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7 Marshall's "Trees" and the Global "Forest": Were "Giant Redwoods" Different?

Leslie Hannah

7.1 The Problem

How can we generalize from the case studies in this volume? How representative are they? Are alternative post hoc rationalizations 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 more 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 favored 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 sixth 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 1961, 316). Marshall was an acute observer of the contemporary real economy in Britain, Germany,

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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 generalizations 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, organizational, 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) are right, for they clearly are, 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. I 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 organizational capabilities.

Skepticism about corporate capabilities is not universal among business historians. The tendency to overemphasize successes (and to rationalize them *ex post*)—what has been criticized 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, e.g., Hamel and Prahalad 1994). It commonly coexists 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 organizational capabilities in generating asymmetries between firms that provide a key to understanding competitive performance. Like Molière’s 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 endeavor, but to reinforce it by disciplining some of its more adventurous generalizations.

7.2 A Proposed Test

The overuse of the survivor technique, distorting our understanding of the process that has led to the present state of things, has affected several disci-

plines besides business history. If we merely observe that many of the firms that now dominate the economy are of ancient lineage,¹ 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 lionized, 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 work (1995) to generalize about the global industrial giants of 1912. While there are no doubt still some omissions, I believe the amended list in appendix A includes almost all the industrial (i.e., mining and manufacturing)² firms in the world with an equity market capitalization³ of \$26 million or more in 1912. These were large firms even by today's standards: the largest (U.S. Steel) employed 221,025 workers in 1912; other firms on the list typically employed more than 10,000.⁴ They were also, generally, firms that had already stood the test of time, being on average thirty-two 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 shakeout 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 1974; Tilly 1982; Samber 1996). 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

1. Harris Corporation (1996) shows that 39 percent of the Fortune U.S. top 500 are more than 100 years old and a further 50 percent were founded between the 1880s and 1920s. The oldest American firm in the 1912 list, Lorillard and Company, can be traced back to 1760. European firms are, of course, generally older: some (relatively small) modern firms had medieval 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 I 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; I have taken total balance-sheet assets, net of any bonded debt, or similar proxies for equity market capitalization in such cases. I have also treated Western Electric (which had recently become a subsidiary of AT&T) in this way. All nationalized 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 capitalization), 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, e.g., Shaw (1983), Kocka and Siegrist (1979).

dividends (Meyer 1910, 196). A population of the largest firms of ten years earlier 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 capitalization is again available for survivors, but the comparison needs to take account of inflation. The deflator I have used is U.S. stock market prices, more specifically Standard and Poor's industrial 500 index. The rise in U.S. stock prices (measured thus between 1912 and 1995 and averaging about 6 percent compounded per year) clearly partly reflects the declining value of the dollar (averaging 4 percent per year in 1912–95) 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 percent per annum, per capita, with some extensive growth in the number of industrial workers also (Maddison 1989, 15).

One intuitive interpretation of the 1995 equity market capitalization, thus revalued "at 1912 stock market 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 one would suggest that giving up in 1912 would have been a better bet. A ratio above one would suggest that, in the long-term, the firm's capabilities were broadened (e.g., 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 sellout in 1912 of firms of this size, even where possible, would not necessarily have been at the market price: breakup 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 been higher or lower than Standard and Poor's 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. 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.⁵ 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) naturally were transformed over time. New corporate resources were also added, not just in ways indirectly captured in our stock exchange price deflator (e.g., 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 "organizational capability" came from the British half (Lever Brothers) not the Dutch half (Margarine Unie) with which it merged in 1929, while Du Pont's stock of skills implicitly came entirely from its chemical rather than oil-company (Conoco) heritage. Because of shares issued to finance such mergers and acquisitions or to finance internal expansion, shareholders probably did worse than our measure of changes in the "lump of managerial capability" suggests.⁶ In that sense, adopting a ratio of one 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 favor of diagnosing corporate growth. I will be making simple, comparative, long-run judgments, and my choice of deflators and benchmarks is usually biased against the hypothesis being tested.

A major problem remains for firms that disappeared by liquidation, acquisition, or nationalization. The treatment of these firms is more fully discussed in appendix A, but for the most common case—acquisition—the best estimate of its capability enhancement seemed to be the price paid at the time of acquisition, converted (as with 1995 survivor values) to 1912 stock exchange prices. Since acquired firms were generally declining, but taken over at a premium, this probably gives an upward bias to the results.⁷

5. 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.

6. E.g., four of these firms appear on a list of the top ten firms that destroyed shareholder value by overinvesting in the 1980s (Jensen 1993).

7. 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 7.1 and appendix A.

7.3 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 organizational learning is also clear. The parables of learning that we have told⁸ 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 popularizing new technologies. Others—like Guinness, Procter and 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 that 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 developed organizational routines that reinforced what they had already learned, creating dynamic, learning organizations that would, through geographic (often multinational) expansion, through diversification into new product markets, or through the institutionalization of innovation by R&D, constantly expand the ambit of their capabilities. That some firms—Procter and 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 and Steel, British ones like Metropolitan Carriage, or U.S. ones like Central Leather, the Utah Copper and Nevada Consolidated group, or Cudahy Packing? And when firms that have drastically declined, like U.S. Steel and Ohio

8. E.g., Usselman (chap. 2 in this volume) for Westinghouse Air Brake, Samber (1996) for Pittsburgh firms, Genesove and Mullin (chap. 3 in this volume) for American Sugar, Lamoreaux and Sokoloff (chap. 1 in this volume) for Pullman.

Table 7.1 Summary Measures of Long-Run Performance of the Hundred Largest Firms of 1912 by 1995

Outcomes	Probability of Outcome (%)
Survives in top hundred	19
Survives and larger in 1995 than in 1912	28
Experiences bankruptcy or similar ^a	29
Larger in 1995 or on earlier exit than in 1912	35
Survives in any independent form	52
Disappears	48
Capability Expansion (below 1 = decline; above 1 = growth)	
Mode ^b	0
Median ^b	0.4
Mean ^c	1.0-1.4

Source: Author's calculations from data in appendix A.

^aIncluding liquidation, bankruptcy protection, extensive corporate breakup, or nationalization.

^bIncluding all exiting firms at their disappearance ratio.

^cIncluding all exit values and terminal values, the unweighted mean value is 1.4 and the mean weighted by 1912 values is 1.2; if all exits are valued at 0, the unweighted mean value falls to 1.1 and the weighted mean to 1.0. The average terminal ratio of the fifty-two survivors in 1995 is 2.0; that of the forty-eight disappearances is 0.6.

