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**MARSHALL'S 'TREES' AND THE GLOBAL 'FOREST':  
WERE 'GIANT REDWOODS' DIFFERENT?**

L. HANNAH

## ABSTRACT

This essay examines the fate of the 100 largest industrial firms in the world in 1912 over the period to 1995. Disappearance and decline were the most common outcomes, but a few outstanding performers — firms like Burmah / BP and Procter & Gamble — left descendants eight or nine times their initial size, in “real stock exchange price” terms. There were no significant differences between the performance of giant German, British and American firms, other than a slightly greater tendency to disappear among American firms. The convergence of national performance of **giant** firms is probably related to converging strategies and structures of such firms in advanced industrial countries. Long-run differences in national economic performance in the twentieth century, at least among industrial leaders, are rooted elsewhere: in non-industrial sectors of the economy or smaller industrial firms. The analysis of the long-run evolution of giant firms also suggests that, while firms in “old” industries on average performed worse than those in “new” ones, the 1912 population included equal numbers of each and there was, in any case, greater variability of outcomes **within** than **between** industries. No simple formula enables us to discriminate *ex ante* between long-run corporate success and failure, for reasons inherent in the nature of modern corporate capitalism’s success as an economic **system**.

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# MARSHALL'S 'TREES' AND THE GLOBAL 'FOREST': WERE 'GIANT REDWOODS' DIFFERENT?

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## 1. THE PROBLEM

How can we generalise from the case studies in this volume? How representative are they? Are alternative *post hoc* rationalisations equally plausible? In altered circumstances, (inherently unpredictable at the time) would different outcomes have been observed? Many of these questions are unanswerable the lessons of the cases are often *sui generis*, the counterfactuals are unknowable, the data for comparable firms are unobtainable or no such firms exist. This does not mean that cases cannot enrich our understanding, but it has sometimes led frustrated business historians to claim rather more for their craft than is justifiable. This essay reviews some of their problems and suggests how we might focus their research on areas where significant progress is most likely. It addresses, particularly, the experience of large firms, in the context of differences in national industrial systems and performance outcomes.

Writing at the time that large corporations were being built on an unprecedented scale, Alfred Marshall felt the need to modify his favoured analogy of firms in the economy as trees in the forest. In his first (1890) edition of the *Principles of Economics*, he had suggested that, like trees in the forest, there would be large and small firms, but “sooner or later age tells on them all”. However, by the 6th edition of 1910 he was cautioning that his earlier sentence could appropriately be put in the past tense, for “vast joint stock companies ... often stagnate, but do not readily die” (Marshall, (ed Guillebaud) 1961, p.316). Marshall was an acute observer of the contemporary real economy in Britain, Germany and America: he would not have modified his view without substantial evidence that the Giant Redwoods he observed in these economies were qualitatively different from the nineteenth century firms on which he had based his generalisations of two decades earlier.



The work of business historians — even those who profoundly disagree with Marshallian perspectives on industrial economics — has generally concurred with his view that something new was happening in the twentieth century corporate world. Chandler (1990) and Lazonick (1991), for example, have suggested that large corporations, by the beginning of this century, built significant technical, organisational and marketing capabilities, thus acquiring often unassailable first-mover advantages, so that they generally still dominate the global oligopolies they first created. The purpose of this essay is not to question whether they (and Marshall) were right, for they clearly were, but rather to establish the degree to which the traditional analogy of rising and declining trees, or the implied new one of Giant Redwoods with a charmed life, perhaps of centuries rather than decades, best describes the reality of the modern corporate economy. We will suggest that — on the evidence of the century so far — there is some life in the old view and that understanding where and why helps us diagnose the nature, strengths and limits of dynamic organisational capabilities.

Scepticism about corporate capabilities is not universal among business historians. The tendency to over-emphasise successes (and to rationalise them *ex post*) — what has been criticised as the “Whig” misinterpretation in the context of political history — is chronically endemic among them, as it is also among businessmen and management consultants (see eg Hamel and Prahalad, 1994). It commonly co-exists with the conviction that they have found the unique recipe for rectifying the failure of firms or countries (a trait particularly well-developed in the Anglo-Saxon world of one-time leaders that have allegedly failed). I believe that some of the insights this process has generated have been valuable: it has, for example, helped us to understand the role of corporate learning and organisational capabilities in generating asymmetries between firms that provide a key to understanding competitive performance. Like Monsieur Jourdain and his prose, “new” industrial economists and business historians are now beginning to formulate explicitly what thoughtful businessmen have long implicitly understood about the limits of the simpler,

neoclassical models of “old” industrial economists. The following comments are not intended to undermine that endeavour, but to reinforce it by disciplining some of its more adventurous generalisations.

## 2. PROPOSED TEST

The over-use of the survivor technique, distorting our understanding of the process that has led to the present state of things, has affected several disciplines besides business history. If we merely observe that many of the firms that now dominate the economy are of ancient lineage<sup>1</sup>, or that **some** of today’s top firms were also at the top a century earlier, we might conclude that giant firms are **generally** long lasting; yet the stated observation is equally compatible with the hypothesis that some initially small firms grow rapidly to become large, while corporate giants have, over reasonably long periods, a poor survival rate. Our current knowledge of survivors dominates our impression of the typical experience and their triumphs are lionised; while the history of the failures is forgotten or considered untypical.

The first step in rectifying resulting misinterpretations has usually been to examine a population of firms defined *ex ante*. For this essay I have extended Schmitz’s (1993) work, to generalise about the global industrial giants of 1912. While there are no doubt still some omissions, I believe the amended list in Appendix A below includes almost all the industrial (mining and manufacturing<sup>2</sup>) firms in the world with an equity market capitalisation<sup>3</sup> of \$26m or more in 1912. These were large firms even by today’s standards: the largest (US Steel) employed 221,025 workers in 1912; other firms on the list typically employed more than 10,000.<sup>4</sup> They were also, generally, firms that had already stood the test of time, being on average 32 years “old” in the corporate sense, and often much longer established as partnerships or earlier private firms. They were not the outcome of temporary stock market bubbles: these were the survivors of a brutal shake-out process

after the global turn-of-the-century stock market booms and merger waves, in which many giants with watered stock but few capabilities had drastically declined (Livermore, 1935; Lamoreaux, 1984; Hannah, 1975; Tilly, 1982; Samber 1997). They were, on the whole, firms that contemporary stock market analysts considered attractive and safe because of their consistently reliable record of generous but sustainable dividends (Meyer 1910, p.196). A population of 1900 giant firms would almost certainly show earlier exits and faster rates of decline than this population of maturing “Giant Redwoods”.

In order to assess their propensity to decline or develop, it was necessary to devise a comparable measure of the size of the 1912 firms in 1995. Equity market capitalisation is again available for survivors, but, the comparison needs to take account of inflation. The deflator I have used is US stock market prices, more specifically the Standard & Poor industrial ‘500’ index. The rise in US stock prices (measured thus between 1912 and 1995 and averaging about 6% compound per year) clearly partly reflects the declining value of the dollar (averaging 4% per year between 1912 and 1995) but also some real growth. It seems appropriate to use a deflator that also captures the fact that even firms merely sustaining their market position would have participated in this growth, which in the OECD countries has, over the century as a whole, attained levels just above 2% per annum per caput, with some extensive growth in the number of industrial workers also (Maddison 1981, p.15).

One intuitive interpretation of the 1995 equity market capitalisation, thus revalued “at 1912 Stock Exchange prices”, is that it reflects the difference between how the long-run strategy of the 1912 managers actually turned out and what they would have left posterity if they had instead decided they had no distinctive capabilities, retired and handed their assets to a hypothetical index-matching fund manager. If the 1912 and 1995 values were found to be equal, it would imply they would have lost nothing (except their managerial incomes) if they had followed that path, while a ratio of 1995 to 1912 “size” below 1 would suggest that giving up in 1912 would have been a better bet. A

ratio above 1 would suggest that, in the long-term, the firm's capabilities were broadened (eg by extensive growth into wider geographic or product space) or deepened (by adding new competitive advantages, perhaps from R&D, or branding).

