for Wisconsin and other regions

We began this paper with a motivation to learn from Japan’s recent experiences to guide the future process of industrial policy-making in Wisconsin and other regions. In South Eastern Wisconsin, for instance, policy-makers are keen to develop both existing and new business clusters, with an emphasis upon attracting high-tech firms to the region. An important facet of South Eastern Wisconsin’s approach is the Techstar initiative - a consortium of business, academe and government - which aims to foster technology-related economic development by assisting the business community to adopt new technologies (see Zimpher, 2000).

⁷ We are grateful to John Connor, of Purdue University, for this point.

The caveat from Japan's recent experiences is that such initiatives should be fully aware of the types of cluster that South Eastern Wisconsin wishes to develop (see also the chapter by Bellandi in this volume). In this respect, it is important for policy-makers to take full account of the global activities of the larger corporations that South Eastern Wisconsin wishes to attract and the types of industrial linkages that they are likely to build with the State's indigenous firms. The Techstar initiative, for example, shares a number of similarities with the Japanese Technopolis Project, with an emphasis upon the new economy and in attracting and retaining principal investors to the region. These are major considerations since, as we have seen in the case of Japan, clusters that involve networks of small firms subservient to the global interests of a corporate elite are unlikely to provide long-term sustainable economic prosperity.

7. Concluding Comments

This paper has explored the 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 respect, we have advocated that Japan move towards a more non-hierarchical mode of production, with a policy emphasis towards the extension of the Japanese *sanchi* and the development of horizontal small firm networks. It is our view that such a shift in industrial policy-making is more likely to lead to sustainable industrial development and serve the wider public interest.

Finally, this paper provides an important lesson from the Japanese experience for Wisconsin and other regions and localities that are involved in industrial policy-making. 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. However, as we have shown, an over-reliance upon transnational corporations is unlikely to provide long-term stability. Industrial policy-makers should be aware of this lesson when considering new policy initiatives.

References

- Aoki, M. (1988). *Information, Incentives, and Bargaining in the Japanese Economy* (New York: Cambridge University Press).
- Aoki, M. (1990). "Toward an Economic Model of the Japanese Firm". *Journal of Economic Literature*, vol. 28, no. 1, pp. 1-27.
- Aoki, M. (1994). "The Japanese Firm as a System of Attributes: a Survey and Research Agenda". In: *The Japanese Firm, Sources of Competitive Strength* (eds. M. Aoki and R. Dore), pp. 11-40. (Oxford: Oxford University Press).
- Armstrong, H & Taylor, J (2000). *Regional Economics and Policy* (Oxford, UK: Blackwell).
- Bailey, D. Harte, G. and Sugden, R. (1994). *Transnationals and Governments, Recent Policies in Japan, France, Germany, the USA and Britain*. (London: Routledge).
- Beamish, P.W., Delios, A., Lecraw, D. J., (1997). *Japanese Multinationals in the Global Economy*. (Cheltenham, UK: Edward Elgar).
- Bellandi, M. (2001). "Local Development and the New Economy" In: *Urban and Regional Prosperity in a Globalised Economy* (eds. ?) Chapter 2.
- Best, M. H., 1990. *The New Competition*. (London: Polity Press)
- Broadbent, J (1989) "The Technopolis Strategy vs. De-industrialisation: High-Tech Development Sites in Japan" In: *Pacific Rim Cities in the World Economy, Comparative Urban and Community Research Studies Volume 12* (ed. M.P. Smith), pp. 231-253. (London: New Brunswick).
- Cowling, K. and Sugden, R. (1994). *Beyond Capitalism, Towards a New World Economic Order*. London: Pinter.