Oil (now combined as 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 7.1 indicates that the typical firm declined: nearly a half of them disappeared and more than a quarter experienced bankruptcy or a similar close shave with it. The modal value of the capability expansion ratios is zero, while the median company registers 0.4, that is, it was only 40 percent of its 1912 size at the terminal date. Yet the distribution is highly skew, with the firms that we remember, particularly the three spectacular performers—Burmah/BP, Procter and Gamble, and Du Pont, with capability expansion ratios above 7—rescuing the mean performance, which, depending on the assumptions made, was between 1.0 and 1.4. Just over half the firms survived and just over half these survivors grew; indeed a number of them did sufficiently well to remain in a similar list of the hundred largest firms today.⁹

9. To outrank the hundredth-ranked firm in the 1995 giant industrials, the lowest-ranked firm of 1912 would have had to achieve a ratio of 4.0. The average giant firm of 1912 would have had to

Yet for the 1912 top hundred overall, the record was not impressive. Not only was decline twice as common as growth, but mean capability expansion ratios slightly above 1 imply that, if these giants issued new capital to shareholders or to pay for firms acquired in 1912–95, as many of them did abundantly, they did notably worse than the average company in Standard and Poor's index. The minority of growth-oriented firms that dominate the literature are by no means typical. The low median value of the ratio suggests that most giant firms are incapable over a long period of sustaining their initial endowment of capabilities. However, a significant group of firms achieves ratios between 1.0 and 9.1, implying that some giants could create new capabilities, in addition to those they manifestly inherited, an arguably more challenging task.

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. 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 (i.e., the time taken for a quarter of them to disappear in bankruptcy, nationalization, or merger) was thirty-three years, and they are, as we approach the millennium, now hovering around their half-life.¹⁰ The time elapsed since 1912—eight decades or so—is not much longer than the business "half-life" of a single human being,¹¹ though, of course, personally managed businesses *generally* had much shorter average life spans than this. Small firms certainly have shorter average lives than giant firms¹²—it usually takes longer to walk down a mountain than to roll off a hillock—but both large and

grow to 2.7 times its 1912 size to achieve the average size of the 1995 top hundred, from \$81 million to \$218 million in 1912 stock exchange prices. The nineteen 1912 giant firms that were still in the 1995 global top one hundred achieved an average ratio of 3.8, though one of them (RTZ) managed to stay in with a ratio as low as 0.8 (falling from thirteenth place to eighty-eighth).

10. Fifty-two of the 1912 top hundred firms still formally exist independently, though arguably some—e.g., Singer (Bicoastal) and U.S. 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 breakup of IG 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 demerged 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 organizational death rates to decline with age; see, e.g., Hannan and Freeman (1984). In calculating half-lives of giant firms I have assumed they were born giants in 1912, rather than when founded as small firms.

11. Demographers do not conventionally use the concept of half-life to describe life expectancy, but in advanced industrial economies the half-life of an eighteen-year old male would be about fifty years; see Registrar General (1914), table 3.

12. 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).

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.¹³ The proposition that it would be possible to fritter away \$3 billion (much less \$90 billion) in a human lifetime is one I personally find daunting, but business leaders are evidently made of sterner stuff. \$3 billion is the value (in 1995 stock exchange prices) that the market placed on the smallest of these firms' "lump of capabilities" in 1912 (and \$90 billion 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 liberalization of world trade, oil crises, unprecedentedly rapid technical change, and the spread of industrialization) is in fact also observed in the earlier periods of increasing national autarky 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 maximization, a point argued for U.S. Steel's early decline by Stigler (1968). 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 preplanned 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.¹⁴

The implications of these observations for industrial economists are clear. While we naturally focus on success—on corporations that did learn to expand

13. 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 note 12, averaged paid-up capital of about £60,000 (Jeffreys 1938, 130), compared with equity market values averaging £16.6 million in the 1912 global top hundred, a ratio of about 1:275. Their half-lives were in the ratio 1:12.

14. Even in Stigler's study (1968) of U.S. Steel, the returns to its stockholders peaked in real terms ten years after the merger, that is, in 1911, and U.S. Steel stockholders did worse on average than other steel companies for the remainder of his analysis (1912–25), which covers the period of this study. The impression of U.S. Steel post-1925 is also not very favorable to an extension forward in time of the Stigler hypothesis.

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 1995a), 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.¹⁵ 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,¹⁶ 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.

7.4 National Differences in Corporate Performance

Perhaps the most widely used systematic model of corporate failure is Chandler’s invocation of Britain’s failure to develop professionally managed corporate hierarchies as a reason for Britain’s twentieth-century economic decline, relative to Germany and the United States (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 (Kleinschmidt and Welskopp 1993; Alford 1994; Hannah 1995a). Our population of Giant Redwoods certainly provides no support for the hy-

15. See, e.g., Raff and Temin (chap. 6 in this volume), Hounshell (chap. 5 in this volume), and, more generally, Lieberman and Montgomery (1988) and Henderson and Clark (1990).

16. 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–\$25 million 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 generalize 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, note 21 below.

Table 7.2 National Performance Differentials of 1912 Giants

	U.S.	Germany	Britain	Other
No. of firms headquartered there in 1912	54	14	15 ^a	17 ^a
Average equity capitalization in 1912 (millions of dollars)	90	59	95	56
Outcomes (%)				
Survival in top hundred 1995	17	29	47	0
Any independent survival	48	57	60	53
Proportion showing positive growth (i.e., ratios above 1.0)	26	43	40	18
"Capability enhancement" ^b				
Unweighted average ^c	1.5	1.2	1.9	0.5
Coefficient of variation	(135)	(104)	(123)	(164)
Median ^c	0.4	0.6	1.3	0

Source: Author's calculations, from appendix A data.

^aCounting Royal Dutch Shell as wholly British.

^bDefined as terminal equity capitalization ÷ 1912 equity capitalization.

^cIncluding exits.

pothesis that large British firms were less likely to sustain their capabilities than German and American ones; indeed, the reverse is true. As table 7.2 shows, British firms were most likely to survive, most likely to remain in the top hundred, and generated higher performance ratios than American or German ones, however measured.¹⁷

Nearly half the British giants of 1912 survived, but less than a fifth in other countries overall. Germany came nearest to Britain, with a 29 percent survival ratio for its 1912 giants; however, Germany seriously lagged in building new giant firms in the twentieth century, an activity in which the United States excelled.¹⁸ Of the new giant firms entering the top hundred after 1912 and still there by 1995, the United States built 50 percent more even than Japan, which had no giant firms in the 1912 top hundred list but twenty-one by 1995. Europe generally built fewer new giants than the United States or Japan, but within Europe, it was Britain, not Germany, that stood out, both as a builder of new giant firms and a sustainer of existing ones.