This appealing intuition should not be pressed too far, however. A sell-out in 1912 of firms of this size, even where possible, would not necessarily have been at the market price: break-up values were less than the going-concern values reflected in the market price; but takeover values could be higher. Equally the ratio of 1995 to 1912 size should not be taken as a measure of investor returns: that would require an analysis of the intervening dividends (and other flows to and from shareholders), which could have seen higher or lower than the Standard & Poor average. In principle, investor returns could be better even if no firm existed at the end: a monopoly well-milked is better for investors than a residue of unprofitable corporate assets.<sup>5</sup> By the same token, a firm may have been under bankruptcy protection, severely compromising its equity investors' assets, but still remain large-scale, reflecting its other capabilities rather than temporary financial mismanagement or ill-luck. A recent example is Texaco, which was under bankruptcy protection in 1987, but still retains significant capabilities and, by our measure, is the fifth best performer of the hundred 1912 giants. Several German firms have also had parallel experiences in their frequently disrupted and dismembered national past. Our concern is **not** the outcome for investors, but rather the survival, development or decline of capabilities embodied in the firm. In that spirit we are primarily interested in the "size" of the 1995 firm relative to that of 1912: the 1912 firm's adjusted 1995 stock market value reflects in some sense whether the "lump" of corporate capability, defined by the boundaries of the firm, has grown or declined.

Of course that size will have been affected by many factors other than its assets in 1912 and the skill with which its 1912 managers then deployed them.<sup>6</sup> Market position and scale often conferred first-mover advantages, but the competitive process was one of continuous

movement, not just initial position: the capabilities needed (and their potential usefulness in the marketplace) were naturally transformed over time. New corporate resources were also added, not just in ways indirectly captured in our Stock Exchange price deflator (eg reinvested profits), but by new capital issues or new stock issued for firms acquired (and acquisition activity was one to which many of these firms were strongly prone). By implication, we assume all of Unilever's "organisational capability" came from the British half (Lever Brothers) not its Dutch half (Margarine Unie), while DuPont's stock of skills implicitly came entirely from its chemical rather than oil company (Conoco) heritage. Because of stock issued to finance such mergers and acquisitions or to finance internal expansion, stockholders will probably have done worse than our measure of changes in the "lump of managerial capability" suggests.<sup>7</sup> In that sense, adopting a ratio of 1 between the 1995 and 1912 values as the threshold defining corporate capability enhancement (rather than decline) should be considered a **very** weak test, biased in favour of diagnosing corporate growth. We will be making simple, comparative, long-run judgements and our choice of deflators and benchmarks is usually biased against the hypothesis being tested.

There are two remaining problems of the capability survival test for our 1912 giant firms: identifying the precise 'heir' of the 1912 firm, and dealing with giant firms that were themselves taken over or otherwise 'disappeared' between 1912 and 1995. Some arbitrary judgements are inevitable — the genetic descent of corporations is less unambiguously defined by economic than by human reproductive processes — but we have tried to apply standard rules to resolve difficult cases. Corporate descent is defined in organisational (rather than legal or technological or marketing) terms. The successor firm of American Tobacco is American Brands, even though it no longer sells tobacco in America and recently disposed of the subsidiary bearing its original name in that business.<sup>8</sup> Considered strategic decisions to change business lines are accepted as the corporate destiny: American Can is now Travelers Group (not part of the Triangle Group that

bought the can-making subsidiary), Singer is now Bicoastal (not the Hong Kong-Bermudan sewing machine and computer company that laboriously re-assembled a world-class sewing machine business, that Singer's managers had believed had no future and broken up).<sup>9</sup> Where mergers have been reversed, the intervening life is ignored: Bayer is the successor of Elberfelder Farbenfabriken (the intervening IG Farben notwithstanding), Zeneca is the successor of Brunner Mond (the intervening ICI notwithstanding). Where voluntary demergers have occurred, the larger core is taken as the continuing firm. However, when demerger derived from government action, large resulting entities are credited as joint successors: Du Pont became Du Pont plus Hercules and Atlas, Lothringer Hüttenverein became Knutange and Klöckner, Burmah is now Burmah Castrol plus BP, Western Electric is now Lucent Technologies plus Northern Telecom.<sup>10</sup> Firms may leave archaeological remains — as in the survival of the Armour and Swift brand names as a small part of a subsidiary of Conagra — but both firms are (reasonably) judged no longer to exist.

Yet some firms that have 'disappeared' into a larger entity retain substantial, separately identifiable, capabilities in "quasi-firms", clearly deriving from the 1912 entity. The National Biscuit Company is traceable in 1995, but had 'disappeared' into RJR Nabisco; similarly Imperial Tobacco is now a division of Hanson Industries. In both cases the larger entity built on the surviving capability of the acquired company and sometimes recognised its independent viability. Indeed, in these two special cases, both parents were discussing demerger of their subsidiary, so that it would again become an independent firm. Clearly such cases on the verge of corporate "reincarnation" are different from a 1912 firm that had truly "disappeared" in the sense of being liquidated (eg Central Leather), sold at a price reflecting long-run decline (eg Pullman) or acquired from bankruptcy protection by an optimistic corporation which proved unable to turn it around (eg AEG). Valuing surviving subsidiaries or divisions in 1995 as separate entities is problematic: AEG, for example, if valued on the basis of capitalising divisional profits, would actually have a negative value

(which would probably be too pessimistic an assessment of its surviving capabilities). We have therefore valued acquired firms at the estimated price paid for acquiring their equity<sup>11</sup> **at the time of their substantive disappearance**<sup>12</sup>, converting this to “1912 Stock Exchange prices” by the appropriate Standard & Poor 500 index point, as with 1995 survivors. Acquisition prices are usually at a substantial premium to market values and, if acquired firms were generally declining<sup>13</sup>, the earlier date of the acquisition would impart an upward bias, relative to surviving firms valued in 1995. This measure is, therefore, presented separately in our tables. Recognising its upward bias, it will be used when a full sample of outcomes is required or where it is clear that it is biased against the hypothesis being tested.

A final problem is nationalisation. This was, for reasons not unconnected with their size<sup>14</sup>, a serious risk for the giant firms of 1912. All the Russian, Mexican and French firms in the 1912 list, many of the German ones, and parts of some British<sup>15</sup> ones were at some stage nationalised and some remain in state hands. Nationalised firms like BP and St Gobain continued to be managed like private firms and by 1995 were privatised, so can be treated in the normal way. Giant Russian companies (of which there were three in 1912) pose difficulties. Nobel Brothers (the only Asian firm in the 1912 list, with St Petersburg headquarters but mainly Azerbaijani operations) was expropriated after the Russian Revolution; the company’s rump of Western operations (eg in Poland) was worth little when finally liquidated in the 1950s. Two other Russian firms in industries with no large quoted 1995 successors (one iron and steel firm, the other in railroad engineering) are also pessimistically treated as declining to zero value. However, where Western firms remain nationalised, we have taken the 1995 balance sheet assets less any traceable dedicated debts as a proxy for market value.

### **3. DID GIANT FIRMS GROW OR DECLINE (1912-1995)?**

Four-fifths of the giant companies in the 1912 list were based in the major industrial countries of their day: Germany, Britain, and, above all, America, which alone accounted for over half. They had amassed substantial assets — physical, human and/or reputational — to become the largest corporations globally. Most had distinctive accumulations of skills, architectures of internal or external relationships, first mover advantages, economies of scale, scope or experience, or technological leads, of a kind that asymmetrically endowed them with competitive advantages over other firms. That these were in many cases the outcome of a path-dependent (and difficult to replicate) process of organisational learning is also clear. The parables of learning that we have told<sup>16</sup> are prominently represented among the 1912 giants and they could be replicated many times over. They include Westinghouse Air Brake, whose market power over its railroad customers — then the dominant transportation providers — derived from network standard setting in which exclusive private ownership (at least in the days before Microsoft) was not common. Some — including Shell, Jersey Standard (Exxon) and Rio Tinto (RTZ) — derived market power from control of raw material resources or distribution networks, or — like Eastman Kodak or Siemens — from popularising new technologies. Others — like Guinness, Procter & Gamble and Lever Brothers — had pioneered branded products in mass urban markets.

The business history literature understandably focuses on companies such as these which, because they have been sustained successes, remain familiar to us today. There is, however, a danger in this perspective of developing a somewhat Panglossian view of giant corporations as repositories of capabilities which are self-sustaining. Indeed, their long-run success easily reinforces the stronger view that such corporations were able to entrench their existing market position and also developed organisational routines which reinforced what they had already learned, creating dynamic, learning organisations which would, through geographical (often multinational) expansion, through diversification into new product markets, or through the institutionalisation of innovation by R&D, constantly expand the ambit



of their capabilities. That some firms — Procter & Gamble, Du Pont, Shell, Siemens and others — did so is undoubtedly true, but how typical were they? That question is rarely answered in relation to a population defined at the start of the process, rather than by the remembered survivors.