- Cowling, K. and Sugden, R. (1998). "The Essence of the Modern Corporation: Markets, Strategic Decision-Making and the Theory of the Firm". *The Manchester School*, vol 66, no 1, pp. 59-86.
- Cowling, K. and Sugden, R. (1999). "The Wealth of Localities, Regions and Nations: Developing Multinational Economies". *New Political Economy*, vol. 4, no. 3, pp. 361-378.
- Cowling, K. and Tomlinson. P.R. (2000) "The Japanese Crisis – A Case of Strategic Failure?" *The Economic Journal*, Vol. 110 No. 464., F358-F381.
- Cowling, K. and Tomlinson. P.R. (2001) "Revisiting the Roots of Japan's Economic Stagnation: The Role of the Japanese Corporation". *Mimeographed, University of Warwick*. (copies available: ecrez@csv.warwick.ac.uk).
- Dicken, P. (1998). *Global Shift, Transforming the World Economy*. (Wiltshire, UK: Cromwell Press).
- Dodwell Marketing Consultants (1997). *The Structure of the Japanese Auto Parts Industry* (Tokyo: Dodwell)
- Dunning, J. H. (1993) *Multinational Enterprises and the Global Economy*. (New York: Addison Wesley).
- Electronic Industries Association of Japan (EIAJ, 1997). *Facts and Figures on the Japanese Electronics Industry 1997*. (Tokyo: Public Affairs Office, EIAJ).
- Friedman, J. (1986). "The World City Hypothesis", *Development and Change*, 17: 69-83.
- Gerlach, M.L (1992). *Alliance Capitalism: The Social Organisation of Japanese Business*. (California: University of California Press).

- Gerschenkron, A.(1962). *Economic Backwardness in Historical Perspective*. (Cambridge: Cambridge University Press).
- Gittelman, M & Dunning, J.H, (1992), “Japanese Multinationals in Europe and the United States: Some Comparisons and Contrasts”. In: *Multinationals and the New Europe and Global Trade* (eds: M.W.Klein & P.J.J.Welfens), pp. 237-267 (Berlin: Springer-Verlag).
- James, B. G. (1989). *Trojan Horse: The Ultimate Japanese Challenge to Western Industry* (London: Mercury).
- Japan Small Business Research Institute (JSBRI, 1996). *The Age of Small Business: The Foundation for Reconstruction of the Japanese Economy*. White Paper. (Tokyo: JSBRI, MITI).
- Japan Statistics Bureau, Management and Co-ordination Agency (2001). *Japanese Statistical Yearbook 2001* (Tokyo: Japan Statistical Association).
- Japanese Small Business Corporation (JSBC, 1998). *The Position of Japan’s SME’s*. (copies available <http://www.jsbc.go.jp/english/esme2.html>).
- Japan Economic Planning Agency (EPA, 1995). *Social and Economic Plan for Structural Reforms - Towards a Vital Economy and Secure Life*. White Paper. (Tokyo: EPA).
- Japanese External Trade Organisation (JETRO, 1997). *White Paper on International Trade*. (Tokyo: JETRO Publications).
- Johnson, C. (1982). *MITI and the Japanese Miracle: The Growth of Industrial Policy 1925-75*. (Stanford: Stanford University Press).
- Jones, C. I.(1995). “Time Series of Endogenous Growth Models”. *Quarterly Journal of Economics*, 110(2), pp. 495-525.

Marshall, A.(1919). *Industry and Trade*. (London: Macmillan).

Mason, M. (1994). "Historical Perspectives on Japanese Direct Investment in Europe". In: *Does ownership matter? Japanese Multinationals in Europe* (eds. M. Mason and D. Encarnation), pp. 1-38. (Oxford: Clarendon Press).

Ministry of International Trade and Industry (MITI, 1998). *Summary of the 27th Survey of Overseas Business Activities of Japanese Companies (Survey 1997)*. (Tokyo: MITI).

Murphy, K.M., Schleifer, A. and Vishny, R.W. (1989). "Industrialisation and the Big Push". *Journal of Political Economy*, vol 97, no 5, pp 1003-1026.

Nichols, D.A. (2000). "Wisconsin Manufacturing in the Global Economy: Its Past, Present and Future", *Paper prepared for Wisconsin Economic Summit, Milwaukee, November/December 2000* (copies <http://www.wisconsin.edu/summit/papers/general>)

Nikkei Weekly (19/10/98). "Bankruptcy Debt Hits 1st Half record". (New York: Nihon Keizai Shimbun Inc).