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

18. Between 1912 and 1995 the German representation in the top hundred halved from 14 to 7 because it created only 3 "new" giant firms to replace its declining firms. The United States' share fell proportionately less, from 54 to 40, because, despite its standing as the worst performer of the three leaders in table 7.2, it created 31 "new" giant firms. Between 1912 and 1995 Britain's share of the world's giant firms declined least of the three, from 15 to 14 (if the 1 Anglo-Dutch firm of 1912 and the 3 of 1995 are counted as entirely British), not only because it had more survivors than Germany but also because it created more new giant firms than Germany in the course of the century (though proportionately fewer than the United States). The 1995 data is from an unpublished study by the author, based on the industrial firms in *Business Week's* listing of the world's giant firms on 31 May 1995 by equity market capitalization.

These results invite speculation on whether entrenched oligopolists weaken rather than strengthen the national economies in which they are headquartered. Some postwar international comparisons (Geroski and Jacquemin 1988; Geroski and Mueller 1996) suggest that the stability of dominant firm positions exhibited in the British case is associated with poor national economic performance, and this reinforces the traditional economist's emphasis on market assortment rather than persisting corporate capabilities as a source of efficiency gains.

However, a more benign interpretation is possible for the British Giant Redwoods in the 1912 population, consisting as they did of giants that had established their global status in competitive conditions before World War I, rather than in Britain's more sclerotic phase of post-1932 protectionism and cartelization (Broadberry and Crafts 1992). The British giant corporations arguably had more staying power because in 1912 they were domiciled in a free-trade country, while American giant corporations were already then substantially overprotected by high tariffs and German ones moderately so (Capie 1994, 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.

Another explanation of the poor U.S. performance could be that U.S. firms were inhibited by antitrust laws from expanding, earlier and more seriously than their German and British counterparts. Antitrust laws clearly did restrain the smaller U.S. giants from some acquisitions, yet some of the best U.S. performers were vigorous independent companies deriving from antitrust action, notably the 1911 breakup of Standard Oil and Du Pont, while the 1912 giant that was "lucky" *not* to be broken up, U.S. Steel, then performed abysmally both in absolute terms and relative to the industry average.¹⁹ Antitrust enforcement thus had positive as well as negative effects on U.S. corporate giants. Moreover, European firms were subject to parallel constraints from nationalization or expropriation: the British firm Vickers, for example, saw its assets in cars, computers, aircraft, and shipbuilding eventually nationalized, and RTZ lost its core assets (in Spain) to Franco's postwar nationalization program. German firms suffered from extensive nationalizations in the 1930s,²⁰ and German giants sustained massive expropriations, in both 1914–19 and 1939–45, of sub-

19. The later demerger of Northern Telecom from Western Electric also performed well, as did the 1914 British company split of Burmah (later Burmah Castrol) and Anglo-Persian (later BP). Even the four companies demerged from American Tobacco in 1911 achieved an average performance of 0.7, compared with the only independent tobacco company's performance of 0.5.

20. Nationalization was the greatest risk in the "other" countries, which performed worst; see table 7.2.

sidiaries in enemy countries and beyond their shrinking western and eastern national borders. Giant corporations faced large and diverse political risks *wherever* they were based in a turbulent century; but the best firms were the ones that turned this to their advantage; no nation had a monopoly of severe challenges to big business.

My results thus decisively reject the notion that there were exceptionally few large British corporations or that they were especially notable for failing to sustain or develop their capabilities; and a case can be made that the opposite is true. Certainly matched pairs of roughly equal British and American firms appear to confirm this: in oil Shell did more than twice as well as Exxon and by 1995 was the largest industrial firm in the world; in tobacco, BAT did three times as well as American Tobacco; in textiles, J&P Coats did three times as well as American Woolen; in copper, RTZ did three times as well as Phelps Dodge. Even when one American firm did markedly better than its British twin (e.g., Du Pont did three times as well as Brunner Mond [Zeneca]), the superior U.S. performance was cancelled out by U.S. firms in the same industry that declined markedly (e.g., American Agricultural Chemical and Virginia-Carolina Chemical).

Of course, the British success could simply be the outcome of random variations in the performance of a relatively small number of firms. What is clear is that the leading industrial countries all had some significant capabilities in managing leading corporations. There are strong indications that Britain's firms slightly lower down in the size range of moderately large corporations also show a clear tendency to outperform Germany and the United States, though the data on these are less standardized and relate to changing populations of firms.²¹

It is abundantly clear, then, that Chandler was wrong in identifying the failure to entrench oligopolies in manufacturing corporations as the key to Britain's fundamental twentieth-century weaknesses. Paradoxically, the country that best exemplifies the Chandlerian thesis about dynamic and sustained corporate capabilities is Britain, the country where he least expected to find it. Yet this conclusion leaves an unresolved puzzle. British GDP by 1995 was only four times in real terms its 1912 level, while the United States and Germany achieved twice this rate of growth.²² The well-known statistics that first focused Chandler's attention on manufacturing as the root cause of Britain's slow

21. Teece (1993, 214) noted that in *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. See also Hannah (1995a). Table 7.4 also suggests that large British firms were faster than continental European ones in adopting what Chandler defined as appropriate structures, despite the contrary impression in *Scale and Scope*.

22. The United States' GDP increased eight times, and Germany's nine times, both in real terms. All countries grew both by increasing labor productivity and by increasing the population, but the latter kind of growth was most noticeable in the United States and least in Britain.

growth are still eloquent: Britain's share of world trade in manufactures declined more rapidly than that of Germany, while America's share actually rose.²³ The proportion of Britain's labor force in manufacturing fell markedly relative to Germany.²⁴ If large British industrial firms were *not* generally performing badly, it seems reasonable to examine whether *smaller and medium-sized* manufacturing firms in Britain were in some sense underperforming relative to those in the United States and Germany. If this alternative hypothesis were nearer the mark, we would expect the decline in British manufacturing to be reflected *especially among smaller firms*; while, if the Chandler view were correct, it would be the larger firms that had suffered most. The industrial concentration data supports the former hypothesis: Britain has become significantly more reliant on its large firms than either the United States or Germany (though in the first decades of this century the United States was probably the leader); Britain now has the highest levels of industrial concentration of any major modern economy.²⁵ The statistical record of industrial structure and performance is consistent with the view that the capabilities embodied in Germany's mid-sized *Mittelstand* or in the vigorous competitive fringe of small and medium-sized firms in Germany and America are what have given them their competitive edge in manufacturing; the data simply are not compatible with the Chandler view of changing national competitive advantage of these countries' large firms and those of Britain. Far from neglecting to develop the core capabilities of its large corporations, Britain seems to have done so proportionately more than its two main industrial rivals over the century as a whole.

