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**On the Organisation of SMEs and Economic Growth in
the USA and Japan**

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ON THE ORGANISATION OF SMEs AND ECONOMIC GROWTH IN THE USA AND JAPAN

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Abstract

The total number of firms, out of which around at least 95 to 99 per cent (or even more) are SMEs approximates the degree of competition that exists in each country and within each sector of a national economy. A historical examination of the American and Japanese firm evolutions, which shows a divergence in industrial organisation between the companies in the USA and Japan provides a qualitative evidence to this role of competition. Also, the same historical trip reveals the close relationship, which prevails between the degree of competition as represented by the total number of firms and the speed of economic growth. The cross section regression model developed in this paper quantitatively confirms this relationship. Furthermore, it is suggested that the historical divergence between the American and Japanese firm evolutions is due to some precise factors such as relative abundance of resources, and other historical circumstances. Consequently, there is not a unique path of optimum growth, since what is good for the USA might not be good for Japan and vice versa. For instance, for the USA, the 'big business' type has always prevailed during the last 120 years, whereas for Japan, the smaller focal type of firms together with some huge conglomerates dominated the Japanese economy. The cross country regression model not only confirms the importance of organisational differences but also supports the endogenous type of economic growth.

Key words: firms, evolution, economic growth, endogenous, competition, resources, history, Chandler, Fruin, organisation, integration, big business, focal firms, SMEs, economies of scope, sub-contracting, diversification, decentralisation of decisions, multidivision, oligopolies, regression, developed countries, zaibatsu, keiretsu.

Introduction

The total number of firms in a national economy includes the large enterprises (LEs), very often vertically integrated and multi-divisional, the medium and the small firms (the latter two are often named SMEs). Researchers such as Chandler (eg 1977, 1990) and Schumpeter (eg 1950) have extensively analysed the positive role the LEs historically have played in the economic growth of nations like the USA and Germany and of industries like the oil and chemical ones.

More recently, much interest has been shown in the role SMEs have been playing in shaping national economies (one of the latest books on this issue is edited by Acs *et al*, 1999). This renewed interest is mainly due to the fact that in many countries, small firms play an increasing role in economic growth, from the 1980s onwards (see, for instance D. Storey, 1994). In this paper, an attempt will be made to synthesise the importance of all types of firms under the umbrella of the total number of firms in an economy, in explaining differences in economic growth amongst the most developed nations today. This total number includes SMEs in a relatively proportionate way (about 99%, see for example the International Note published by the JSBM, 1995, or the 1996 OECD report), which means that any conclusions on the total number of firms will also be applicable to the number of SMEs.

At the same time, reference will be made to competition. One of the characteristics of strongly competitive markets is the large number of producers and hence their inability to influence the prevailing prices. This characteristic will be utilised in this report to bring evidence to my contention that stronger competition entails stronger economic growth on both the macro and micro levels. Similar findings have been recently reached by various researchers (see for example, Caree and Thurik (1998), Nickel (1996), also Pratten (1991)). In addition, the comparison of the historical evolutions of the Japanese and the American firm will be used as evidence that in countries in which stronger competition exists grow faster than others in which the oligopolistic and monopolistic elements are more prevalent.

In the process of explaining the differences in economic growth amongst the most developed nations today, elements of organisational innovations will be included. These elements are necessary to include in this analysis because economic growth is not just growth in investment and technological change. This will become more apparent in sections A and B below. Economic growth will be further examined in section C and will be tested econometrically in section D.

More precisely, sections A and B will deal with a historical examination of the firm evolution in Japan and the USA respectively. Without such a trip to the past, it is impossible to properly evaluate the present form, structure, quality and quantity of firms in these two countries. In section C, the comparison between the two evolutions will be examined and conclusions will be drawn. In section D an econometric model will give

evidence to the previous sections and more relevant conclusions will be evaluated. Finally, in section E a summary of some major conclusions will be separately developed.

A The Japanese firm evolution.

a-Japanese economies of scope and decentralisation of decisions

Several scholars have produced a detailed historical evolution of the Japanese economy as well as of the Japanese firm (for a recent work on the small firms in this country see Whittaker (1997)). In this report, I will synthesise the relevant parts of W. M. Fruin's (1992) Chandlerian historical analysis of Japan's spectacular economic development. This author distinguishes three types of enterprises which have made their presence felt, namely the *zaibatsu*, the independent urban firms, and the independent rural firms. Most of the studies have been concentrated on the first type, and admittedly the most prominent, in shaping the Japanese industries in a decisive way.

The privatisation process which took place in the second stage of the Meiji Restoration, after 1885, was not smooth, leading to the particular nature that the *zaibatsu* acquired during that period. Indeed, these groups were from that starting point a collection of mostly unrelated commercial, industrial, and service enterprises which were family-owned and for a while family-managed. To use a modern term, they became conglomerates and they had to find a way to create inter-dependence between themselves.

Consequently, for this type of enterprises, from this early period, we had a situation of joint production and distribution, thus generating economies of scope. As Fruin (1992) remarked "...In Japan, *zaibatsu* grew for the most part by unrelated diversification, which is to say that economies of scale in production and distribution were not the forces behind the development of national or *zaibatsu* business groupings..." (p. 90). Unrelated diversification was a salient feature of these groupings before the 1930s. The initial clusters were transportation, mainly in shipping, energy production, and finance. Manufacturing was crafted on to these initial activities. The extent to which the interrelated constellation of firms was effectively coordinated, it generated and contributed to the lowering of costs. For example, this coordination was obvious where raw materials had to be sourced overseas, paid for and insured, shipped to Japan, stored, shipped again, processed, and then distributed, thus making the non-manufacturing segment of the value chain quite extended. Furthermore, when some economies of scale were also realised, they were so in intermediate product markets.

Economies of scale did not take place until the boom of the World War I (WW1), and in a more extensive way until the late 1950s. "...In Japan before World War II (WW2), indeed before the late 1950s, the domestic and proximate East Asian markets for volume goods were not large, and it was extremely risky to compete on the basis of economies of scale in most instances..." (Fruin, 1992, p. 113). Some sustainable scale economies were present before WW1 only in some industries, such as textiles, paper, some metals

production, food (sugar, beer, milled grains), beverages, some chemicals, and cement. However, only textiles were exported in bulk, thus realising more economies of scale.

A significant corollary of the importance of economies of scope present in this early Japanese industrial development, is the "...nearly universal separation of production and distribution..." (Fruin, 1992, p. 109). Thus, countless specialised trading companies existed at the same time as some bigger general trading firms which were part of the largest *zaibatsu*.

The parallel existence of these two phenomena, namely, first, the divorce between distribution and production, and second, the economies of scope had another consequence, that is the inexistence of organisational centralisation and hence Japanese firms of this period had a non-complex (weak) U-form organisational chart. The Japanese holding companies concentrated managerial resources in factories and at the lower level of the firm, and consequently they did not act as a capital market to allocate funds to subsidiary enterprises. Even the most managerially advanced companies, the textile ones, kept a relatively simple form.