Nikkei Weekly (25/10/99). "Can Ghosn steer Nissan along the Road to Recovery ?". (New York: Nihon Keizai Shimbun Inc).

Nikkei Weekly (21/5/2001). "Nissan Stages Swift Comeback, but still Trails Front-runners" (New York: Nihon Keizai Shimbun Inc).

Nikkei Weekly (18/6/2001) "Japanese R&D Trickling Overseas: Skilled, Cheap Work Forces in Other Asian Nations attracting Japanese Firms" (New York: Nihon Keizai Shimbun Inc).

Organisation for Economic Co-operation and Development (OECD, 1999), *International Direct Investment Statistics Yearbook* (Paris: OECD).

Ozawa, T. (1973). "Technology Imports and Direct Foreign Investment in Japan" *Journal of World Trade Law*, 7 (6), pp. 666-679.

Ozawa, T. (1991). "Japan in a New Phase of Multinationalism and Industrial Upgrading: Functional Integration of Trade, Growth and FDI". *Journal of World Trade*, 25, 43-60.

Ozawa, T., (1992). "Cross Investments Between Japan and the EC: Income Similarity, Technological Congruity and Economies of Scope". In: *Multinational Investment in Modern Europe: Strategic Interaction in the Integrated Community* (ed: J.Cantwell) pp. 13-45 (Cheltenham, UK: Edward Elgar).

Peoples, J and Sugden, R. (2000) "Divide and Rule by Transnational Corporations" In: *The Nature of the Transnational Firm* (eds. R. Sugden and C. N.Pitelis) pp. 174-192. (London: Routledge).

Piore, M. and Sabel, C. (1984). *The Second Industrial Divide: Possibilities for Prosperity*. (New York: Basic Books).

Pitelis, C. N.(1996). "Effective Demand, Outward Investment and the (Theory of the) Transnational Corporation: An Empirical Investigation". *Scottish Journal of Political Economy*, vol 43, no 2, pp. 192-206.

Pitelis, C.N. (2000). "The TNC: An all-weather company". In: *The Nature of the Transnational Firm* (eds. R. Sugden and C. N.Pitelis) pp. 193-209. (London: Routledge).

Rosenstein-Rodan, P. (1943) "The Problems of Industrialisation of Eastern and South Eastern Europe", *Economic Journal*, No.53, pp 203-211.

Ruigrok. W. & J.J. Tate (1996). "Public Testing and Research Centres in Japan: Control and Nurturing of Small and Medium-Sized Enterprises in the Automobile Industry". *Technology Analysis & Strategic Management*, Vol 8, no. 4.

Ruigrok, W. & R. Van Tulder (1995). *The Logic of International Restructuring* (London: Routledge).

Sacchetti, S. & R. Sugden (2000). "Governance in Production and Governance of Corporations: The Nature and Impact of Subcontracting Networks". *Paper Presented at the EUNIP Fourth Annual Conference, Tilburg, December 7-9, 2000. (Copies available from sacchetti@economia.unife.it)*

Scher, M. J. (1997). *Japanese Interfirm Networks and their Main Banks*. (London: Macmillan).

Smitka, M. J. (1991), *Competitive Ties: Subcontracting in the Japanese Automotive Industry*, (New York: Columbia University).

Sony Corporation (1999), *Annual Report* (Tokyo: Sony Corp.).

Sugden, R. & Wilson, J. (2001). "Urban and Regional Prosperity in a "Globalised", "New Economy": An Agenda and Perspective". In *Urban and Regional Prosperity in a Globalised Economy* (eds. ?) Chapter 1.

Toyo Keizui Inc (1999). *The Japan Company Handbook*. (Tokyo: Toyo Keizui).

United Nations (UNCTAD, 1997). *World Investment Report 1997*. New York: United Nations.

United Nations (UNCTAD, 2000). *World Investment Report 2000: Cross-Border mergers and Acquisitions and Development*. New York: United Nations.

Whittaker, D. H., (1997). *Small Firms in the Japanese Economy*. (Cambridge: Cambridge University Press).

Womack, J.P., Jones, D.T. and Roos, D. (1990) *The Machine that Changed the World* (New York: Rawson Associates).