There are, moreover, strong indications that it is a mistake to focus the debate on changing national competitive advantage solely on the manufacturing sector. Indeed, on Broadberry's estimates, between 1909–11 and 1990 Britain *improved* its manufacturing *productivity* performance relative to both the United States and Germany.²⁶ Some of this is arguably due to the reversal since 1979 of the British government's former promanufacturing, pro-large-

23. Britain's share of world manufactured exports declined from 30 percent in 1912 to 9 percent in 1991, while Germany's fell only from 26 percent to 20 percent; the United States' rose from 13 percent to 17 percent over the same period (Tyszynski 1951, 286; Central Statistical Office 1992, 142).

24. The share of manufacturing in total employment fell slightly faster between 1910–13 and 1990 in Britain (from 32 percent to 20 percent) than in the United States (from 22 percent to 15 percent), while in Germany the manufacturing share was stable at around 30 percent of employment (Broadberry 1996).

25. By 1970/71 the largest one hundred manufacturing firms controlled 40 percent of net output in the United Kingdom, 33 percent in the United States, and perhaps only 30 percent in Germany; around the First World War, concentration had been lower in Britain than in the United States and about the same as in Germany (Hannah 1995b, 58).

26. U.S. manufacturing productivity in manufacturing was 103 percent higher than the United Kingdom's in 1909–11 but only 75 percent higher by 1990; German manufacturing productivity was 19 percent higher than the United Kingdom's in 1911 and only 8 percent higher (in West Germany alone) by 1990 (Broadberry 1996). Of course, productivity in East Germany is now markedly lower than in either Britain or West Germany.

corporation stance; the encouragement of small-firm growth by small-business programs, similar to those adopted earlier in the United States and Germany; and the espousal of a more free-market and free-trade policy stance that Britain had championed in 1912 but soon, along with other countries, abandoned for interventionist policies.

In that changing environment, the long-run decline of British manufacturing employment and exports is less worrying than might at first appear. As Britain latterly became self-sufficient in oil, it had less need of manufacturing exports to pay for oil imports than Germany or the United States (i.e., it moved nearer to the United States' position in 1912, as a net oil exporter achieving only *low* manufacturing exports). This is not to say Britain had no economic troubles: its living standards have fallen relative to Germany and the United States in the twentieth century. Yet careful sectoral analysis of the components of growth suggests that some of this was inevitable (Britain had already industrialized more than the United States and Germany in 1912, so had far less scope for overall productivity improvement by shifting resources out of agriculture), while insofar as any British sector fell behind its rivals, it appears to have been, not manufacturing, but services, particularly the utilities and communications sectors, in which America has done markedly better than Britain.²⁷

7.5 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.²⁸ As table 7.3 shows, about half the firms are in five industries—coal mining, textiles and leather, nonferrous metals (including other mining), iron and steel (including 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 hundred. The "successes" in these "old" industries²⁹

27. The U.S. productivity lead over Britain in utilities was only 50 percent in 1909–11 but 290 percent by 1990; Germany's lead was 4 percent in 1909–11 and 30 percent in 1990. Britain's transportation and communications sector has, however, had a better productivity record relative to Germany (Broadberry 1996).

28. Though the poor performance of Germany and "other" in table 7.2, relative to Britain, is partly due to their having a higher proportion of their giant firms in the "old" industries. Germany was strong in two "new" industries (electrical engineering and chemicals) but had *no* giant firms in either petroleum or branded products. (Britain had old industries but they were generally organized 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 proportion of giant firms in "new" industries as Britain.

29. 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.

Table 7.3 Industrial Performance Differentials among 1912 Giant Corporations

Industry	No. of 1912 Giant Firms in the Industry	Aggregate 1912 Market Capitalization of the Industry's Giant Firms (billions of US\$)	Median Industry Performance	Average Industry Performance	Coefficient of Variation
Textiles and leather	4	0.4	0.1	0.1	79
Coal mining	7	0.4	0	0.2	185
Mechanical engineering	10	0.9	0.1	0.4	164
Nonferrous metals, etc.	14	1.2	0.2	0.4	116
Iron/steel/heavy industry	18	1.5	0.3	0.6	125
Branded products	18	1.6	0.9	1.3	142
Chemicals	10	0.4	2.2	2.4	79
Electrical engineering	5	0.4	3.4	2.7	70
Petroleum	14	1.2	3.6	3.7	62
All 1912 giant firms	100	8.1	0.4	1.4	140

Source: Author's calculations from data in appendix A.

often achieved it by selling out early (e.g., the railroad-equipment manufacturer, Metropolitan Carriage, in 1919 with a ratio of 1.9); others succeeded in their core old activities as well as new ones (e.g., Mannesmann, with the best ratio for this group of industries of 2.7 in 1995). A few well-performing survivors shifted industry completely: for example, American Can into financial services (with a ratio of 1.9) and 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 such new industries in order to escape constraints in individual markets. Judging from giant firms in coal, textiles, and railroad-equipment manufacture, the collapse of their markets and the limitations on interindustry transfer of their capabilities 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 maximize the value of what few transferable skills they still embodied.³⁰ 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—also tended to grow on average.

However, it would be wrong to suggest that giant firms had clearly predestined outcomes depending on their initial "sunrise" or "sunset" industry base. In fact, there was more diversity of performance *within* industries than *between* them.³¹ Even in an industry as promising as electrical manufacturing—where three out of five firms scored above 3.3—Westinghouse (0.7) and AEG (0.3) performed weakly. Oil companies overall did well, but relative laggards, when nationalized or taken over, could be below their 1912 size. The branded-product firms include some of the great twentieth-century successes like Procter and Gamble (8.1) and Lever Brothers (Unilever) (3.4) but also some of the more remarkable failures like American Tobacco/Brands (0.4) and 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 U.S. Steel (0.1), International Harvester (0.1), and Krupp (0.2); *Gewerkschaft deutscher Kaiser* (Thyssen) (0.9) and John Deere and Company (0.9) did distinctly better. As the last column of table 7.3 shows, both old and new indus-

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

31. The coefficient of variation of the average ratios for the nine industries is .95; thus there is more variation *within* the majority of the industry groups (coal, mechanical engineering, nonferrous 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.

tries 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 (e.g., 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 1993).

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 specter 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 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 I have described were remarkable successes in 1912; their high stock market valuation reflected their ability to earn supernormal 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 emphasized, 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 posi-

tions could also be challenged by antitrust or by expropriations (both nationalizations and those following defeat in war).

Where such challenges were ineffective, or where they were neutralized 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 capability enhancers is that they had some distinctive architecture that 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 skeptically, as the fund manager views the financial economist's "efficient markets hypothesis," with which it has close affinities.³² 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.³³ 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 dis-

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

33. At least in the United States, the United Kingdom, and Germany. The "other" countries—many what we would now call "emerging markets"—actually show the worst performance in table 7.2, perhaps reflecting that they did not have these social capabilities in such large measure.

tinctive 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 favored) system of social organization.