Although *zaibatsu* firms played a central role in the Japanese economic development, the independent enterprises were more numerous, widespread, and diversified in terms of their activities. "...They were also more important given their estimated two-thirds (2/3) to three-quarters (¾) contribution to the nation's domestic manufactured product..." (Fruin, 1992, p. 119).

Thus, without the natural resources of many Western nations, Japan was going to further reinforce its existing strategy of creating this unique organisational system of its own. One main message comes again and again, when analysing Fruin's detailed study (1992, eg chapter 5). That is, Japanese firms did not grow very large compared with Western companies, they specialised their production in mainly one or two products at the most, and they concentrated their organisational activities within the factories, thus avoiding centralisation and accentuating inter-firm networks. The product focussed inter-firm networks are translated in large out-sourcing as a percentage of manufacturing value added. Consequently, vertical integration was low and a large network of product based firms was already in place in Japan during the inter-war period.

Furthermore, often horizontal integration, through mergers and acquisitions, especially in textiles, paper, agricultural chemicals, and machinery led to concentration of resources at production sites and decentralisation. This also meant a gradual multi-functional organisation of business starting with a single function such as sales or purchasing or production and then gradually combining them in a parallel way. Thus the tendency to specialise in form and function led to interdependence of firms at the same time.

b-Focal factories and sub-contracting

Decentralisation of management decisions amounted to the development to what Fruin calls the focal factories which

“...duplicated locally the growing complexity in managerial functions found at the apex of the corporate hierarchy. Within focal factories, a panoply of corporate functions could be found: quality-assurance offices, marketing and sales staff, research facilities, and even personnel departments. Factory managers, like company presidents, were enveloped by a hive of clerical and technical specialists...Focal factories were charged not only with labour management but also with technology transfer, product and process innovation, engineering, manufacturing, cost accounting, new personnel policies, regional distribution, and sales coordination...” (ibid, p. 136).

Why has this focal factories system evolved so strongly in Japan? Several reasons can be detected from Fruin’s analysis. First, there was from the end of the 19th century a process of a trial-and-error adaptation of Western knowledge and technology, which found a fecund area for development in small decentralised local and autonomous firms. The time and economic uncertainty constraints made this process even more necessary in such firms. Second, the economic downturn following WW1 and defence cuts caused widespread lay-offs among military arsenals and civilian shipbuilders. This large pool of skilled and semi-skilled underemployed or unemployed workers became the pool of many small subcontractors who became suppliers to large firms between the mid 1920s and the beginning of the 1930s. Third, and as corollary of the second reason, larger firms used the smaller subcontractors- also- because of their lower wages.

Fourth, factories were not producing for the national market but for regional or international markets. Fifth, cost accounting methods were not well developed. Sixth, the well-established regional traders and middlemen prevented companies from centralising and coordinating relevant functions. This was especially true in the textile, cement, food, and beverages, which considered together, accounted for 53% of the 200 largest industrial firms in 1930. Seventh, there was no anti-trust legislation to prohibit interlocking business alliances and hence small local firms could exist independently and yet be at the same time part of a bigger group such as the *zaibatsu*.

Eighth, alliances in manufacturing and distribution of small focal firms minimised risks while taking advantage of the production and distribution resources that other firms commanded. “...a strategy of maximising inter-firm economies of scope through group-driven cooperative transactions made better sense than the pursuit of internal production and allocative efficiencies through vertical integration and product diversification...” (Fruin, 1992, p. 157). Ninth, the performance of focal factories being strongly correlated with the existence and intensity of inter-firm networks, suggests that there were substantial savings in transaction costs and diseconomies of managerial control. Tenth, the price-cost margins of small firms were also due to pursuing the strategy of producing in distinct niches and thus offering dynamic complementarity (D. B. Audretsch *et al*, 1999).

Besides Fruin, M. Best (1990) tells us a similar story:

“...When the Japanese firms first penetrate foreign markets they often find that they are competing against firms with an array of product lines,. But instead of

competing with a similar array, the Japanese competitor focuses on the high volume segment and establishes a production facility that minimises complexity. This strategy is based upon the fact that manufacturing overheads in Western companies are usually between 150% and 250 % of direct labour costs...” (p.142).

Hence, by focussing on a small number of product lines, Japanese greatly reduced costs and consequently they were able to substantially undercut prices (see also J. C. Abegglen & G. Stalk Jr.,1985).

There were, however, some alternatives to this system. For instance, an early integration of mass production and distribution was the strategy of the Matsushita electric company, which was founded in 1918. However, this was an exception rather than the rule.

An extension of the focal factories is found in sub-contracting and out-sourcing. Parent or generally larger companies have established with suppliers or generally smaller firms two types of sub-contracting, the informal one according to which written contracts are non-existent, and the formal one. A set of ‘shared network norms’ was established over time in the former one and a trusting relationship developed. In addition, there was a continuous transfer of organisational and technological innovations from the big *kaisha* firms to the smaller ones, though the latter did not benefit in every respect from this cooperation (for instance not in terms of wages).

Within the sub-contracting system, special emphasis must be given to the component design, which depending on the relative independence of the smaller firms, maximised technological innovations. Following M. Best’s analysis (1990, p. 164), there are three types of component design relationship between automakers and parts makers:

1. “...The automaker provides blueprint specifications to a range of potential part makers, each of whom submits a price bid.
2. “...The automaker supplies blueprint specifications but expects the parts maker to suggest alterations in the development process.
3. “...The automaker does not provide blueprint specifications but only component performance requirements. Here the parts maker is expected to have an independent design capacity and be able to solve problems jointly with the automaker...”.

The second and third types of supplier relations are much more networked than the first one and are more of a Japanese organisational innovation which has been successful in promoting new technologies combined with high quality. This innovation has gradually penetrated other industries as well. As Whittaker (1994) tells us, in 1987, 55.9% of SMEs did some form of sub-contracting, though at a decreasing rate from 1981.

After WWII, the complicated system of Japanese firm networks between *zaibatsus*, or between the latter and non-*zaibatsus* was replaced only in name by the even more intensified network of *keiretsus* and non-*keiretsus*. Overall, by and large, the system has

not changed much: a huge number of establishments, especially small ones still exist and survived despite the recent long lasted recession, all of them intertwined with each other in a cooperative way.

Furthermore, after WWII, the Japanese large firms, such as Toyota, introduced a few unique organisational innovations. These were the Just-In-Time (JIT) production and inventory process, the automated and flexible manufacturing system (AFMS), the adaptable product development (APD), the process efficiency, the extended quality control and so on (see for instance, Best (1990), Abegglen and Stalk (1985), McMillan (1984), etc). All these innovations reinforced the dual cooperative system of *keiretsus* and big firms cum SMEs.