Zimpher, N.L., Mone, M., Sammis, W., Sheehy, T. & Piwek, K. (2000). "Wisconsin Economic Summit: South Eastern Wisconsin Regional Paper", paper prepared for the *Wisconsin Economic Summit*, November/December 2000.

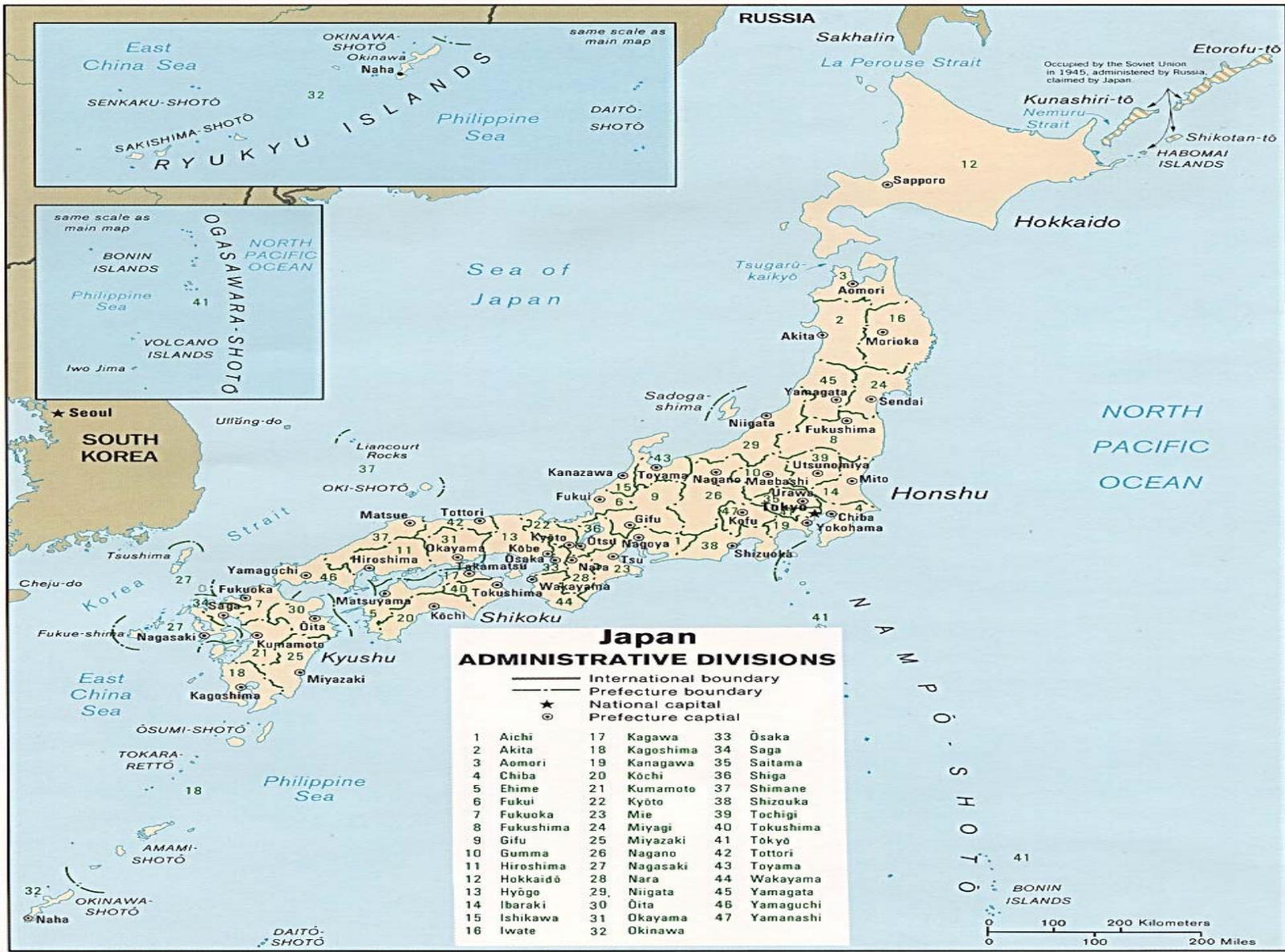


Table (1)**The Geographical Concentration of Japan's Machinery Sector and Manufacturing Industry (By Prefecture) 1998**

Prefecture ¹	Total Manufacturing Industry			Total Machinery Sector		
	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 (1)).
- 2) The table shows the 15 main Japanese Prefectures, where the machinery sector is concentrated.
- 3) The Machinery Sector consists of five sub-sectors: Metal Products, Machinery and Equipment, Electrical Machinery, Transport Equipment and Precision Tools.