Yet who now remembers German giants of 1912 like Hohenlohe Iron & Steel, British ones like Metropolitan Carriage or US ones like Central Leather, the Nevada Consolidated and Utah Copper group or Cudahy Packing? And when firms that have drastically declined, like US Steel (now USX Marathon), are remembered, it is usually as exemplars of their failure to expand their capabilities, as elephants that did not learn to dance in a world in which corporations (if they are wise or well-advised) normally do.

Our 1912 population — and our tracking of the outcomes by 1995 — enable us to judge how typical the firms we remember are, relative to those we have largely forgotten. Is it easy to expand corporate capability (whether at the terminal date of 1995 or by earlier exit at a respectable size) or are cumulative corporate learning and capability expansion difficult tricks for giant firms to pull off? Table 2 indicates that just over a quarter of the firms did both remain independent and experience growth and just over a fifth managed to stay in the top 100 by market capitalisation in 1995. Yet such favourable outcomes were less common for giants than either corporate disappearance or experience of bankruptcy or a close shave with it.<sup>17</sup> Nearly three-quarters of the 100 giant firms had disappeared or were smaller in 1995 than in 1912. The average giant firm, it is true, was larger in size in 1995 (or on its earlier disappearance) than it had been in 1912, but this average was heavily influenced by the few cases of exceptionally strong growth<sup>18</sup>, less than a third of companies showed positive growth, and the modal ratio was zero. Overall, in this highly skewed distribution, the ratio of terminal to 1912 values was, depending on the assumptions made, between 1.1 and 1.4 when something around 3 was required to stay in the global top 100

industrial firms.<sup>19</sup> The dominant tendency to experience decline was particularly marked among the larger of the 1912 giants.<sup>20</sup>

To extend Marshall's analogy of the population of firms as the "trees of the forest", the Giant Redwoods among them were in the long-run prone to death and decline, and the super giants more than most. Economists are notoriously shy about defining what they mean by the long-run, but it is certainly a shorter time in economics than in silviculture: we are talking about corporate "redwoods" with a distinct propensity to die over decades, not the centuries of their natural cousins. The "quarter-life" of the 1912 giants (ie the time taken for a quarter of them to disappear in bankruptcy, nationalisation or merger) was thirty-three years, and they are, as we approach the millennium, now hovering around their half-life.<sup>21</sup> The time elapsed since 1912 — eight decades or so — is not much longer than the business "half-life" of a single human being<sup>22</sup>, though, of course, personally-managed businesses **generally** had much shorter average life spans than this. Small firms certainly have shorter average lives than giant firms<sup>23</sup> — it usually takes longer to walk down a mountain than to roll off a hillock — but both large and small firms commonly die. They differ only in the length of time they take and, even in that respect, by surprisingly little: to raise a joint stock company's half-life by one year, it is necessary to increase its size by twenty-three times.<sup>24</sup> The proposition that it would be possible to fritter away \$3b (much less \$90b) in a human lifetime is one I personally find daunting, but business leaders are evidently made of sterner stuff. Three billion dollars is the value (in 1995 stock exchange prices) that the market placed on the **smallest** of these firms' "lump of capabilities" in 1912 (and \$90b that of the largest); yet overall these firms barely increased their value, many had decimated it or dissipated it completely. The supposedly exceptional turbulence in corporate rankings (now modishly asserted by businessmen to have followed the liberalisation of world trade, oil crises and the spread of industrialisation) is in fact also observed in the earlier periods of increasing national autarchy and relative economic stagnation. Corporate dinosaurs are ubiquitous in an ever-changing

world. As the old English music hall joke had it: Q. How do I build a successful small firm? A. Easily! Buy a large one and wait!

One interpretation of the strong tendency to stagnation or decline would be that it was the rational strategy of dominant firms pursuing shareholder profit-maximisation, a point argued for US Steel's early decline by Stigler (1965). Rather than set an entry-preventing price, it may be sensible for dominant firms to milk their monopoly position while yielding market share to competitors. This was particularly likely where it helped firms appear respectable to anti-trust authorities, especially when rivals thus indulged respected price levels. Casual inspection of the business histories of the declining firms in this population suggests that planned decline was rarely their explicit objective, though it may have been implicit in their muddled reactions. We have not investigated overall stockholder returns, but the general impression in these companies' histories is of depressed profits desperately used by managements to paper over the cracks of declining capabilities, not of generosity to stockholders during a pre-planned yielding to competitors of market share they could not have expected to keep. Stigler's hypothesis could clearly be investigated further, but it appears unlikely to account for more than a small proportion of the 1912 giants' propensity to reduce their size.<sup>25</sup>

The implications of these observations for industrial economists are clear. While we naturally focus on success — on corporations that did learn to expand or sustain their capabilities — this is not something that giant managerial hierarchies have normally been very good at. In fact the alleged twentieth century tendency to increased industrial concentration is by no means universal or sustained in all national markets (Hannah, 1995) and probably is quite mild on a global basis also.

The implications for the parables that business historians tell and for understanding individual corporate evolution are that we should be as sensitive to the sources of eroding capabilities as of their building. Corporations can forget as well as learn; their inherited learning can become redundant (or even dysfunctional) in a changed environment;

“first mover” advantages appear fleeting; supposedly distinctive capabilities can be replicated or improved upon by competitor firms.<sup>26</sup> Such outcomes appear to be twice as common as successful expansion of capabilities for giant corporations.

Clearly if we could distinguish *ex ante* what determines how firms can beat the normal form and do well, we could change the balance of economic evolution and (presumably) become very rich men. The reader will not, then, be surprised that it is in fact very difficult to do so, and that those who have so far been brave enough to attempt it are quite unconvincing. While this population of firms is not large enough — given the variability of outcomes — to generate many statistically significant results<sup>27</sup>, it does enable us at least to call in question some generic recipes for corporate success, even those generated with hindsight. If *ex post* “prediction” is difficult, we can be reasonably certain that *ex ante* prediction will pose a few problems; the strategic management consultants we should most respect are the modest ones.

#### **4. NATIONAL DIFFERENCES IN CORPORATE PERFORMANCE**

Perhaps the most widely believed systematic model of corporate failure is Chandler’s recent international comparison, invoking Britain’s failure to develop professionally managed, large, corporate hierarchies as a reason for Britain’s twentieth century economic decline, relative to Germany and the USA (Chandler, 1990). This thesis is appealingly grounded in a compelling argument about corporate capability, but its vigorously stated comparative perspectives are vulnerable from a number of angles (Alford, 1994; Hannah, 1995). Our population of “Giant Redwoods” certainly provides no support for the hypothesis that large British firms were less likely to sustain their capabilities than German and American ones. Indeed, as Table 2 suggests, the reverse is true: British firms were more likely to survive, more likely to remain

in the top 100 and averaged a higher degree of capability expansion than American or German ones.<sup>28</sup>

These results invite speculation rather on British advantages as a home for corporate Giant Redwoods<sup>29</sup>, particularly when viewed in relation to the markedly inferior growth performance of the UK economy for many decades after 1912. The British giant corporations perhaps had more staying power because in 1912 they were domiciled in a free trade country, while American corporations were substantially over-protected by high tariffs and German ones moderately so (Capie 1994, p.59): British 1912 capabilities were thus already disciplined by more stringent (because more global) **market** tests. British giant corporations also tended already to spread an unusually high proportion of their corporate **resources** globally. Since perhaps a third of the British giant corporations' activities were located overseas in 1912, probably twice as much as the average American or German giant corporation at that time (Hannah, 1996), they were less constrained by their home market performance and already more fitted to compete globally.

However, it would be a mistake to pursue such speculations very far. Our results are sufficient to cast doubt on the notion that there were exceptionally few large British corporations or that they were especially notable for failing to sustain or develop their capabilities, but they are vulnerable to highly variable individual outcomes on small numbers of cases. They add to the suspicion that Chandler started a wild goose chase in *Scale and Scope*, and his conclusions on national differences are unlikely to be rescued by wider samples including more, moderately large, industrial firms.<sup>30</sup> Broadberry (forthcoming) has, in any case, shown that America and Germany overtook Britain in the twentieth century **not** by maximising their relative labour productivity performance in manufacturing, but rather by shifting resources out of agriculture (an option not open to already heavily industrialised Britain) and by overtaking the exceptionally strong British labour productivity performance in services. (For one example of US performance see Raff and Temin (forthcoming); for a general discussion

see Wright (forthcoming).) Broadberry's sectoral disaggregation of productivity change thus further undermines the view that national differentiation in the performance of **manufacturing** corporations fundamentally drove twentieth century changes in **national** competitive advantage. More generally, Robert Reich has exposed some flaws in the view that the national corporate champions and the economies of nation states are closely coupled (Reich, 1992; but cf Lazonick, 1996). Nor can the possibility be ruled out that vigorous competition of smaller firms displacing giants, not sustaining the first-mover giants themselves, is the primary sign of a vigorous economy and that this differentiates Germany and America from Britain more than their large corporations.