Indeed, Western researchers about the Japanese economic miracle from 1950 to 1990 have repeatedly observed that there is cooperation in all levels of Japan's society, for instance between workers and managers, between government agencies and firms etc. "...Japan's physical and geographical characteristics give social reinforcement to its social history of groupism, interdependence, and sense of *ON* and *GIRI*- debt and obligation..." (C. J. McMillan, 1984, p. 23).

B The American firm evolution.

a-The start of the big business, external and internal organisation: towards the Second Industrial Revolution

The development of the railways system coincided with the USA's economic industrial take-off period of the mid 19th century. The most important achievement in the railways development was the appearance, for the first time in economic history, of the modern big business based on salaried managers to run multimillion railway firms across the country (Chandler, 1977). These firms will influence in the decades up to the end of the 19th century many other enterprises in different industries in terms of their organisation and management techniques. Famous entrepreneurs who played a marked role in innovating in their own business originally were trained in the railways firms.

Together with the development of a national network of rails, there was a parallel development in telegraph, steamships and cable systems which all allowed for the first time in history a speedy and voluminous dispatch of various products in all parts of the vast country. This in turn paved the way for huge economies of scale and scope in existing and new industries during the second half of the 19th century.

Besides the railways expansion, another precondition for the second industrial revolution was the superabundance of land, combined with a favourable inclination for entrepreneurship (Americans were always fascinated by the success of their business people), and a shortage of labour (McCraw, 1997; Habakkuk, 1962).

Big business through mass production began to gather steam in the 1870s and 1880s. Out of the Fortune 500 largest American firms in the mid 1990s, 53 were founded in the 1880s (eg Kodak, Johnson & Johnson, Coca-Cola, Westinghouse Electric), 39 in the 1890s (eg General Electric, Pepsico, Goodyear), 52 in 1900s (eg Ford Motor, Gillette, General Motors) (the source of this count is Harris Corporation, 1996).

In the 1880s and early 1890s, many small manufacturers in the sugar, leather, salt, distilling, linseed and cotton oil, biscuit, petroleum, fertiliser and rubber boot and glove industries, joined into forming large horizontal combinations. The latter resulted mainly as a response to overproduction by numerous small firms in an expanding national market during the 1860s and 1870s and hence a threatening situation of prices falling below production costs (Chandler, 1959, p. 10). The producer goods industries developed later. Until the depression of the 1890s, most of the combinations and consolidations had been in the consumers' goods industries.

The American economy was consolidated and strengthened during the period 1890 to 1910 approximately (the core of the Second industrial Revolution). This consolidation took place through the process of:

- * Full integration of mass production and mass marketing (Chandler's thesis) for both the consumer goods and producer goods industries.
- * Multi-functional hierarchical business organisation (to some extent similar to that of the railways firms).
- * A marked change in the organisation of shop floor (Lazonick's thesis, 1990).
- * Appearance of big national and international corporations.
- * Salaried managers took over in running big business from the founding entrepreneurs in an increasing way.
- * Middle management and especially top management for the first time replaced market forces in an oligopolistic environment.
- * The learned skills and knowledge within each oligopolistic market were company-specific and industry-specific.

Combinations and integrations in the consumers' goods industries before 1897 had almost entirely been engineered and financed by the entrepreneurs themselves. On the contrary, after 1897, when the biggest merger movement in the American economic history took place, outside funds played an increasingly significant role in industrial combination and integration. Financiers and promoters began to acquire the same type of control over industrial corporations as they did earlier in the 1850s over railroad firms.

Like the companies making consumers' goods, those making producers' goods also set up nation-wide and world-wide marketing and distributing organisations, consolidated production into a few large plants and established purchasing departments. Also, except in steel, integration usually followed combination in the producers' goods industries.

Such large enterprises often led to diversification of the types of products these manufacturing companies made and sold. The 'full line' strategy, pioneered by General Electric and Westinghouse, was soon adopted by many other consolidated concerns.

Large industrial firms became by the turn of this century, vertically integrated, forward into distribution and backward into supplies of inputs, also centralised and functionally departmentalised organisations. They became increasingly bureaucratic internally and oligopolistic externally, despite some tendencies for monopolies. Integration and combination by one manufacturer forced others to follow.

Still following Chandler's analysis, further reorganisation of firms took place, this time internal in nature. The coordination and control of the flow of materials at a high volume and speed through many departments in which many workers were employed in each of the production processes created most challenging administrative and managerial problems in the second half of the 19th century. These problems became acute only in the late 1870s and 1880s but their solutions started taking place in the 1890s and 1900s.

In the years of expansion of 1870s and 1880s, industrialists relied on skilled foremen to recruit, train and manage the workers. That was the 'inside contracting' system of labour organisation, through which the owners eventually lost control over costs and the coordination of the flow of goods through the many departments.

H. C. Metcalfe, in 1885, prescribed a solution to the 'inside contracting' system. His solution was an adaptation of the voucher system of accounts developed in railroad repair shops to the needs of interchangeable-parts manufacturing. H. A. Towne, F. A. Halsey, and other metalworking manufacturers subsequently developed the 'gain-sharing' system. However, a further suggestion came from F. W. Taylor, who, in 1895, pronounced his 'scientific management', according to which standards of premiums and bonuses paid should be determined 'scientifically' and not historically. American manufacturers rarely adopted Taylor's full system. Instead, they gradually, from the mid 1890s to the end of 1900s adopted and refined the line-and-staff organisation which originally was invented by railroad men in the 1850s.

There is another way of looking into these organisational innovations, which were directly linked to the relation between workers on the shop floor and management of the production processes. Skilled workers who played a central role in shop floor operations were transformed into lower managers, thus a valuable cooperation was gained from these transformed salaried employees. As Lazonick said: "...making skilled workers members of the firm helped management to divide and conquer the labour force." (p. 229, Lazonick, 1990).

All these internal organisational reforms further strengthened the power of the larger firms, which in turn accelerated their growth and at the same time the growth of the USA. As Chandler says "...Kuznets data support the assertion that the industries spearheading American economic growth were those dominated by a small number of large managerial enterprises..." (p. 226, Chandler, 1990).

b- Diversification of production and reinforcement of big business. Reversal of the trend from the 1980s.

The interwar period was very turbulent with major recessions and booms, which eventually consolidated the structure of the American economy as this was shaped before WW1. The USA were already dominating the world economy before the break of the World War II. When the latter ended, the American economy was even stronger and totally in control of the non-communist globe. It was not though until the late 1960s and especially the 1970s that the European and Japanese nations started threatening this American supremacy.

How did these managers respond to the then developing fierce competition? Chandler, and other researchers have suggested that the American firms decided to expand through the process of diversification either to a minor extent to related industries or, to a major extent, for the first time, to unrelated ones. The diversification into unrelated industries led to the emergence of many conglomerates, an innovation of the *1960s* for the Americans (Chandler & Tedlow, 1985, p. 739). This trend was reversed later in the 1980s, when consolidation and specialisation took place again (Shleifer's & Vishny's (1994)).