7.6 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 hundred industrial firms in 1912 and for twenty in the 1995 top hundred. 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, U.S., and German companies: of these, only the British firm, Brunner Mond, was large enough to enter the top one hundred (the other licensees, Deutsche Solvay and the U.S.-based Solvay Process Company, though operating in bigger national markets, were less profitable). The largest U.S. 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 R&D 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-oriented 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

Table 7.4 Adoption of the Multidivisional Structure (% of the top 100 corporations with M-form structure)

	1913	1932	1950	1960	1970	1980-83	1993
U.S.	0	8	17	43	71	81	—
Japan	1	0	8	29	55	58	—
Germany	1	—	5	15	50	60	70
France	1	3	6	21	54	66	76
Italy	—	—	7	17	48	—	—
U.K.	0	5	13	30	72	89	88

Sources: See appendix B.

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,³⁴ 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 multidivisional organization through U.S. industry, after its pioneering in the 1920s by firms like General Motors.³⁵ Table 7.4 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 Italy, which was notorious for having relatively few giant U.S.-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 minimized 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

34. 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 twenty; even a foreign company like the merger of U.S. 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 and financial center and the availability of cheaper scientists from good universities than the United States and Germany now offer (i.e., 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 implies sustaining low living standards).

35. Though Hounshell (chap. 5 in this volume) suggests the problem of applying it to different corporations, e.g., Ford.

enter the market to spread them. Competition and emulation thus do a great deal to homogenize the giant-firm sector in reasonably competent advanced industrial countries.³⁶ In that sense, we should not be surprised at our earlier conclusion that some popular characterizations of national differences in large corporations appear to be baseless caricatures.

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 localized businesses are inherently less subject to (though, of course, not entirely immune from) many of the pressures for international emulation and homogenization (Piore and Sabel 1984; Kogut 1993; Knight 1995). 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 well-known example [1990] 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 mine—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 United States' 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 some of which Britain had an initial lead which was reversed) than in manufacturing (in which the British productivity gap remained remarkably stable) (Hannah 1995a; Field 1996; Broadberry 1996).

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 my findings are a pointer, business historians may more productively focus their research on national institutional differences in other directions. The prize of focusing our efforts accurately is an attractive

36. Even here, however, note that the adoption of the M-form stabilized 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 United States and United Kingdom 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; cf. Ingham 1992).

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.

Appendix A

The World's 100 Largest Capitalist Industrial Enterprises of 1912

All industrial enterprises³⁷ with equity market capitalization of \$26 million or more in 1912 are listed in rank order within industry groups. For a fuller account of the construction of this population see Hannah (1998) and Schmitz (1995). I am grateful to Alison Sharp for research assistance and to many national specialists for advice, which is more fully acknowledged in Hannah (1998). For industry averages see table 7.3; for national averages see table 7.2; for overall totals see table 7.1.

There are two major 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 judgments are inevitable—the genetic descent of corporations is less unambiguously defined by economic than by human reproductive processes—but I have tried to apply standard rules to resolve difficult cases. Corporate descent is defined in organizational (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.³⁸ 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 reassembled a world-class sewing-machine business that Singer's managers had believed had no future and had broken up).³⁹ Where mergers have been reversed, the intervening life is ignored: Bayer is the successor of

37. Defined as all nongovernment enterprises with more than 50 percent of their activity in mining and manufacturing.

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

39. While in individual cases choosing these successor companies 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.

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.⁴⁰ Firms may leave archeological 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 “quasifirms,” 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 recognized 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 (e.g., Central Leather), sold at a price reflecting long-run decline (e.g., Pullman), or acquired from bankruptcy protection by an optimistic corporation that proved unable to turn it around (e.g., AEG). Valuing surviving subsidiaries or divisions in 1995 as separate entities is problematic: AEG, for example, if valued on the basis of capitalizing divisional profits, would actually have a negative value (which would probably be too pessimistic an assessment of its surviving capabilities). I have therefore valued acquired firms at the estimated price paid for acquiring their equity⁴¹ *at the time of their substantive disappearance*,⁴² converting this to “1912 stock exchange prices” by the appropriate Standard and Poor’s 500 index point, as with 1995 survivors. Acquisition prices are usually at a substantial premium to market values, and as acquired firms were generally declining,⁴³ the earlier date of the acquisition imparts an upward bias, relative

40. 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.

41. Where this was not published in the press at the time, I have estimated it from market price data at the time of the merger.

42. Some judgments verge on the arbitrary; e.g., where firms were temporarily absorbed into a larger firm, then demerged, then later merged more completely, I have generally taken their later disappearance, to preserve some symmetry with the treatment of surviving (but once merged) firms.

43. As my data imply, see note 7.

to surviving firms valued in 1995. This measure is, therefore, presented separately in parentheses in table 7A.1. Recognizing 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 nationalization. This was, for reasons not unconnected with their size,⁴⁴ 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 ones⁴⁵ were at some stage nationalized, and some remain in state hands. Nationalized firms like BP and St. Gobain continued to be managed like private firms and by 1995 were privatized, 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 (e.g., 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 nationalized, I have taken the 1995 balance-sheet assets less any traceable dedicated debts as a proxy for market value.

Since this work was undertaken, one further omitted firm has been identified: Alpine-Montangesellschaft, an iron and steel firm with equity capital of \$72.4 million in 1912, based in the Hapsburg Empire (Austria). This firm became majority-owned by Vereinigte Stahlwerke in 1926, then, after the *Anschluss*, part of the Hermann Göring Werke, and was nationalized in postwar Austria as Vöst-Alpine. Its inclusion (ranked thirty-fourth in 1912) would displace the Belgian-based Lothringer Hüttenverein from the hundredth position, but would not materially affect any of the major reported results.

44. On the Caligulan principle ("I wish the Roman people had but a single neck"), governments were more likely to nationalize large firms than small.

45. 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 nationalized in Britain, but they were left with a range of capabilities that have been considered the surviving firms. In some cases (e.g., Vickers) the effects of nationalization of large parts exaggerate their measured decline.