If business historians devote more attention to national differences in large corporates' performance, they should formulate some clearer hypotheses that fit the facts better. Until then it would be best to assume that nationality is not a significant variable in the performance of large corporations at least among industrial leaders. Some of the methods of successful large corporations and nations<sup>31</sup>, and — it seems reasonable now to add — some of the mistakes of unsuccessful ones, appear to be equally easily replicated or spread.

As Table 3 suggests, more countries host the giant industrial firms of today than in 1912, though the newcomers have mainly entered at the expense of the USA and of Germany not of Britain.<sup>32</sup> We evidently have to look elsewhere than giant corporate performance to differentiate successful from unsuccessful nations. We will return later to the question of more plausible candidates in the analysis of national economic differentiation.<sup>33</sup>

## **5. ARE THERE “SUNSET” AND “SUNRISE” INDUSTRIES OR “SUNSET” AND “SUNRISE” FIRMS?**

The various industries in which the giant firms of 1912 were concentrated appear at first sight to have exhibited more consistent

patterns of performance than their nationality.<sup>34</sup> As Table 4 shows, about half the firms are in five industries — coal mining, textiles and leather, non-ferrous metals and other mining, iron and steel (and related heavy industries) and mechanical engineering — in which the **average** firm had substantially declined in size at the terminal date, very few giant firms increased in size and only one (RTZ) remained in the 1995 top 100. The “successes” in these “old”<sup>35</sup> industries often achieved it by selling out early (eg the railroad equipment manufacturer, Metropolitan Carriage, in 1919 with a ratio of 2.0); others succeeded in their core old activities as well as new ones (eg Mannesmann, with the best ratio for this group of industries of 2.7 in 1995). A few well-performing survivors shifted industry completely: eg American Can into financial services (with a ratio of 1.9) or the French steel giant Schneider into electrical engineering (achieving the stability ratio of 1.0). Such “new” industries undoubtedly offered better growth opportunities but, of course, many of the “old” 1912 industries did not have any relevant capabilities to transfer to them in order to escape constraints in individual markets. Judging from giant firms in coal, textiles and railroad equipment manufacture, the speed or degree of the collapse of their markets and/or the limitations on inter-industry transfer of their capabilities of 1912 posed particularly tough obstacles. The most promising solution for such firms may have been the absorption into other firms that many of them suffered, presumably to maximise the value of what few transferable skills they still embodied.<sup>36</sup> By the same token, firms that were in 1912 already in the rapidly-growing industries of petroleum, chemicals and electrical engineering (industries whose giant firms more than doubled in real size on average) perhaps had a somewhat easier task in converting their initial stock of skills and building dynamic capabilities. Branded products firms — the most numerous of the “new” industries in the 1912 list — were also more likely to grow than to decline.

However, it would be wrong to suggest that giant firms had clearly pre-destined outcomes depending on their initial “sunrise” or “sunset” industry base. In fact, there was more diversity of

performance **within** industries than **between** them.<sup>37</sup> Even in an industry as promising as electrical manufacturing — where three out of five firms scored above 1 — Westinghouse (0.7) and AEG (0.3) performed weakly. Oil companies overall did well, but relative laggards, when nationalised or taken over, could be below their 1912 size. The branded product firms include some of the great twentieth century successes like Procter & Gamble (8.2) or Lever Brothers (Unilever) (3.4) but also some of the more remarkable failures like American Tobacco/Brands (0.4) or Cudahy Packing (0.1). In industries where decline was the typical outcome — like the steel and related engineering industries — not all had to go the way of US Steel (0.1), International Harvester (0.1) or Krupp (0.2); *Gewerkschaft deutscher Kaiser* (Thyssen) (0.9) and John Deere & Co (0.9) did distinctly better. As the last column of Table 4 shows, both old and new industries showed considerable variability of growth outcomes: the coefficient of variation exceeded 60 in all industries and exceeded 100 in half of them. This pattern of diversity of experience within industries is consistent with the pattern revealed by wider samples of firms over shorter periods (eg Schmalensee, 1985; Rumelt, 1991). Dynamic economies — of which the global economy in which most of these firms in varying degrees operated is the largest case — indeed consist of rising and declining industries, but businesses can develop and sustain competitive advantages in **either** kind of industry. Simplistic recipes for industry portfolio management may have earned consultants fortunes, but a surer key to sustained success is learning to operate distinctively and profitably anywhere, rather than paying expensively for fashionable diversifying acquisitions in industries in which no distinctive new proprietor value can be added (Kay, 1995).

How, then, can large corporations retain their positions, continue to add value and expand their capabilities? The only reasonable answer is: with great difficulty. Samuel Johnson’s view, that “business could not be managed by those who manage it if it had much difficulty”, has often appealed to academic analysts and is probably true of the generality of businesses; but the generality of businesses —



in the short- or long-term depending on their initial size — are dead. It is a pleasant conceit of us all — from business school professors, through academic analysts to management consultants — that the world would be a better place if systematic analysis could change that. Given the high incidence and costs of corporate decline and failure — and the distance of the spectre of global domination by a few exceptionally competent firms — it is doubtless in the social (as well as the private) interest that all possible steps should be taken to encourage such systematic analysis. To date, however, we have made great strides in storytelling, but a clearer, surer recipe for sustained<sup>38</sup> success for large corporations has remained elusive.

This outcome is not accidental: it is inherent in the competitive market process that underpins the success of twentieth century capitalism. Most of the companies we have described were remarkable successes in 1912; their high stock market valuation reflected their ability to earn super-normal profits. These profits were often a reward for large-scale investments in production, management and marketing, along the lines described by Chandler (1990). There was often something more — a technological advantage, exclusive possession of raw materials or of valuable distribution networks, a strong brand image — to entrench the position of the first movers in the Chandlerian sense. Yet, as Lieberman and Montgomery (1988) have emphasised, such advantages are often fleeting and contingent. Patents were of limited effectiveness, advertising built up rival brands, new mines and oil wells were discovered, techniques of management, production and marketing were copied. Even where this could not easily happen, exogenous changes in the technology of production or in the nature of markets could make the initial advantage insecure; entrenched positions could also be challenged by anti-trust or by expropriations (both nationalisations and those following defeat in war).

Where such challenges were ineffective, or where they were neutralised by the firms' own strategic initiatives, the giants survived, but, given the power of competitive forces, it is arguably no surprise that disappearance or decline was nearly three times more likely among

the giants than growth. The process of copying was one that often competed the profits of the onetime leaders down to normal levels, spreading the benefits of their initial advantage more widely. Firms that limited this process and maintained some competitive advantage once could, in principle, have had a run of further luck that enabled them constantly to entrench new capabilities. A more plausible explanation of survivors is that they had some distinctive architecture which enabled them — but not others — constantly to replicate their early success (Kay, 1993). Such corporate architectures must be complex and difficult to identify, describe and copy, for, if that were not the case, their value would be competed down by emulators. **By definition**, we do not know what those architectures are, though it is plausible that their corporate operators have acquired that knowledge through a process of collective, tacit learning, transmissible between managerial generations.

This points up starkly the catch-22 of their craft for all business historians and management gurus. They naturally view that bleak scientific point sceptically, as the fund manager views the financial economist's "efficient markets hypothesis", with which it has close affinities.<sup>39</sup> It is perfectly possible, in both cases, to discover a generically effective strategy, but, when we do, its profitability will be competed down by the emulation our discovery prompts. The gold we have unearthed will very soon turn into the dross of normal profits, as its benefits are widely spread, but the private dross represents the broad social benefit of expanding average capabilities.

Both the incentive to develop competitive advantages, and the incentive to emulate them, were strong in the societies in which the giant firms of 1912 operated.<sup>40</sup> Large firms themselves became very efficient surveyors of the possibilities, increasingly competing with and emulating each other. In that sense, the averagely weak ability of large firms to develop the distinctive capabilities that had once generated their size is a sign, not of their individual weaknesses, but of their collective strengths within the capitalist market system. Marx understood the 'contradictions' in this dialectical system well.

Paradoxically, capitalist firms are induced by the search for surplus value (supernormal profits) to grow; but competition between them also tends to destroy the distinctive sources of supernormal profits. Marx's mistake was to consider this a weakness in the stage of economic evolution he then saw unfolding. In fact, the mix of incentives and checks it created has been capitalism's fundamental strength as the (now globally favoured) system of social organisation.