In short, the American managers, via the third most important merger movement in their history, have chosen in the *1960s* an easy way of making some extra profits, or at least conserving the existing ones, but they did not lower unit costs of various products via economies of scale, as they have so successfully done during the Second Industrial Revolution.

In addition, diversification and multi-divisionalisation went hand in hand. The continuous process of vertical and horizontal integration as well as the product extension into additional industries during more than a 100 years of American economic development has ended up in more and more multi-divisionalisation, hence the proliferation of the M-form of American firms.

Finally, the propagation of American transnational firms (TNCs) in the world economy, their spreading-out in many nations and sectors through their tool of 'visible hand' (eg transfer prices) certainly makes it possible to make the contention that the supremacy of the American TNCs further solidified the big business trend of the American firm evolution.

However, a reversal towards smaller firms and an increase in the total number of business concerns started in the 1980s or even earlier (see for instance table 1.3b of the 1997 OECD report, or Harrison, 1994). This reversal can be described as follows.

The new information technology introduced in the 1950s, expanded in the 1960s really took off in the 1970s. It allowed the appearance of flexible and programmable machines, which can be used not just for one task but for a whole set of tasks. These machines can

extend Tayloristic organisation of labour from mass production to the production of small lots and even single products. Consequently, "...Corporations would be run as networks of establishments often considerably smaller than the classical Fordist factory. Also many forms of subcontracting, franchising and the like are used to a considerable extent to create formally independent units well integrated in such networks..."(H. Ernste & C. Jaeger, 1989, p. 173).

P. Dicken (1986, 1992), and others also confirm this conclusion. For instance, A. Chandler (1990, p. 607) says that "...In the 1960s and 1970s a wide variety of industries shifted from electromechanical to electronically controlled processes of production that began to transform the work place and alter the materials used in production. They realigned the economies of scale and scope, often reducing minimum efficient scale and at the same time expanding the opportunities for exploiting the economies of scope..."

The system of flexible specialisation can be defined in broad terms as a vertical disintegration of some core industries or as "...the establishment of a much more independent network of small plants based on a work organisation which as a complement to flexibility and specialisation explicitly emphasises professionalisation..." (H. Ernste & C. Jaeger, 1989, p. 176).

B. Harrison (1994) has argued for similar points in his attempt to explain "the changing landscape of corporate power in the age of flexibility" in the USA. For instance he mentions vertical disintegration, and strategic downsizing of large conglomerates in order to capture the power of core competencies, as being two main factors for the proliferation of smaller firms.

C Comparison between the Japanese and the American evolutions of firms. Comparison with other countries. Relation with economic growth and competition.

From the very brief historical trip to Japan and the USA some conclusions can now be readily made.

In Japan, smaller and more numerous firms has been the trend from the beginning of the country's industrialisation process. This was due to the early development of the focal type of company, because of limited resources and technology, hence the search for cooperation and consequently economies of scope to the detriment of economies of scale. On the contrary, in the USA, we have seen the contrary evolution to take place, that is a tendency from the beginning of the country's industrialisation process for the creation of big business, diversification of products, and eventually multi-divisional organisation. This was due to a natural abundance of resources, human and non-human, plus a series of major and minor technological and organisational breakthroughs. This divergent historical evolution of the firm in the two countries Japan and the USA demonstrates that there is not a unique way to evaluate competition and the role of SMEs, but this

evaluation depends on the historical context of factors such as availability of resources, technology, and organisation . In other words what is good for the USA might not be good for Japan, or what is good for Japan might not be good for Canada, and so on.

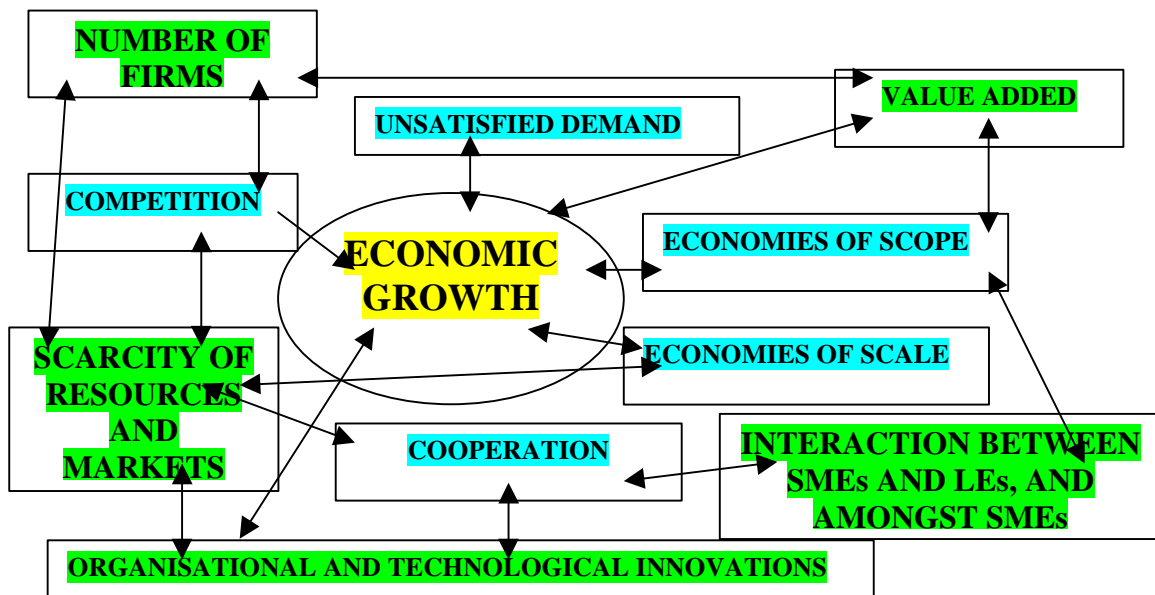
Also, in Japan, many organisational innovations such as AFMS, JIT, APD, (see section A) and the Japanese style sub-contracting enhanced and sustained the development of SMEs. On the contrary, in the USA, only very recently, from the late 1980s, there has been a reversal in the continuous expansion of big business to the detriment of smaller ones. This is very probably explained by the reorganisation of the American firms to take into account the immense possibilities offered by the huge development of information technology, such as Internet and powerful individual computers. Otherwise, no major organisational innovation took place in this country after WWII except an intensification of product diversification and multi-divisionalism.

In Japan, the conglomerate type of business existed from the start of the country's industrialisation process and has continued its development up to these days. On the contrary, in the USA it only appeared in the mid 1960s, but its development was reversed in the 1980s. Again, this antithesis between the Japanese and the American firm evolutions can be explained by differences in resource and technological endowments as well as historical circumstances.

An important conclusion is that in Japan, we have a more competitive economic environment than in the USA. Here, a stronger competition means that a buyer has a larger choice of suppliers or sellers in the economy. This can be verified mainly by considering the number of firms operating in each industry and in total. Table 1 in Appendix 1 shows this number for 16 OECD countries. In each of the industries examined, the Japanese competition is stronger than in any other country (though the data used are not consistent across countries, the comparison is revealing). On the contrary, the American industries are not as competitive, they often tend to be more oligopolistic.