Table (2)**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
<i>Toyota</i>	<i>Automotive</i>	<i>44.9</i>	<i>131.5</i>	<i>55.2</i>	<i>101.0</i>	<i>113 216</i>	<i>183 879</i>	<i>6</i>	<i>3</i>
<i>Honda Motor</i>	<i>Automotive</i>	<i>26.3</i>	<i>41.8</i>	<i>29.7</i>	<i>51.7</i>	.....	<i>112 200</i>	<i>18</i>	<i>6</i>
<i>Sony Corp.</i> ²	<i>Electronics</i>	.....	<i>52.5</i>	<i>40.7</i>	<i>56.6</i>	<i>102 468</i>	<i>173 000</i>	<i>20</i>	<i>3</i>
Mitsubishi Corp	Diversified	21.7	74.9	43.5	116.1	3 668	11 650	24	2
<i>Nissan Motor</i>	<i>Automotive</i>	<i>21.6</i>	<i>57.2</i>	<i>25.8</i>	<i>54.4</i>	.....	<i>131 260</i>	<i>25</i>	<i>9</i>
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
<i>Sumitomo Corp.</i>	<i>Trading/Machinery</i>	<i>15.0</i>	<i>45.0</i>	<i>17.6</i>	<i>95.0</i>	.....	<i>5 591</i>	<i>46</i>	<i>2</i>
Nissho Iwai	Trading	14.2	38.5	9.1	71.6	.....	4 041	49	3
<i>Matsushita Elect.</i>	<i>Electronics</i>	<i>12.2</i>	<i>66.2</i>	<i>32.4</i>	<i>63.7</i>	<i>133 629</i>	<i>282 153</i>	<i>55</i>	<i>7</i>
<i>Fujitsu Ltd.</i>	<i>Electronics</i>	<i>12.2</i>	<i>42.3</i>	<i>15.9</i>	<i>43.3</i>	<i>74 000</i>	<i>188 000</i>	<i>56</i>	<i>8</i>
<i>Hitachi Ltd.</i>	<i>Electronics</i>	<i>12.0</i>	<i>76.6</i>	<i>19.8</i>	<i>63.8</i>	<i>58 000</i>	<i>331 494</i>	<i>58</i>	<i>9</i>
Marubeni Corp	Trading	10.6	53.8	31.4	98.8	.....	8 618	68	4
<i>Mitsubishi Motors</i>	<i>Automotive</i>	<i>8.4</i>	<i>25.4</i>	<i>16.8</i>	<i>29.1</i>	<i>18 251</i>	<i>29 945</i>	<i>88</i>	<i>14</i>
<i>Canon Electronics</i>	<i>Electronics</i>	<i>7.4</i>	<i>23.4</i>	<i>17.8</i>	<i>24.4</i>	<i>41 834</i>	<i>79 799</i>	<i>92</i>	<i>11</i>
<i>Bridgestone</i>	<i>Auto-Parts</i>	<i>7.4</i>	<i>14.7</i>	<i>11.3</i>	<i>17.1</i>	.....	<i>97 767</i>	<i>93</i>	<i>3</i>
<i>Toshiba Corp.</i>	<i>Electronics</i>	<i>6.8</i>	<i>48.8</i>	<i>14.5</i>	<i>44.6</i>	.....	<i>198 000</i>	<i>100</i>	<i>12</i>

Source: UNCTAD (2000), World Investment Report 2000 Cross-Border Mergers and Acquisitions and Development (New York: UN).

Notes:

- 1) Machinery Sector TNC's are in Bold 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