Table 7A.1

The World's Hundred Largest Industrial Firms of 1912

Rank in Global Top 100 in 1912 (and in parentheses, 1995, where still in top 100)	1912 HQ Location	Name of Company in 1912 (in parentheses, 1995 changed name or alternative outcome) ^a	Market Capitalization of Equity (in millions of US\$ at 1912 stock market prices) ^b	
			1912 Initial	1995 Multiple ^c
<i>Textiles and Leather</i>				
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)
<i>Coal Mining</i>				
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. 1968/69)	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)
<i>Mechanical Engineering</i>				
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 and Foundry (Icahn acq. 1984)	52	(0.3)
64	R	Briansk Rail and 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)
<i>Nonferrous Metals and Other Mining (including related refining and smelting)</i>				
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

Table 7A.1

(continued)

Rank in Global Top 100 in 1912 (and in parentheses, 1995, where still in top 100)	1912 HQ Location	Name of Company in 1912 (in parentheses, 1995 changed name or alternative outcome) ^a	Market Capitalization of Equity (in millions of US\$ at 1912 stock market prices) ^b	
			1912 Initial	1995 Multiple ^c
18	US	Utah Copper and 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
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	U.S. Smelting Refining & Mining (Sharon acq. 1979)	34	(0.2)
86	SA	E. Rand Proprietary	33	0
		<i>Iron, Steel, and Heavy Industrial^d</i>		
1	US	U.S. 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 Group)	57	1.9
48	G	Deutsch-Luxemburg (Vereinigte Stahlwerke 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 Iron & Steel (dismembered and liquidated 1921–39)	36	(0)
81	Lux.	ARBED	35	0.2
89	G	Mannesmann	32	2.7
90	G	Gutehoffnungshütte (Maschinenfabrik Augsburg-Nürnberg)	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	Belg.	Lothringer Hüttenverein (Schneider et. al. acq. Knutange 1919, Klöckner insolvent 1992)	26	(0.6)

(continued)

Table 7A.1 (continued)

Rank in Global Top 100 in 1912 (and in parentheses, 1995, where still in top 100)	1912 HQ Location	Name of Company in 1912 (in parentheses, 1995 changed name or alternative outcome) ^a	Market Capitalization of Equity (in millions of US\$ at 1912 stock market prices) ^b	
			1912 Initial	1995 Multiple ^c
<i>Branded Products^e</i>				
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	U.S. Rubber (Uniroyal)	80	0*
31	US	B.F. 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
97	US	Cudahy Packing (General Host acq. 1968)	26*	(0.1)
<i>Chemical^f</i>				
37 (20)	US	Du Pont (+ Hercules + ICI acq. Atlas 1971)	69*	7.2
53 (94)	G	Farbwerke vormals Lucius & Bruning (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 Chemical (Continental acq. 1963)	38	(0.2)
76	US	Virginia-Carolina Chemical (Mobil acq. 1963)	38	(0.2)
84	F	St. Gobain	33	2.5
85	Belg.	Solvay	33*	1.1
92	US	General Chemical (Allied-Signal)	30	3.1
<i>Electrical Engineering</i>				
7 (2)	US	General Electric	174	4.7
24	G	AEG (Daimler-Benz acq. 1985)	93	(0.3)

Table 7A.1

(continued)

Rank in Global Top 100 in 1912 (and in parentheses, 1995, where still in top 100)	1912 HQ Location	Name of Company in 1912 (in parentheses, 1995 changed name or alternative outcome) ^a	Market Capitalization of Equity (in millions of US\$ at 1912 stock market prices) ^b	
			1912 Initial	1995 Multiple ^c
39	US	Westinghouse Electric	67	0.7
41 (32)	G	Siemens	65	3.4
59	US	Western Electric (Lucent Technologies + Northern Telecom)	47*	4.7
<i>Petroleum</i>				
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 (U.S. Steel acq. 1982)	66*	(3.5)
55	US	Prairie Oil & Gas (Sinclair acq. 1932)	50	(0.3)
56	Mcx.	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 (New York Standard acq. 1931)	26	(5.1)

^aAcq. = acquired; nat. = nationalized.

^bAn asterisk indicates that market valuation was not available. An approximation (usually based on balance-sheets assets net of quoted debt) was used.

^cI.e., 31 May 1995 equity capitalization, revalued at 1912 stock exchange prices by the Standard and Poor's industrial 500 index, divided by 1912 equity market value, that is, what in the text is described as the "capability enhancement ratio."

^dMany firms in this category included vertically integrated coal mines and shipbuilding yards in 1912.

^eIn addition to the core food, drink, and tobacco industry, this category includes branded household chemicals, rubber tires, and photographic goods.

^fThis 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 7.4

United States

1913 inferred from Chandler (1962).

1932 from Chandler (1962) and based on fifty companies, but with no multidivisionals in the next fifty assumed.

1950–80 percentages estimated from the chart in Kogut and Parkinson (1993, 190), based on 150 firms—this may underestimate multidivisionals in the top one hundred.

However, Rumelt (1974), basing his study on samples of 183–207 of the top 500 firms, suggests figures of 20 percent for 1949, 50 percent for 1959, and 77 percent for 1969, which rather surprisingly implies no greater propensity to adopt multidivisional organization among very large than among more moderate-sized corporations, at least after the war.

Japan

1913–32 inferred from Morikawa (1992, 113–14).

1950–80 from 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, 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,” that is, Siemens, in Kocka (1978, 577).

1950–70 from Pooley-Dyas and Thanheiser (1976).

1983–93 from Whittington, Mayer, and Curto (forthcoming).

France

1912 from Levy-Leboyer (1980) (but cf. Daviet 1988).

1932 from Fridenson (1997).

1950–70 from Pooley-Dyas and Thanheiser (1976, 186–87).

1983–93 from Whittington, Mayer, and Curto (forthcoming).

Italy

1950–70 from Pavan (1970, 67), percentages based on 6/84 firms in 1950, 16/94 in 1960, and 48/100 in 1970.

United Kingdom

1913 inferred from Hannah (1976).

1932 from Hannah (1976), based on approximately fifty companies, with the assumption that lower-ranked companies did not adopt the multidivisional structure, as for the United States at that date.

1950–70 from Channon (1972, 67), percentages based on 12/92 in 1950, 29/96 in 1960, 72/100 in 1970.

1983–93 from Whittington, Mayer, and Curto (forthcoming).

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Comment Bruce Kogut

Leslie Hannah's paper is one of a few solitary gulls flying in the midst of the storm of protest against the fascination of the large firm in business history over the past few decades. Since a good deal of the storm is also no other than Hannah, the paper provides an excellent venue to take a perspective of the issues.¹ The target of the attack is not simply the interpretation placed by Alfred Chandler on the British "failure" due to personal capitalism, but the facile reasoning by which careful academics and less than careful pliers of the trade in the auctioning of ideas have come to associate size with success, a success dressed up with the honey glaze of "organizational capabilities."

There is not madness in the idea that big means good. Countries such as the United States, France, Japan, Germany, and the United Kingdom are rich, and they have what Prais has called "giant" enterprises. This generation of big firms, moreover, has appeared to lead to ever larger shares of their national economies. Table 7C.1 gives a summary of the data, and the data are simply very impressive. Since these countries differ in their per capita incomes and since these big firms play such a large role in their economies, it is entirely reasonable to conclude that a good part of the explanation for country differences must lie in the capabilities of their large enterprises.