M. Porter (1990) has also analysed the degree of competitiveness in several countries, such as Japan and the USA, when he talked about "domestic rivalry". However, he seems to indicate that an oligopolistic competition is desirable, at least as an alternative to monopolies and oligopolies with only few rivals. My argument is rather based on the relative importance of SMEs which offer a more intensive competition than just a larger number of oligopolistic firms. Further evidence that Japan offers a very strong competitive environment, even in the sub-contracting sector, is provided by many other researchers such as Y. Miwa (1994), M. Ito (1994), Y. Watanabe (1997), T. Fujimoto and A. Takeishi (1997).

As a consequence of all the analysis so far, I will propose the following theoretical model in order to explain differences in economic growth between the advanced nations. The following schema shows the main points.



Briefly, the above schema tells the following story. First, the poorer the country is the lower the average income and the more unsatisfied the demand for all goods is, which in turn generates more growth if the remaining conditions are met. This is a necessary but not a sufficient condition for high economic growth. This is another way of expressing the controversial convergence theory of growth (for the latter see for example Barro and Sala-i-Martin (1995), or C. I. Jones (1998) for a comprehensive review). The application of this condition to the two economies under study clearly shows that Japan's lateness of economic development when translated into substantial unsatisfied demand created a solid basis for higher economic growth than in the USA for most of the periods of the last century.

Second, another necessary but not sufficient condition for high economic growth is a continuous flow of minor and major managerial and technological innovations. This took place in both Japan and the USA, though in different ways, in different periods and in different intensities, as sections A and B have demonstrated.

Third, another necessary and perhaps sufficient condition for high economic growth is competition and rivalry amongst domestic firms in all industries. Such competition, especially if accompanied by some cooperation and networking enhances not so much economies of scale but economies of scope (not necessarily as joint production under the same roof and firm but as joint production in separate establishments). In turn, strong competition and economies of scope increase value added, which eventually leads to high economic growth. The chance of a larger number of companies creating a larger value added than a smaller number of enterprises is very high, since the various stages of production are increased with a larger number of firms. In other words horizontal and especially vertical integration reduces the value added for a given product, especially in

heavy manufacturing industries, such as cars. In addition, strong competition and a large number of production establishments are also closely related to the system of sub-contracting.

How is this third condition translated in the two countries? In the USA, the tendency for big business, vertical integration, mass production, formation of oligopolies and a limited number of firms has meant a slower economic growth than in Japan (*ceteris paribus*) over most of the last century. The contrary is true for the Asian country. However, I should add that not all the Japanese industries are exposed to domestic and international competition, contrary to the American entire set of industries, which have been exposed to at least international competition for a long time. This two-faced Japanese competition is perhaps the deep reason for the recent prolonged recession in the Asian country.

Fourth, economic growth and industrial organisation depend on the scarcity or abundance of resources and markets. Thus, Japan with a relatively limited amount of resources, technology and markets in the beginning of its economic development adopted a different mode of economic organisation than the USA with its renowned richness in all these factors. This point of the relative abundance of resources will be taken up again at the end of this section.

According to the above conclusions, I will attempt now to separate the OECD (as of the year 1990) plus the East Asian countries (these two different groups constitute perhaps the most advanced economies in the world today) in two camps. In the Japanese camp, I will include all the East Asian countries, plus the poorest of the OECD ones, namely, Spain, Portugal, Greece, Turkey, plus Italy with its rich North and poor South. In this camp, the general characteristic is a dual system of some big companies with a big army of SMEs, which propel their economies in a dynamic way. Also, in this camp, there is a relative scarcity of natural resources, late development, and a reliance on technological imitation. Finally, perhaps as a consequence of all these traits, these countries were the fastest growing economies in the world (with minor exceptions) in the last 30 to 50 years (see the quantitative analysis in the next section).

In the American camp, I am attempted to include Canada, Australia, New Zealand, plus all the Northern European countries, plus France. In this camp, the general characteristics are virtually the contrary of the Japanese camp, that is a proliferation of big business, a long history of independent economic and technological development, and a slower economic growth during the last 30 to 50 years.

As a confirmation of my choices, I will briefly give some elements for two countries in terms of their firm evolution, namely Italy (of the Japanese camp) and Germany (of the American camp). Comparison with other countries will be made in the next section in a quantitative way.

Chandler (1990) has extensively examined some of the main aspects of the German capitalism. "...The greatest difference, however, came in interfirm and intrafirm relationships. Whereas in the United states the new, large, integrated managerial firms

competed aggressively for market share and profits, in Germany many of them preferred to cooperate...” (p. 395). Famous German large enterprises are particularly noticeable in the chemical, electrical and mechanical industries, which directly compete with the American giants. Also, a more recent study by Schwalbach (1990) has concluded, “...technological factors, like scale economies, limit the prosperity of small business. In addition, industries with a high intensity of investments in advertising and R&D, and large domestic and foreign output volumes are dominated by big business...”. The quantitative model in the final section will support these remarks.

The Italian case is very similar to the Japanese one, in terms of firms’ networks and sub-contracting. Best (1990) best describes it. “...An industrial district is like a collective entrepreneur. In Brusco’s terms it combines productive decentralisation and social integration...We can identify a large number of cooperative institutions within the third Italy that serve as functional equivalents to managerial hierarchy...They are establishing an alternative to the Japanese institutional complex as a form of the new Competition...(p. 207). The Italian decentralised and flexible production system has been extensively analysed by others researchers as well (see for instance F. Pyke *et al*, 1990 for a good review). The Italian industrial districts are characterised by flexible specialisation, (which is very different from the Fordist organisation), competition, and cooperation (Pyke et al, 1990). I should also add, that In Italy as in Japan, the coexistence between very large firms and a myriad of smaller companies creates a positive and unique lever for economic growth.

I will supplement this section with an attempt to briefly explain the Japanese and American firm evolutions by using the tool of linear programming (LP). The following theoretical example of LP will serve to illustrate some of the main issues I discussed above.

Suppose that we have two firms, one in the USA and one in Japan, facing the usual simple LP problem of maximising profits subject to some constraints. Without disclosing as yet which LP problem belongs to which country, I will formulate the two models first.