## **6. WHICH NATIONAL DIFFERENCES WERE MOST SUSTAINABLE?**

If that view of the world is accepted, we might expect international differences among giant firms to diminish in all except a few cases of well-entrenched or undiscoverable competitive advantages. We can see some of this process in the chemical industry, which accounted for ten of the world's largest 100 industrial firms in 1912 and for twenty in the 1995 top 100. In 1912 the chemical giants of Britain, Germany and America were substantially differentiated. The Germans — with excellent universities and moderately-paid scientists — were strongest in the research-intensive sector, where these cheap human resources were a particular advantage, that is in fine chemicals (then mainly dyestuffs). The British, with plentiful and cheap supplies of capital, excelled in the capital-intensive sector. The major technological innovation in this sector, the Solvay process, had been licensed by its Belgian owners to separate British, US and German companies: of these, only the British firm, Brunner Mond, was large enough to enter the top 100 (the other licensees, Deutsche Solvay and the US-based Solvay Process Company, though operating in bigger national markets, were less profitable). The largest US chemical firm was Du Pont, an explosives specialist, with its national market among mines and gun-owners larger than European equivalents (the London-based Nobel Dynamite Trust had a near-monopoly in both the British and German

explosives markets, but was still just too small to qualify for entry to the 1912 list).

However, these superficially strong national differences among giant chemical corporations were short-lived. Du Pont had already in 1912 begun to focus its research and development strategy, so that it was poised to become an engine of growth and diversification for the company **nach deutscher Art** (Hounshell and Smith, 1988). In the next quarter century, the somewhat diverse chemical giants of Britain, Germany and America all became very much more like each other: as research-intensive as the Germans, as capital-intensive as the British and as market-orientated as the Americans. This occurred partly by expropriation (notably by the British and Americans of German patents and other assets) but also by processes of competition and emulation of advantages seen in domestic and overseas competitors. Chemical engineering and financing techniques, research laboratories, patent pools and multinational investment all played their part in the process. The competitive advantages that had once seemed nationally distinctive rarely remained so. Indeed, with the widespread post-World War II entry of the oil companies into downstream chemical operations, it became obvious that not only rival chemical companies but also vertically-related producers could copy and acquire the chemical companies' various research, production and marketing skills. The process was not all one-way, for there were still some good reasons for pursuing distinctive strategies in a changing and complex world<sup>41</sup>, but, except in the pharmaceutical sector (where, patent protection is unusually effective), it was difficult for companies to entrench any distinctiveness (and the supernormal profits that brought) for long.

The process of competitive emulation of distinctive advantages nationally and internationally can be traced more precisely for what has been seen by many business historians as **the** distinctive generic capability facilitating the management of the giant diversified corporations that allegedly prospered in the twentieth century world. Chandler (1962) showed the postwar spread of the multi-divisional organisation through US industry, after its pioneering in the 1920s by

firms like General Motors.<sup>42</sup> Table 5 shows that its postwar spread throughout the five other major industrial countries was less rapid, but, with only a slight lag, the M-form was widely adopted in Britain, and, soon after, in Germany, France, Japan and even in Italy, which was notorious for having relatively few giant US-style corporations.

Yet, in many respects, these countries' business cultures are undoubtedly profoundly different; the spread of the M-form simply demonstrates that these national differences are minimised by large-scale business institutions. Techniques of managing large corporations, of harnessing central research laboratories to diversification, or of advertising national brands may easily be copied by the large corporations of one nation from another, or a multinational may enter the market to spread them. Competition and emulation thus do a great deal to homogenise the giant firm sector in reasonably competent advanced industrial countries.<sup>43</sup> In that sense, we should not be surprised at our earlier conclusion that some popular characterisations of national differences in large corporations appeared to be caricatures, even if (like all good caricatures) they sharply focus on one distorted aspect of the truth.

Where, then, is national differentiation in business cultures and business institutions likely to reside, if it is not in industrial giants? There are, I suggest, two main locations. First, the culturally-embedded characteristics of business are often reinforced by local institutions underpinning small and medium-sized businesses: such essentially localised businesses are inherently less subject to (though, of course, not entirely immune from) many of the pressures for international emulation and homogenisation. Well-known examples in the literature are the German apprenticeship training system (which underpins the powerful world market position of German **Mittelstand** firms in the engineering industry) and Italian small firm networks (typified by Porter's (1990) well-known example of Sassuolo's ceramic tiles). Firms may find it difficult to capture the resulting rents — so they do not generally appear in lists of large firms like ours — but the

positive impact on national living standards (and the sustainability of the differences underpinning that) are likely to be considerable.

The second likely area of substantial and sustained national differentiation is in the utilities and communications sectors. Public ownership or state regulation of competitive processes dominate here and frequently prevent international convergence of institutions and standards. It seems quite likely, for example, that the USA's ability to increase its lead over Britain in living standards in the first half of the twentieth century was more due to its relative performance in these services (in which Britain had an initial lead which was reversed) than in manufacturing (in which the British productivity gap remained remarkably stable) (Hannah, 1995; Broadberry, 1998).

Research on contrasts in national economic performance and their relationship to business institutions is difficult and not yet systematically developed. There may be some mileage in further international comparisons of giant industrial corporations, but, if our findings are a pointer, business historians may more productively focus their research on national institutional differences in other directions. The prize of focussing our efforts accurately is an attractive one: the understanding of the microeconomic foundations of the macroeconomic convergence processes that economists have identified in the modern economic development of advanced industrial nations, and also of the limits on such convergence processes.

## ENDNOTES

1. Harris Corporation (1996) shows that 39% of the Fortune US top 500 are more than 100 years old and a further 50% were founded between the 1880s and 1920s. The oldest American firm in the 1912 list, Lorillard & Co, can be traced back to 1760. European firms are, of course, generally older: some (relatively small) modern firms had mediaeval origins and the large French firm St Gobain can plausibly be traced back to the mid-seventeenth century, though it did not take modern corporate form until the nineteenth century.
2. The study is confined to these sectors because they most clearly approximate to being globally competitive in the twentieth century and we wish to test how corporate evolution in such markets works.
3. A few giant companies (mainly American and German and often family-owned) had no quoted equity capital in 1912; we have taken total balance sheet assets, net of any bonded debt, or similar proxies for equity market capitalisation in such cases, noted by a \* in Appendix A. We have also treated Western Electric (which had recently become a subsidiary of AT&T) in this way. All nationalised or substantially state-owned firms of 1912 have been excluded.
4. These employment figures are provided only for illustrative purposes. Because the population is defined by a capital measure (equity market capitalisation), some firms in capital-intensive industries will be included but employ under 10,000. Employment data is more readily available for British and German firms than for other countries: see eg Shaw (1983), Kocka and Siegrist (1979).
5. see p.14.
6. For that reason, I would expect correlations between 1912 size and 1995 outcomes to be very low; but since much has been made in the literature of first mover advantages, dynamic increasing returns and the sustainability of core corporate capabilities, it is worth defining the

extent of the phenomenon more precisely.

7. eg four of these firms appear on a list of the top ten firms that destroyed shareholder value by **over**-investing in the 1980s (Jensen 1993).

8. Such decisions can notably affect the results: the American Tobacco subsidiary was sold in 1994 for \$1b, whereas at our 1995 benchmark the rest of American Brands was worth \$8b.

9. While in individual cases this affects the calculated outcome, overall the swings may well cancel out the roundabouts: the alternative option would show American Can performing much worse and Singer performing rather better.

10. However, most problems of this kind have been avoided by our choice of dates: 1912 is after the major 1911 divestitures imposed on Standard Oil and American Tobacco and before the major German mergers (Vereinigte Stahlwerke and IG Farben) which were later reversed by allied anti-trust action.

11. Where this was not published in the press at the time, we have estimated it from market price data at the time surrounding the merger.

12. Some judgements verge on the arbitrary eg where firms were temporarily absorbed into a larger firm, then de-merged, then later merged more completely, we have generally taken their later disappearance, to preserve some symmetry with our treatment of surviving (but once merged) firms.

13. As our data imply. The average terminal ratio of surviving firms was three times that of acquired ones; and firms acquired prior to 1950 had twice the ratio of firms acquired after 1950, see Table 1 and Appendix A below.

14. On the Caligulan principle (“I wish the Roman people had but a single neck”) governments were more likely to nationalise large firms



than small.

15. BP was majority owned by the state for most of its twentieth century existence, but not in 1912 or 1995; parts of several other 1912 companies were nationalised in Britain but they were left with a range of capabilities which have been considered the surviving firms. In some cases (eg Vickers) the effects of nationalisation of large parts exaggerate their measured decline.