Hannah wants rightfully to rethink this conclusion. Business historians may wince at the implications. For if governments would rather nationalize big companies than many small ones, academics prefer to study them for the same reason. "I wish the Roman people had but a single neck," Hannah writes, citing Caligula. The population of small and medium-size business firms is large; Marshall (1921) estimated the U.K. manufacturing population to be 45.8 percent in 1901. We applaud the accomplishment, even if not to the satisfaction of all, of Chandler tracking the records of 200 companies for each of his three countries. Nevertheless, he left out hundreds of thousands of other firms, including innovative small firms, breweries, and pubs. It is not surprising that researchers have preferred the histories of large firms, but a principal message of Hannah's story is that small and medium-size firms are essential parts of the comparison among countries. I return to this point below.

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1. See, for example, Hannah (1995).

Table 7C.1 Share of Industrial Output by Hundred Largest Firms (percentage)

Country	~1915	~1950	~1970
France	16 (1912)	25 (1955)	40 (1970)
Germany		22 (1949)	46 (1966)
Japan		39 (1950)	34 (1980)
United Kingdom	16 (1909)	21 (1949)	41 (1968)
United States	22 (1909)	30 (1954)	33 (1970)

Sources: For France, Daviet (1988); for Germany and Japan, Suzuki (1991); for the United Kingdom and the United States, Prais (1976).

Let's put aside for now the implications and consider the critical thesis. Hannah suggests that the virtuous association of size and capabilities should be subjected to analysis. In this regard, he has hit upon a fundamental point of confusion in the studies of large firms, namely, that the cross-section of the largest firms tends to obscure a survivor bias. Take a cross-section at any point of time and large firms are revealed. The important issue is why some large firms grow and prosper and others dwindle and, sometimes, die.

To initiate this analysis, Hannah creates a list of the hundred largest firms in several advanced industrialized countries for 1912, and then compares their capitalization against survivors for 1995. In this exercise, he makes some assumptions, such as the use of the U.S. Standard and Poor's deflator for all countries, a crude pass that one suspects nevertheless goes a long way to make the data for the years 1912 and 1995 comparable. The findings indicate the following: (1) Only one-half of the large firms avoided merger, liquidation, or nationalization.² (2) Big firms in the United Kingdom survive more often than those in the United States.

The first result casts doubt on the value of first-mover advantages over a long period of time. Of course, the period is eighty-three years. Wars have occurred, boundaries have changed, and dividends have been paid. Still, it is fair to ask, given the assumption that size matters, what is the story of survival and growth? The answer is that 21 percent of the firms listed in 1912 were still in the top hundred in 1995, and over half were still alive. Two-thirds of the large firms failed to keep up with the movement in the overall market.

These conclusions are not unlike those of other studies on sustainable advantage. Pankaj Ghemawat (1991) took 692 businesses from the Profit Impact of Market Share database, split into two samples for 1971 ROI. Sample 1 was

2. We can quibble over the significance of ignoring the distinction between debt and equity in market capitalization and the difference in liquidation versus nationalization.

39 percent, sample 2 was 3 percent. In 1980, it was 21.5 percent and 18.0 percent. What is true at the business level applies also at the corporate level. Not only are corporate effects on business profits hard to identify (Rumelt 1991), past innovative success is a poor predictor of future success (Mansfield 1963).

Given these sorts of baselines, it is not surprising that there is considerable reversion to the mean, if not outright reversal. Without information on the annual average changes and their variance, it is hard to calculate the expected distribution. Moreover, since there is considerable industry variation, one would expect that firms in older industries would face less attractive growth opportunities than those found in newer industries. In fact, Hannah finds evidence for this. Yet Burmah Oil, Procter and Gamble, ARCO, and Du Pont accounted for about a fourth of the total relative growth in the population. These outliers might represent spontaneous drift, or superior "organizational capabilities." The presence of three in the petroleum and petrochemical industries suggests also a simple market-opportunity story.

The second result, as listed above, argues against the statement that the United Kingdom lost relative ground due to the failures inherent in personal capitalism. Contrary to Hannah's finding that nationality is not a significant variable in the performance of large corporations, his data show that U.K. membership was a decidedly significant asset. Table 7.2 indicates that only 17 percent of the U.S. firms survived in the top one hundred of 1995; German and British firms evinced survival rates of 29 percent and 47 percent, respectively. The rate of survival in any independent form, however, was more tightly grouped, with British firms showing the *best* rate (60 percent), and the U.S., the *worst* (48 percent).

Hannah offers the speculation that British firms were hardened by a more open economy in 1912, while German and American firms were overprotected. Of course, British productivity growth ranked behind its major competitors prior to 1913 and was second to last from 1913 to 1929; Weimar Germany did worse. From a position of 25 percent of world trade in 1925, it fell to 12 percent by 1929.

There is a more conventional complaint to be made against the use of size. To what extent can we say that growth in size is an indication of success? What happened to the Hannah (and Kay) of 1977 who, taking on the dragon of spontaneous drift (the argument that the tendency toward large-firm concentration is an outcome of a random log-normal process), found that four-fifths of the growth of British large business was due to mergers and acquisition? Surely, Chandler's wild goose chase (one suspects he would have preferred ducks as the hunting target) did not entail the rounding up of bulimic giants who grew by their appetites rather than by their wits.

Size is interesting in a few ways directly, but it is mostly interesting as part of a larger drama. There is little evidence that size is clearly associated with scale economies. In the famous study by Rostas (1948) comparing U.S. and

U.K. productivity, no evidence was found for scale economies leading to productivity; even though the United States led absolutely in productivity for all industries, the United Kingdom frequently had larger plants when measured by unit output. Similarly, Prais (1976) found essentially no evidence for scale.

However, we do know that the industry distribution of firm sizes is correlated among countries, as are concentration rates. I normalized the data taken from Chandler's appendices, creating Z-scores for each firm in a given country (Kogut 1992). Regressing these scores on industry dummies generated coefficients that indicate the effect of membership in a given industry on a member firm's size. These industry coefficients are highly correlated across countries, and their correlations increased over the three panels (approximately 1912, 1936, 1950). Extending this analysis to Japan and France generates similar results. In short, Chandler's claim that variations in technical conditions lead to large firms in some industries and not others is consistent with these results. And it is not a terribly bad story, given its simplicity and the magnitude of the problem, to claim that the United States and Germany often led the exploration of these technical possibilities in the new industries of chemical, electrical equipment, and transportation.

It is a story, however, that is frequently puzzling. For example, contemporary observers in Europe often claimed that their national markets did not support the scale economies found in the United States, hence the causes of their weakness. Yet American firms were increasingly important investors in Europe; many of these firms were not large, and even when large, their plants were often not unusually large (Kogut 1992). What American firms embodied was a kind of knowledge, call it national organizing principles, that had developed steadily and cumulatively over the course of a century of experience (Hounshell 1984). To read the reports of the productivity missions from France and England to the United States is a test of will to endure long accounts of what appears to be common sense; the pages are filled with minute description of the routinization of work that was, strikingly, often absent in the European factories.