LP1: $\max Z = ax + by + cz + dw$

Subject to:

$$\begin{aligned} a_{11}x + a_{12}y + a_{13}z + a_{14}w &\leq M_1 \\ a_{21}x + a_{22}y + a_{23}z + a_{24}w &\leq M_2 \\ a_{31}x + a_{32}y + a_{33}z + a_{34}w &\leq M_3 \\ a_{41}x + a_{42}y + a_{43}z + a_{44}w &\leq M_4 \\ a_{51}x + a_{52}y + a_{53}z + a_{54}w &\leq M_5 \\ a_{61}x + a_{62}y + a_{63}z + a_{64}w &\leq M_6 \end{aligned}$$

LP2: $\max Z = ax + by + cz + dw$

Subject to:

$$\begin{aligned} a_{11}x + a_{12}y + a_{13}z + a_{14}w &\leq M_1 \\ a_{21}x + a_{22}y + a_{23}z + a_{24}w &\leq M_2 \end{aligned}$$

Z is the objective function to be maximised, x, y, z, and w are the 4 products to be produced, a, b, c, and d are the profit per unit for each product, a_{ij} are the substitution coefficients, and M_1 to M_6 are the technological, human, and organisational constraints, such as machines, tools, skilled labour, and so on.

Furthermore, the firm in LP1 has the intention to produce four products by using six different types of technological, human, and organisational inputs or constraints, as all these inputs are readily available. On the other hand, the firm in LP2 also has the intention to produce the same four products, but its resources are limited to only two types of inputs (namely M_1 and M_2).

According to the rules of the LP formulation, the firm in LP1 has two possibilities, either to produce the four products considered x, y, z, and w, or to increase its production to six products, say through vertical integration. On the contrary, the firm in LP2 has only one limited possibility, that is, to produce only two products amongst the four (the precise combination will be suggested by the solution of the LP2 problem).

By now, it has become apparent that the firm in LP1 is an American firm with its larger choice of inputs, whereas the firm in LP2 must be somewhere in Japan. It would be possible to extend this LP formulation in order to include differences in demand and networking, but I will leave this as an exercise in another paper. Also, the programming does not have to be linear in order to demonstrate the relevant issues, but it makes explanations easier.

As an important confirming conclusion drawn from this LP exercise, I can readily say that the Japanese evolution of the firm has been influenced by the limited resources, (technological, human, and organisational), from the beginning of its industrial development a century ago, and consequently, it still depends on the myriad of smaller firms for a strong economic growth. On the contrary, the American firm has evolved from the beginning of its industrial take-off as a big business and relies much less on the peripheral smaller firms, because resources have always been relatively abundant in the USA.

D Quantitative evidence of the relationship between the number of firms (as a proxy for competition) and economic growth

According to the previous three sections, I will now propose the following simple but robust cross-country linear regression model in order to give some quantitative evidence to my arguments. The 14 EU countries (thus excluding Luxembourg), plus Norway, plus Japan, the USA, Australia, Canada, and Switzerland are included in the sample of the 20 most developed nations. Smaller countries like New Zealand, and Iceland were excluded.

$$\text{RG} = \text{CONSTANT} + a * \text{Y60} + b * (\text{TOEST/POP}) * \text{EMP99} + c * \text{PAT} + d * \text{EXDIV} + e * \text{HUCAP} + f * \text{INCTAX} + g * \text{AGRSEC} + \text{error} \quad (1)$$

RG stands for average annual growth rate of GDP per worker from 1960 to 1990 as a percentage, and is explained by the following factors (see Appendix 2 for actual data). Y60 stands for GDP per worker relative to the USA in 1960 (the original data are divided by 1000), and represents the convergence variable mentioned in the previous section. The lower this variable is, the higher the RG becomes.

TOEST indicates the number of total establishments (all sectors) in 1990, and represents the competition influence, as well as the organisational structure of industries (for instance, the small focal firms of Japan and the larger more diversified firms of the USA). TOEST is further emphasised by the contribution of the small business sector as represented by the variable EMP99, which indicates the percentage of employment of up to 99 employees in that sector. TOEST is multiplied by EMP99 so that both of them together further stress the contribution of small business to the overall competition. POP stands for population in 1990 and is used to standardise the TOEST as a per capita variable. The regression variable $(TOEST/POP)*EMP99$ is divided by 1000. The higher this variable is, the higher the RG becomes.

PAT is the average annual number of patents granted to residents per 100000 inhabitants during 1987 to 1990, and it is a proxy for the technological innovations taking place in each country. Thus we see, that Japan is the champion in this respect followed further down in the ladder by Germany and the USA. The higher this variable is, the higher the RG becomes. EXPDIV is the percentage of export market value dominated by the top 3 destination countries in 1988, and is a proxy for the close integration of each country within a particular region, eg Canada is heavily trading with the USA. The higher this variable is, the higher the RG becomes.

HUCAP represents the human capital factor and is approximated by the multiplicative effect of two variables, the HIGEDUC and the SECEDUC. The HIGEDUC is the percentage of relevant age group receiving full-time secondary education in 1988 and the SECEDUC is the fraction of 20-24 year-old population enrolled in higher education also in 1988. These two variables are put together as $HIGEDUC * SECEDUC^3$ (SECEDUC is raised to the power 3 to emphasise the differences in secondary education, though this does not significantly alter the results). Thus, we see, that the UK is lacking behind most of the other countries in this respect. The higher this variable is, the higher the RG becomes.

INCTAX is the personal income tax (on profits, income and capital gains) as a percentage of GDP in 1989, and is a proxy of the government intervention in national economies. Thus, Denmark is the champion in this respect followed by Sweden etc. The higher this variable is, the lower the RG becomes. Finally, AGRSEC is the percentage of total employment in the primary sector in 1991. Thus, Greece still employs a quarter of its workforce in agriculture, followed by Portugal, Ireland and Spain. The higher this variable is, the lower the RG becomes.

The OLS regression on equation (1) above gave the following very encouraging results.

$$\begin{aligned}
 \text{RG} = & \mathbf{4.3} \quad \mathbf{-42.2* Y60} + \mathbf{0.19 * (TOEST/POP)*EMP99} + \mathbf{0.012 * PAT} + \\
 & (0\%) \quad (0\%) \quad (0.3\%) \quad (2.0\%) \\
 & \mathbf{0.009*EXDIV} + \mathbf{0.01 * HUCAP} - \mathbf{0.03* INCTAX} - \mathbf{0.03* AGRSEC} \quad (2) \\
 & (13.4\%) \quad (4.5\%) \quad (1.6\%) \quad (9.1\%)
 \end{aligned}$$

$$\mathbf{R^2 = 0.973; \quad SEE = 0.21.}$$

The figures in brackets under the coefficients denote P-values. Only the variables EXDIV and AGRSEC are not significantly different from zero at the 5% (13.4% and 9.1% respectively). Furthermore, all coefficients have the right signs. There is no apparent concern for multi-collinearity.

The interpretation of these results can also be seen if we calculate each variable's contribution to the RG. Thus, regarding the variable Y60, if a country such as Japan started in 1960 with a low GDP per worker of 20% as against 100% for the USA, then the average constant RG of 4.3 (the constant of the regression) is only reduced by 0.84 for Japan and by 4.22 for the USA during the period 1960 to 1990. Regarding the contribution of the variable representing competition, that is (TOEST/POP)*EMP99, a country like Japan with a high value of this variable will benefit by an extra 0.81 of 1% of growth, as against 0.26 for the USA.