16. eg Usselman (1997) for Westinghouse Air Brake, Samber (1997) for Pittsburgh firms, Genovese & Mullen (1997) for American Sugar, Lamoreaux & Sokoloff (1977) for Pullman.

17. including nationalisations, which in the longer-run shielded some of these firms from bankruptcy.

18. Only four cases (Burmah/BP 9.1, Procter & Gamble 8.1, DuPont 7.2 and Arco 5.9) account for about a quarter of the average ratios for the whole population shown in Table 1 ( their sum divided by 100 is 0.3).

19. To outrank the 100th ranked firm in the 1995 giant industrials, the lowest-ranked firm of 1912 would have had to achieve a ratio of 4.0. Of course, much less was required of the very largest 1912 firms: indeed the largest, US Steel, needed to decline to a tenth of its 1912 size to drop out of the 1995 top 100. If it had maintained the same real size, it would have been worth \$90.5b in 1995, only a little short of Royal-Dutch Shell, the actual 1995 leader (at \$107.6b), though USX's actual 1995 size (even after merging with a 1912 giant oil company already twice its own size in 1982) was \$8.7b and USX **did** drop out of the top 100. The average giant firm of 1912 would have had to grow to 2.7 its 1912 size to achieve the average size of the 1995 top 100, from \$81m to \$218m in 1912 stock exchange prices.

20. As is suggested by the gap between the unweighted average ratios (1.4) and the (lower) average ratios weighted by 1912 size (1.2), shown

in Table 1.

21. 52 of the 1912 top hundred firms still formally exist independently, though arguably some — eg Singer (Biocoastal) and United States Rubber (Uniroyal) — are so small that they are as good as disappeared. The problem of reincarnation also complicates the calculation: paradoxically rather **more** 1912 giant firms still existed in 1950 than earlier, in 1945 (largely because of the break-up of I G Farben and Vereinigte Stahlwerke, which in the 1920s had absorbed half the German giants of 1912); similarly at least two firms (Nabisco and Imperial Tobacco) are about to be de-merged from their recently acquired parents at the time of writing. Because of such reincarnations, it is wrong to conclude from the longer interval between the quarter life (1912-45) and the half life (-1999?) that the rate of disappearance declines over time, though, in the limit, that will become true. Moreover, if economic evolution is Lamarckian rather than Darwinian (and the process of corporate learning clearly implies that), we might expect organisational death rates to decline with age, see eg, Hannan and Freeman (1984). In calculating half-lives of giant firms we have assumed they were born giants in 1912, rather than when founded as small firms.

22. Demographers do not conventionally use the concept of “half-life” to describe life expectancy, but in advanced industrial economies the half-life of an 18-year old male would be about fifty years, see Registrar General (1914), Table III.

23. Most studies of new, small firms show a half-life in very low single digits. At the time Marshall began writing, English joint stock companies had a half-life of about seven years (Shannon, 1933).

24. In the range between the average English joint stock company and the average global 1912 giant firm. Around 1885, joint-stock companies, whose half-lives are referred to in the previous endnote, averaged paid-up capital of about £60,000 (Jeffreys 1938, p.130), compared with equity market values averaging £16.6m in the 1912

global top 100, a ratio of about 1:275. Their half-lives were in the ratio 1:12.

25. Even in Stigler's (1965) study of US Steel, the returns to its stockholders peaked in real terms 10 years after the merger, in 1911, and US Steel stockholders did worse on average than other steel companies for the remainder of his analysis (1912-25), which cover the period of this study. The impression of US Steel post-1925 is also not very favourable to an extension forward in time of the Stigler hypothesis.

26. See eg Raff and Temin (1997), Hounshell (1997) and, more generally, Lieberman and Montgomery (1988), Henderson and Clark (1990).

27. Why not, then, increase the size of the sample? Because this is not a sample; it is (or is very close to being) the whole population of giant firms in 1912. Though inclusion of very large firms in the \$15-\$25M range would be possible, that suffers from the same problem as the econometrics of national growth rates and convergence (do we really want Iceland to have the same weight as the United States?). The truth is that, for assessing corporate or national performance, the world has not generated enough human experience for us to generalise econometrically. Disciplined parables are a more realistic scholarly objective. For some indication of the likely results of adding firms in a lower size range to the study, cf n.32, below.

28. The use of the US rather than the British stock exchange index (which rose by less) as the deflator biases the results against British-based firms.

29. Given the poorer performance of larger firms **within** this sample noted in Table 1, it might be thought that this would affect national performance; in fact, however, as Table 2 line 2 shows, the average British giant firm was slightly larger than the average US firm and substantially larger than German and 'other' firms. Cf n.36, below, on

the neutrality of industrial composition effects.

30. Teece (1993, p.214) noted that on **Chandler's own data** on the top 200 firms in each country, leading German firms had a low probability of maintaining their position, though he was inclined to excuse it as the effect of war at the 1953 benchmark date for Germany. But Cassis (1997) observes that the poor German performance persists in longer-run comparisons with the longevity of large British and French firms. Chandler's study (1990 appendices) of the **largest 200** firms in each country shows that in 1919-48 the median British firm's enterprise value (equity capitalisation plus value of quoted debt) nearly quadrupled, whereas in 1917-48 the median US firm only tripled its balance sheet assets and 1913-53 the median German firm less than doubled its balance sheet assets. There are problems in such direct comparisons. The collapse of the mark raises questions about German balance sheet assets at historic cost as a measure of size, while Tobin's  $q$  (the ratio between the equity values used by Chandler to measure British firm sizes and the balance sheet assets he uses to measure US firm sizes) could have varied substantially at the benchmark dates. Nonetheless it is striking that Chandler's **own** quantitative data requires very substantial correction to generate results consistent with what his book purports to explain, and that the only quantitative evidence he explicitly provides for differential national performance is at the macroeconomic level, the significance of which Broadberry (1998) seriously challenges. This is **not** to deny that, in **some** manufacturing industries, the USA forged ahead of Britain and Germany in the 1940s and after, see eg, Mishina (1997) for the aircraft manufacturing example.

31. The evidence implicit in Kim (1995), of the spread of industrial capabilities regionally within the USA, especially from the 1930s, is also consistent with this suggestion.

32. The numbers are small and too much should not be read into them. These results, for the whole population of 1995 firms, compared

with those in Table 2 for 1912 survivors, imply that, although its 1912 giant corporations have not performed well, the USA has created quite a lot of **new** ones, while Germany has not: the latter's distinctive modern industrial strength is correctly identified with the **Mittelstand**.

33. see Section 6.

34. Though the poor performance of “Germany” and “other” in Table 2, relative to Britain, is partly due to their having more giant firms in the “old” industries. Britain had old industries but eg in coal they were organised on the basis of Marshallian industrial districts, with external economies substituting for economies of scale internal to large firms. However, America's poor performance cannot be explained by industrial composition: it had the same proportions of giant firms in “new” industries as Britain.

35. Of course they were often considered important and significant industries **at the time**: railroad manufacturers were then bigger than car manufacturers; gold, diamond and copper mines were felt to have excellent prospects, as were high-tech armaments and ship manufacturers. They are “old” only in retrospect.

36. US coal firms were absorbed into firms like Du Pont; in Europe the post-1945 solution was nationalisation (Britain's National Coal Board and Charbonnages de France) or publicly-subsidised private corporations (Ruhrkohle in Germany): a solution that seems more often to have expensively delayed decline than facilitated diversification or skill transfer.

37. The coefficient of variation of the average ratios from the nine industries is 95; thus there is **more** variation **within** the majority of the industry groups (coal, mechanical engineering, non-ferrous metals, etc, iron and steel, and branded products) than **between** industry groups and, within the four less variable groups (textiles, chemicals, electrical engineering and petroleum), there is still almost as much variability as there is **between** industry groups.

38. Though, as we suggest below, much diagnosis and emulation, of a kind which erodes rather than sustains profits, has occurred.

39. and, as with stock-picking, it is easier to give business strategy advice retrospectively than prospectively!

40. Or at least in the US, the UK and Germany. The “other” countries — many what we would now call “emerging markets” — actually show the worst performance in Table 2, perhaps reflecting that they did **not** have these social capabilities in such large measure.