The ambiguity of size is, of course, that big size is as likely to be the outcome of firms who know how to do it better as to represent a source of advantage itself. Now, if size was the first-mover advantage, then Hannah should be finding more powerful evidence for sustainable advantage. But if size is the outcome of an unobserved advantage (be it organizational capabilities, patented technology, or government contracts), then a firm's duration is contingent on the evolution of its broader competitive and institutional landscape.

This broader landscape consists of firms, workers (sometimes organized in unions), governments, political interests, research centers, suppliers and buyers, idea merchants, and, of course, mechanisms of financial intermediation and corporate governance. To think of big firms as the engines of growth is not silly. The economic development of Korea, Malaysia, India, Mexico, and many other countries suggests that big firms are an integral part of the process. Some,

such as Amsden and Hikino (1994), point to this recapitulation as evidence of technical efficiency.

Large firms arise in industrializing markets because the diffusion of managerial knowledge is unevenly distributed across the space of firms, regions, and nations. Smith was right, and Stigler echoed this theme. The encapsulation of economic knowledge in the organizing principle of the division of labor was a source of British industrial strength. Where it was absent in other countries, it would have to be created. Stigler noted the same, adding that this division of labor would be recreated through the greater vertical integration of firms in countries where development was lagging.

In the 1800s, institutions of labor, finance, and suppliers were weak, as if the industrial landscape was unpopulated. The explosion of powerful new technologies opened up these vistas for exploration. Large firms represented peninsulas of competence jutting into the unorganized space of economic relations in rapid transition; they also represented powerful political counterweights to governments, often intervening, often corrupt. This was the Cambrian explosion in the exploration of organizational form in the absence of organizing templates.

The boundaries of nations, like the boundaries of firms, are meaningful. The simple reason is that governments make laws and levy revenues. But nations are also characterized by the systemic interdependence of labor markets, managerial hierarchies, governance and financial intermediation, and product market competition. (See, for example, Soskice 1990.)

Consider, for example, France, for which Houssiaux (1957) has made an especially exhaustive study of the emergence of large firms. He compiled a list of the largest stock firms for 1912, based on their total assets. He followed their evolution through successive panels conducted for 1936 and 1952.

There are a few minor, but still informative, points to observe. First, because Houssiaux did not restrict his attention to manufacturing firms, his list for 1912 shows a surprising dominance of mining firms (as notes Hannah in his list) but also of maritime transportation companies, department stores (e.g., Printemps), and water companies; to this day, the *Compagnie Générale des Eaux* remains a remarkable company, large, multinational, and never nationalized. Also, France, like the United Kingdom, was unusually strong in food and beverage sectors, though its success in these areas is less provoking of bewilderment.

Second, the French firms evidenced a reasonably strong stability, despite a very difficult period from 1929 to 1945. Table 7C.2 reproduces Houssiaux's findings (1957, 295). Houssiaux concludes that "this rate of mortality confirms the hypothesis of the stability of the large enterprises."

The riposte is to concentrate on the list for 1952, for which it is noticed that seventy-two firms are older than thirty years. (Houssiaux dates age from the time of incorporation, which can underestimate age considerably, especially for firms founded in the previous century.) Eight firms are dated to be less than

Table 7C.2 Mortality of the Hundred Largest Firms in 1912

	1912–36	1936–52	1912–52
Unchanged	77	92	69
Merger, restructured	12	7	16
Dissolved	11	1	15

ten years old. But these, Houssiaux notes, were descendants or were founded by the largest firms.

It is in this small observation of the entrepreneurial ties among the firms that the contrast between focusing on firm size or focusing on systemic relations is clearly drawn. In 1952, Houssiaux (1957, 794) notes, the portfolio investments (*poste*) of the hundred largest French companies rose to more than 200 billion francs, while their gross assets had a value of 237 billion francs. These enterprises had 900 known financial ties, averaging 9 ties per firm. One hundred twenty-seven of these ties tied these hundred to each other. Their administrators, numbering 975, disposed of a total of 3,120 board seats. "In spite of a production structure that was too little concentrated," concluded Houssiaux, "the most essential businesses in France is under the control more or less directly by the largest companies." Nor has the importance of industrial groups in France declined, as witnessed in the persistence of current studies.

The significance of understanding the firm in relation to its environment does not only imply the importance of interfirm ties. One of the most troubling periods in German economic history was the collapse of the traditional craft institutions during the Weimar Republic. The inflation had led to a compression in wages, and the introduction of techniques of mass production threatened to diminish the attractiveness of attaining craft skills. The number of apprentices fell compared to the prewar years, and the system was not repaired until the 1930s. The impact of these strains is starkly evident in the data on productivity, and is reflected in Hannah's observations on the low stability of German enterprises during the interwar period (see his footnote 28). The weakness of German firms was partly the consequence of the breakdown of Weimar labor institutions. Large firms provided critical support to these institutions; their hesitations, especially given the experiences of the revolutionary period just after World War I, were a major source for the breakdown in the education and advancement of skilled workers in the 1920s.

In other countries, the dominance of large firms hides a dynamic small-firm sector. (See footnote 18 in Hannah's chapter.) To leave aside the familiar example of Italy, Sweden of the interwar period revealed an unusual dynamism despite the depression. Dahmen (1950, 420) reports that between one-third and one-half of the workers employed in 1939 belonged to firms started after 1918. Behind the success of a Volvo or Asea were the foundings of many small firms that served as suppliers and sources of funding. Again, large firms rise to prominence because of their instrumental role in national innovatory networks.

In all, the most important implication of Hannah's analysis, as he notes in his conclusions, is that the comparison among countries must look at the entrepreneurial conditions for the emergence of new firms. In this regard, the higher mortality rate of American firms is an indication of a healthy entrepreneurial climate. Should it be cause of celebration that almost half of British firms in 1912 still make the top one hundred list some eighty-three years later?³ If there is weakness in the British performance of this closing century, it is odd to fault the large corporation for its survival rather than look for causes on the shop floor, or at the small and medium-size portion of the distribution. No doubt the appeal of Caligula's maxim for academic research explains the hesitation of business and economic historians to take the plunge into a historical analysis of small-firm birth and growth.

If Hannah is right that Chandler rode off, like the uncle in *Tristram Shandy*, on his hobbyhorse, only to have the horse return riderless, then attention paid to the large firms in this paper has nevertheless paid handsome dividends. The substance of Hannah's investigation into firm size fits a bit the irony Isaiah Berlin noted about Marx, that the success of his ideas in the world offered his own contradiction. The study of big firms remains a good horse to ride, even if the interpretative landscape has radically changed.

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3. One can, in this respect, empathize with Hannah's lack of restraint in noting that respect should be reserved for modest strategic management consultants.

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