Regarding the variable PAT (patents), the proxy for technological innovations, the extra growth for Japan is 0.52 as against 0.23 for the USA. The human capital variable HUCAP contributes to the growth of Japan by an extra 0.26 and to that of the USA by an extra 0.56 of 1% growth. Note, that all these contributions to annual growth not only for Japan and the USA, but also for every other country in the sample, are comparative contributions, that is due to comparing each nation against the others. However, within each country's economic growth, the constant 4.3% indicates the growth generated by each country's common technological and organisational advancements, investments and so on (common to all nations).

Finally, a brief examination of the residuals (see Appendix 2) shows that overall the errors are very small and most probably are due to errors in data.

What are the main conclusions of this quantitative analysis? First, in relation to the topic of this paper, the econometric model shows that competition and SMEs play a clear and decisive role in economic growth. This model shows that even when we take into account some of the fundamental factors in determining economic growth such as unsatisfied demand, technological innovations, and human capital, then competition and the number of SMEs still have an important role to play. At the same time, as the number of SMEs is also a proxy for the organisational structure of firms, the regression confirms my contention that historical differences in company organization (eg small focal firms in Japan as against larger diversified firms in the USA) make significant differences in contributions in economic growth.

Second, the convergence factor or unsatisfied demand seems to play a preponderant role in determining economic growth, thus reaffirming similar conclusions of relevant literature (see for example Barro and Sala-i-Martin (1995), or C. I. Jones (1998) for a comprehensive review).

Third, if the estimated constant of regression (2) is further examined, an interesting concept emerges. If all the 7 explanatory variables are negligible, then the average growth rate is about 4.3% per annum. If the convergence factor is expressed as 50% of the GDP per capita level of the USA in 1960, and all other factors are virtually zero, then the average growth rate is about 2.2% per annum. I propose to call these various levels of growth rates thus determined the “intrinsic” or “auto-sustained” rates of growth. For example, if the convergence factor is expressed as about 100% of the GDP per capita level of the USA in 1960, and all other variables of regression (2) are virtually zero, then the “intrinsic” rate of growth is about 0% per annum. This also means that unless the other variables such as competitive forces, technological cum organisational innovations, and human capital increase, economic growth per capita will tend to go to zero. Consequently, as these variables in developed countries tend to be positive and significant, economic growth per capita will not tend to go to zero, thus supporting the endogenous type of economic growth.

Fourth, it is worthwhile noting what the reasons have been for a positive growth rate in the USA in the last 30 to 40 years. Since, the initial conditions of economic development were 100% for that country in 1960 (the value of Y_{60}), the average growth rate would have been zero if the other variables of the model were not positive. Thus, the American economy grew at an average of 1.4% from 1960 to 1990, because of improvements in human capital (about 0.56%), because of the competitive factor (about 0.26%), because of technological advancements (0.23%) (the remaining variables cancelling out).

E SUMMARY OF CONCLUSIONS

From the literature point of view, this paper, in some ways, examines and contrasts two Chandlerian analyses of firm evolution and subsequent growth, namely one suggested by Chandler’s monumental work, and the other by Fruin’s less voluminous but enlightening work. I hope to have added some further light as to why the two largest economies of the world, the USA and Japan, *differ* in terms of their organisational structures, and economic growth. My attempt consisted of comparing Chandler’s and Fruin’s analyses both qualitatively and quantitatively, and in the context of other scholars’ work. The following partial conclusions can only be part of the more general historical context in which societies and economies evolve.

The first two sections have provided some qualitative evidence about three fundamental differences between the two firm evolutions, namely the American and the Japanese ones (the discussion on these differences took place in the third section). First, from the beginning, Americans opted for the ‘big business’ organisation and continued to do so

during the last century, contrary to the Japanese entrepreneurs who opted for the smaller or focal firms. Second, the American companies have been very often industrially organised as monopolies or oligopolies, and with a tendency for a centralised type of management or multidivisional. Whereas the Japanese firms have been a mixture of a handful of conglomerates with an army of SMEs with them, and a tendency for a decentralised type of management or more functional than multidivisional. Third, the Americans have opted for a production of diversified related products, whereas the Japanese opted for a small range of products, that is for specialisation and sub-contracting. Explanations as to why Japanese firms evolved differently from the American ones included differences in natural resources and technology, which were examined under the light of (linear) programming models. Other explanations (see section B) were a consequence of historical circumstances.

The third section has related the two firm evolutions to economic growth and competition. Two main conclusions are worth mentioning here. First, the particular firm evolution in Japan and its consequential organisational features has led to a very high economic growth, substantially higher than that of the American economy. The econometric cross-country model of the fourth section has carefully shown that countries such as Japan and Italy have experienced higher growth rates than the USA and Germany because of stronger competition elements and more effectively organised firms, approximated by the number of SMEs in each country (other reasons for higher economic growth were also included in the analysis). Second, inter-firm economies of scope and non-integration were a major moving force behind Japan's higher economic performance, contrary to the intra-firm economies of scale and scope and vertical integration of American firms. To my opinion, these inter-firm economies of scope constitute the major Japanese organisational innovation leading to higher economic growth rates. It is worth repeating Fruin's (1992, p. 157) conclusion again:

“...a strategy of maximising inter-firm economies of scope through group-driven cooperative transactions made better sense than the pursuit of internal production and allocative efficiencies through vertical integration and product diversification...” .

Finally, from the fourth section, the econometric analysis shows that a higher economic growth rate for a given country such as Japan and Italy, comes from the following four main factors. First, from the convergence factor or unsatisfied demand, thus confirming the relevant literature on the matter. Second, from technological innovations. Third, from the degree of competition and organisational effectiveness as approximated by the number of SMEs. And fourth, from the human capital factor. An interesting corollary of this conclusion is that for the 20 most developed countries in the sample, if the convergence factor is expressed as 100% of the GDP per capita level of the USA in 1960, and all other factors are virtually zero, then the average growth rate is about 0% per annum. Consequently, as these variables in developed countries tend to be positive and significant, economic growth per capita will not tend to go to zero, thus supporting the endogenous type of economic growth.