41. A recent example is the rise of the British pharmaceutical industry in the last quarter of a century. In 1970 the largest British pharmaceutical company rated only sixteenth in the world; now Glaxo-Wellcome is the largest in the world and several others are ranked in the top 20; even a foreign company like the merger of US Upjohn with Swedish Pharmacia chose to base its new headquarters in London. This change in the British position in research-based fine chemicals is probably due to the advantages of London as a commercial financial centre and the availability of cheaper scientists from good universities than the USA and Germany now offer (a similar advantage to pre-1914 Germany, though not one that any sensible country would like to base its competitive advantage on for long, since it implied sustaining low living standards).

42. Though Hounshell (1997) suggests the problem of applying it to different corporations, eg Ford.

43. Even here, however, note that the adoption of the M-form stabilised in continental Europe and Japan at lower levels than in the “Anglo-Saxon” countries. One plausible explanation is contrasts in their capital markets: the monitoring processes of M-form head offices may, for example, be undertaken by universal banks or other agents in less fluid capital markets. Significantly, while in the US and UK a positive correlation is found between profitability and M-form adoption (Armour and Teece 1978, Steer and Cable 1978), no such correlations

appear in Germany and Japan (Cable and Dirrheimer, 1983; Cable and Yasuki, 1985; and cf Ingham, 1992).

**TABLE 1**

**Summary Measures of Long-Run Corporate “Performance” of the  
100 Largest Firms of 1912 by 1995**

	<b>Probability</b>
Survival	
- in top 100	21%
- larger in 1995 than in 1912	28%
- in recognisable independent form in 1995 of whatever size	52%
 Firms that had experienced some form of liquidation, nationalisation, break-up or corporate bankruptcy protection	 29%
 Capability “expansion ratios”* (1=stability, below 1= decline)	 <b>Ratio</b>
- average of survivors (1995 value ÷ 1912 value)	2.0
- average of disappearers (exit value ÷ 1912 value)	0.6
- overall unweighted average	1.4
- overall average weighted by 1912 size	1.2
- overall unweighted average counting all disappearances as zero	1.1
- overall weighted average omitting double counting†	1.1
- proportion of the 100 showing positive growth (ie terminal value exceeding 1.0)	35%
- modal value	0
- median	0.4

Notes: \* defined as terminal equity capitalisation at 1912 stock exchange prices ÷ 1912 equity capitalisation.  
† ie counting as zero any firms permanently acquired by a firm also in the 1912 top 100.

Source: author’s calculations, based on data in Appendix A.



**TABLE 2****National Corporate Performance Differentials of 1912 Giants**

	<b>USA</b>	<b>Germany</b>	<b>Britain</b>	<b>Other</b>
No of firms headquartered there in 1912	54	14	15†	17†
Average equity capitalisation in 1912	\$90m	\$59m	\$95m	\$56m
Survival chances:-				
in top 100 1995	19%	29%	47%	0%
any independent survival	48%	57%	60%	53%
“Capability Enhancement”*				
Proportion showing positive growth (ie ratios above 1.0)	26%	43%	40%	18%
Unweighted average ratio for all survivors	2.3	1.9	2.7	0.7
Unweighted average ratio for all disappearers	0.7	0.1	0.7	0.3
Overall unweighted average ratio (Coefficient of variation)	1.5 (135)	1.2 (104)	1.9 (123)	0.5 (164)
(Memo item) 1995 real GNP ÷ 1912 real GNP	8	9	4	-

Notes: \* defined as terminal equity capitalisation ÷ 1912 equity capitalisation.

† Counting Royal-Dutch Shell as wholly British.

Source: author’s calculations, from Appendix data.

**TABLE 3**

Geographical Distribution of the Top 100 Global Industrial Firms  
by Equity Market Capitalisation

Headquarters Country	1912	1995
USA	54	40
UK	14.5	12.5
Germany	14	7
France	6	5
South Africa	4	1
Russia	3	0
Belgium	2	0
Mexico	1	0
Luxembourg	1	0
Netherlands	0.5	2.5
Japan	0	21
Switzerland	0	4.5
Sweden	0	2.5
Australia	0	1
Italy	0	1
Finland	0	1
Korea	0	1
Total	100	100

Sources: 1912: author's calculations.  
1995: calculated from *Business Week's* listings of the world's largest corporations on 31 May, with non-industrial firms omitted.



**TABLE 4****Industrial Performance Differentials among 1912 Corporations**

Industry	No of 1912 Giant Firms in the Industry	Aggregate 1912 Market Capitalisation of the Industry's Giant Firms	* Overall Industry Performance	* Average Industry Performance	Standard Deviation	Coefficient of variation
Textiles & Leather	4	\$0.4B	0.2	0.1	0.1	79
Coal Mining	7	\$0.4B	0.1	0.2	0.3	185
Mechanical Engineering	10	\$0.9B	0.2	0.4	0.6	164
Non-Ferrous Metals etc	14	\$1.2B	0.4	0.4	0.5	116
Iron/Steel/Heavy Industrial	18	\$1.5B	0.3	0.6	0.7	125
Branded Products	18	\$1.6B	1.1	1.3	1.9	142
Chemicals	10	\$0.4B	2.7	2.4	1.9	79
Electrical Engineering	5	\$0.4B	3.0	2.7	1.9	70
Petroleum	14	\$1.2B	3.2	3.7	2.3	62
All 1912 giant firms	100	\$8.1B	1.1†	1.4	1.9	140

\* The “overall” industry performance is the average capability enhancement ratio of all firms in the industry weighted by their 1912 size; “average” industry performance is unweighted mean performance; if the former exceeds the latter, truly giant firms perform better than merely very large firms.

† See Table 1 for omission of double counting.

Source: Author’s calculations from data in Appendix A.

**TABLE 5**

Adoption of The Multidivisional Structure  
(% of the top approximately 100 corporations with M-Form structure)

	1913	1932	1950	1960	1970	1980
USA	0	8	17	43	71	81
Japan	1	0	8	29	55	58
Germany	1	-	5	15	50	58
France	1	3	6	21	54	58
Italy	-	-	7	17	48	-
UK	0	5	13	30	72	80

Source: See Appendix B.

## APPENDIX A

### The World's 100 Largest Capitalist Industrial Enterprises of 1912

All industrial enterprises<sup>1</sup> with equity market capitalisation of \$26m or more in 1912 are listed in rank order within industry groups. For a fuller account of the construction of this population see Hannah (1997) and Schmitz (1993). I am grateful to Alison Sharp for research assistance and to many national specialists for advice which is more fully acknowledged in Hannah (1997). For industry averages see Table 4; for national averages see Table 2; for overall totals see Table 1.

Rank in Global top 100 in 1912 (and, in brackets, 1995, where still ranked)	1912 HQ location	Name of Company in 1912 (in brackets, 1995 changed name or alternative outcome; acq = acquired nat = nationalised)	Market Capitalization of Equity (in US\$m at 1912 stock market prices)	
			1912 initial capitalisation	1995 multiple <sup>2</sup> (or in brackets multiple on earlier exit)
<b>Textiles and Leather</b>				
3	UK	J&P Coats (Viyella acq 1986)	287	(0.3)
68	US	Central Leather (liquidated 1952)	40	(0)
69	US	American Woolen (Textron acq 1955)	40	(0.1)
82	UK	Fine Cotton Spinners (Courtaulds acq 1964)	34	(0.1)

(\*=estimate from balance sheet  
assets)

<sup>1</sup> Defined as all non-government enterprises with more than 50% of their activity in mining and manufacturing.

<sup>2</sup> ie 31 May 1995 equity capitalisation, revalued at 1912 Stock Exchange prices by the Standard & Poor 'industrial 500' index, divided by 1912 equity market value.