APPENDIX 1: Table 1

ISIC number	Establishments* (in ,000)						POP**	Establishments per 10000 inhabitants						
	"3810"	"3820"	"3830"	"3832"	"3840"	"3843"		"3810"	"3820"	"3830"	"3832"	"3840"	"3843"	average
Australia	4.3	2.4	0.9	0.0	1.4	0.9	15.8	27.2	15.2	5.7	0.2	8.5	5.6	10.4
Austria	0.8	0.7	0.5	0.0	0.1	0.1	7.6	10.5	9.2	5.9	0.6	1.4	0.9	4.8
Canada	3.7	4.3	1.3	0.6	1.4	0.8	25.2	14.7	17.1	5.2	2.3	5.6	3.0	8.0
Denmark	0.9	1.0	0.3	0.1	0.3	0.1	5.1	17.6	19.6	5.9	2.4	5.9	2.2	8.9
Finland	0.7	0.7	0.2	0.1	0.3	0.2	4.9	14.3	13.3	4.1	1.2	6.1	3.1	7.0
Germany***	5.3	5.5	3.3	1.2	1.0	1.5	61.0	8.7	9.0	5.4	2.0	1.6	2.5	4.9
Greece	0.6	0.4	0.3	0.0	0.3	0.1	9.9	6.1	4.0	3.0	0.4	2.5	0.7	2.8
Ireland	0.6	0.3	0.3	0.1	0.1	0.1	3.5	17.1	8.6	7.1	3.4	3.4	2.2	7.0
Japan	50.7	46.5	34.0	16.0	14.7	10.6	120.8	42.0	38.5	28.1	13.2	12.2	8.8	23.8
Norway	0.8	0.6	0.3	0.1	0.5	0.1	4.2	19.0	14.3	6.2	2.3	11.2	2.1	9.2
Portugal	1.2	1.1	0.2	0.0	0.2	0.1	9.9	12.1	11.1	1.7	0.4	2.3	1.4	4.8
Spain	14.7	13.7	2.2	0.4	1.2	0.1	38.4	38.3	35.7	5.7	0.9	3.1	0.2	14.0
Sweden	1.6	1.2	0.4	0.1	0.5	0.3	8.4	19.0	14.3	4.8	1.1	5.6	3.1	8.0
Switzerland	1.1	0.0	0.0	0.0	0.1	0.0	6.5	16.9	0.0	0.0	0.4	1.5	0.5	3.2
UK	14.6	22.5	9.8	3.7	4.4	2.1	56.7	25.7	39.7	17.3	6.5	7.8	3.7	16.8
USA	35.9	53.1	16.6	8.5	11.6	6.6	238.5	15.1	22.3	7.0	3.6	4.9	2.8	9.2

* For the year 1986, or if not available for the year 1987

**POP stands for population in millions

***For Germany, and for 3832, and 3843 the figures were guessed

Note: these numbers should be treated with caution, as they are not consistent in definitions and accuracy

ISIC code:	<u>"3810"</u>	metal products
	<u>"3820"</u>	machinery nec
	<u>"3830"</u>	electrical machinery
	<u>"3832"</u>	radio, television,telephones,records, etc
	<u>"3840"</u>	transportation equipment
	<u>"3843"</u>	motor vehicles

APPENDIX2: Table 2: Original data used in the regression

	RG	Error	Y60	TOEST	POP	TOEST	EMP99	PAT	EXPDIV	SECEDUC	HIGEDUC	HUCAP	INCTAX	AGR
	%			in ,000	millions	/POP	%		%		%	%	%	%
Australia	1.5	0.06	78	430	17	25.3	59	6.4	38	0.99	29	28.1	14.3	5.5
Austria	3	-0	44	180	7.7	23.4	50	17.3	53.3	0.8	31	15.9	10.2	7.9
Belgium	2.7	0.01	58	490	10	49.0	55	4.9	54.4	0.99	33	32.0	16.4	2.8
Canada	1.9	-0.2	79	600	26.6	22.6	45	4.4	82.2	1.05	62	71.8	16.7	4.5
Denmark	1.8	-0.2	60	170	5.1	33.3	64	5.9	38.8	1.07	31	38.0	29.4	5.5
Finland	2.9	0.05	47	110	5	22.0	61	15.9	41.5	1.08	40	50.4	19.2	8.5
France	2.7	-0.1	55	1980	56.7	34.9	54	15.3	38.4	0.94	35	29.1	7.6	6.1
Germany	2.5	-0.2	57	2290	62	36.9	46	28.1	31	0.94	32	26.6	12.3	3.3
Greece	4.1	-0.3	21	690	10.1	68.3	81	4.8	47.8	0.95	28	24.0	6.1	25.
Ireland	3.5	0.26	34	130	3.5	37.1	56	0.7	55.5	0.98	25	23.5	13.2	15
Italy	3.4	0.15	45	3920	56.7	69.1	73	0.3	43.3	0.76	26	11.4	14	8.5
Japan	5	0.15	20	7000	123.5	56.7	75	43.2	45.9	0.95	30	25.7	15.1	6.7
Netherlands	2	-0	70	420	15	28.0	54	5.4	49.1	1.04	32	36.0	12.8	4.5
Norway	2.4	0.07	58	90	4.2	21.4	59	6.7	50.1	0.94	35	29.1	15	5.9
Portugal	4.1	0.16	20	600	9.8	61.2	65	0.2	45.2	0.59	18	3.7	9.2	17.
Spain	3.9	0	34	2460	39	63.1	70	4.4	40.3	1.05	32	37.0	11.3	10.
Sweden	1.6	0.03	71	170	8.6	19.8	63	22.9	33.2	0.9	31	22.6	23.3	3.2
Switzerland	1.6	-0.1	82	150	6.7	22.4	67	40.4	38.9	1	25	25.0	12.7	5.5
UK	2	-0.3	60	2630	56.6	46.5	49	7.7	34.9	0.83	23	13.2	14.3	2.2
USA	1.4	0.36	100	6000	249.9	24.0	56	19.1	39.9	0.98	60	56.5	13	2.9

For the definition of variables see text, section D.

Sources:

The variables RG and Y60 were extracted from Table B.2 in C. I. Jones (1998).

The variables PAT, EXPDIV, SECEDUC, HIGEDUC, INCTAX, and AGRSEC are extracted from tables 7.25, 2.27, 8.11, 8.12, 3.29, and 8.30 respectively in IMD (1992). Note that for Switzerland, SECEDUC was guessed to be 1. HUCAP is a derived variable (see section D).

The variable POP was taken from the OECD publication (1995).

For the variable TOEST and EMP99, various sources were used and some rather “harmless” estimations were performed because the data in this domain are not very reliable nor consistent. As the authors of the 1997 OECD report on SMEs remarked “...The demand for reliable, relevant and internationally comparable data on SMEs is on the rise...” (p. 3).

For the 11 EU countries of 1990, the table 2.8 of the ENSR (1994) report was used without any further calculations. For the three EFTA countries Austria, Finland, and Sweden the corresponding figures were estimated from the information on pages 32-33, same report (ENSR). For the countries Switzerland, Norway, and Canada the figures were estimated by using the sources of the OECD report (1997) on SMEs, tables 1.1 to 1.6, the manufacturing relevant data from A. J. Darnay (1995), and the OECD (1996) report. For Japan, the table 14-2, volume 4, of JSA, 1987, was used and the figures were extrapolated for 1990. For the USA, table 873 of the 1991 national Data Book was utilised, and the figures were extrapolated for 1990. For Australia, various issues of the “Yearbook Australia” were utilised and the appropriate figures were estimated.

Note that in the model presented in section D above, the estimated figures did not alter the significance of the results, mainly because the data for the main countries such as Japan, the USA, Italy etc are relatively accurate. Also, small changes in these estimated figures do not alter the regression results significantly.

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