<b>Coal Mining</b>				
23	F	Mines de Lens (Charbonnages de France)	94	0*
28	F	Mines de Bruay (nat. 1945)	87	(0)
29	G	Gelsenkirchener (Ruhrkohle/RWE acq. 1968/9)	86	(0.2)
47	F	Mines de Courrières (nat. 1945)	55	(0)
61	F	Mines d'Anzin (nat. 1945)	47	(0)
72	G	Harpener Bergbau (VEW acq.1992)	38	(0.1)
91	US	Pittsburgh Coal (Continental acq.1966)	31	(1.0)
<b>Mechanical Engineering</b>				
4	US	Pullman (Wheelabrator-Frye acq.1980)	200	(0.1)
8	US	Singer (Bicoastal)	173	0*
10	US	International Harvester (Navistar)	160	0.1
21	US	Westinghouse Air Brake (American Standard acq. 1968)	102	(0.1)
36	US	John Deere	70*	0.9
50	US	American Car & Foundry (Icahn acq.1984)	52	(0.3)
64	R	Briansk Rail & Engineering (nat.1917)	45	(0)
79	US	American Locomotive (Worthington acq. 1964)	37	(0)
88	US	Baldwin Locomotive (Armour acq.1965)	32	(0.1)
95	UK	Metropolitan Carriage (Vickers acq. 1919)	27	(1.9)
<b>Non-Ferrous Metals and Other Mining (including related refining and smelting)</b>				
6	US	Anaconda (Arco acq. 1977)	178	(0.2)
12	SA	De Beers	158	0.3
13(88)	UK	Rio Tinto (RTZ)	148	0.8
18	US	Utah Copper & Nevada Consolidated (Kennecott acq. 1923-33)	116	(1.1)
22	US	Phelps Dodge	95	0.3
25	US	American Smelting (Asarco)	92	0.1
42	SA	Rand Mines	65	0.0
43	SA	Crown Mines (Rand Mines acq. 1968)	63	(0)
45	US	International Nickel (Inco)	57	0.4
54	US	Calumet & Hecla (Universal Oil acq. 1968)	51	(0.1)
60	UK	Consolidated Goldfields (Hanson acq. 1989)	47	(1.6)
70	US	National Lead (NL Industries)	39	0.2
83	US	US Smelting R&M (Sharon acq. 1979)	34	(0.2)
86	SA	E Rand Proprietary	33	0.0

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**Iron, Steel and Heavy Industrial<sup>3</sup>**

1	US	US Steel (USX Marathon)	741	0.1
14	G	Krupp	130*	0.2
38	G	Phoenix (Thyssen acq. 1963)	67	(0.1)
46	US	American Can (Travelers)	57	1.9
48	G	Deutsch-Luxemburg (V.St.acq. 1926)	55	(0)
49	G	Gewerkschaft Deutscher Kaiser (Thyssen)	54	0.9
51	UK	Vickers	52	0.2
65	US	Pennsylvania Steel (Bethlehem acq. 1916)	43*	(0.5)
67	UK	Armstrong-Whitworth (bankrupt 1926)	41	(0)
71	F	Schneider	39	1.0
77	R	Russo-Belge (nat. 1917)	37	(0)
80	G	Hohenlohe (dismembered and liquidated 1921-1939)	36	(0)
81	Lux	Arbed	35	(0.2)
89	G	Mannesmann	32	2.7
90	G	Gutehoffnungshütte (MAN)	32*	1.0
93	US	Crucible Steel (Colt acq. 1968)	30	(0.3)
96	US	Republic Iron & Steel (LTV acq.1984)	27	(0.5)
100	B	Lothringer Hüttenverein (Schneider <i>et al</i> acq. Knutange 1919, Klöckner insolvent 1992)	26	(0.6)

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**Branded Products<sup>4</sup>**

9	US	American Tobacco (American Brands)	169	0.4
11 (38)	UK	British-American Tobacco (BAT Industries)	159	1.3
15 (44)	US	Eastman Kodak	128	1.3
16	US	Armour (Greyhound acq. 1970)	126*	(0.1)
17	UK	Imperial Tobacco (Hanson acq.1986)	120	(0.5)
19	US	American Sugar (Tate & Lyle acq.1988)	110	(0.1)
20 (75)	UK	Guinness	109	1.2
27 (19)	UK	Lever Brothers (Unilever)	87	3.4
30	US	US Rubber (Uniroyal)	80	0*
31	US	BF Goodrich	75	0.2
32	US	Swift (Beatrice acq. 1984)	75	(1.0)
34	US	National Biscuit (RJR acq. 1985)	72	(1.8)
44	US	Liggett & Myers (Grandmet acq.1980)	58	(0.4)
52 (10)	US	Procter & Gamble	51	8.1
66	US	P. Lorillard (Loews acq. 1968)	42	(0.7)
75	UK	Reckitt & Sons (Reckitt & Colman)	38	1.0
87	US	Corn Products (CPC International)	33	2.3

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97	US	Cudahy Packing (General Host acq.1968)	26*	(0.1)
<b>Chemicals<sup>5</sup></b>				
37 (20)	US	Du Pont (+ Hercules + ICI acq. Atlas 1971)	69*	7.2
53 (94)	G	Farbwerke v. L & B (Hoechst)	51	2.0
57 (85)	UK	Brunner Mond (Zeneca)	49	2.4
62 (67)	G	Elberfelder Farbenfabriken (Bayer)	45	3.0
63 (95)	G	BASF	45	2.3
73	US	American Agricultural (Continental acq. 1963)	38	(0.2)
76	US	Virginia-Carolina (Mobil acq. 1963)	38	(0.2)
84	F	St. Gobain	33	2.5
85	B	Solvay	33*	1.1
92	US	General Chemical (Allied-Signal)	30	3.1
<b>Electrical Engineering</b>				
7 (2)	US	General Electric	174	4.7
24	G	AEG (Daimler-Benz acq. 1985)	93	(0.3)
39	US	Westinghouse Electric	67	0.7
41 (32)	G	Siemens	65	3.4
59	US	Western Electric (Lucent+Northern Telecom)	47*	4.7
<b>Petroleum</b>				
2 (3)	US	Jersey Standard (Exxon)	390	1.9
5 (1)	N/UK	Royal Dutch Shell	187	4.8
26 (22)	US	Indiana Standard (Amoco)	88	3.2
33 (14)	US	New York Standard (Mobil)	73	4.4
35	US	California Standard (Chevron)	71	3.7
40	US	Ohio Oil (US Steel acq. 1982)	66*	(3.5)
55	US	Prairie Oil & Gas (Sinclair acq.1932)	50	(0.3)
56	Mex	El Aguila (Shell acq. 1919)	50	(2.4)
58	R	Nobel Bros (nat 1917, rump dissolved 1959)	48	(0)
74 (16)	UK	Burmah Oil (Burmah Castrol + BP)	38	9.1
78	US	Mexican Petroleum (PNP acq. 1919)	37	(2.3)
94 (58)	US	Texas Co (Texaco)	29	5.2
98 (52)	US	Atlantic Refining (Arco)	26	5.9
99	US	Vacuum Oil (NY Standard acq. 1931)	26	(5.1)

<sup>3</sup> Many firms in this category included vertically integrated coal mines and shipbuilding yards in 1912.

<sup>4</sup> in addition to the core food, drink and tobacco industry, this category includes branded household chemicals, rubber tyres and photographic goods.

<sup>5</sup> This category includes St. Gobain, which in 1912 (as now) was mainly a glass producer, though in 1912 it also had a major interest in chemicals.

## APPENDIX B

### Sources for Table 5

- USA            1913. Inferred from Chandler (1962)  
                  1932. Chandler (1962) and based on 50 companies, but with no multidivisionals in the next 50 assumed.  
                  1950-80. Percentages estimated from the chart in Kogut and Anderson (1993), p.190, based on 150 firms - this may underestimate multidivisionals in the top 100. However, Rumelt (1974) basing his study on samples of 183-207 of the top 500 firms, suggests figures of 20% for 1949, 50% for 1959 and 77% for 1969, which rather surprisingly implies no greater propensity to adopt multidivisional organisation among very large than among more moderately-sized corporations, at least after the war.
- Japan            1913-32 inferred from Morikawa (1992), pp.113-4.  
                  1950-80 Suzuki (1991), based on 114 companies. He has a category “mixed functional and divisional”, half of which I have allocated to the multidivisional category. Kono (1980) p.80 gives very similar results, though cf. Fruin (1992) for the view that multidivisionals were not so common in Japan as these figures imply.
- Germany        1913 “at least one”, ie Siemens, in Kocka (1978), p.577.  
                  1950-70. Dyas and Thanheiser (1976).  
                  1980. Grossing up of the figures for 48 firms in Cable and Dirrheimer (1980), p.46.
- France            1912 Levy-Leboyer 1980 (but cf. Daviet 1988).  
                  1932. Fridenson 1994.  
                  1950-70. Dyas and Thanheiser (1976) pp.186-7.  
                  1980. Approximation based on the trend line in Kogut and Anderson (1993), p.193, though it is hard to discern how that table has been calibrated.
- Italy            1950-70. Pavan (1970) p.67, percentages based on 6/84 firms in 1950, 16/94 in 1960 and 48/100 in 1970.
- UK                1913 inferred from Hannah (1976).  
                  1932. Hannah (1976), based on approximately 50 companies, with the assumption that lower-ranked companies did not adopt the multidivisional structure, as for the USA at that date.  
                  1950-70. Channon (1972) p.67, percentages based on 12/92 in 1950, 29/96 in 1960, 72/100 in 1970.  
                  1980. Approximation based on the trend line in Kogut and Anderson (1993), p.193, though it is hard to determine how that table has been calibrated.

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