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# ADVENTURES IN FINANCE

*Deborah A. DeMott\**

FINANCE AND INDUSTRIAL PERFORMANCE IN A DYNAMIC ECONOMY: THEORY, PRACTICE, AND POLICY. By *Merritt B. Fox*. New York: Columbia University Press. 1987. Pp. x, 455. \$45.

Does corporate finance matter? That is, is the economic world of concrete transactions in goods and services much affected by the rarified sphere of corporate capital structure and investment strategy? Some "persons on the street" (Main Street not Wall Street), interviewed by the news media in the wake of the market collapse on October 19, 1987, responded that their personal economic spheres were self-evidently unaffected by Wall Street's difficulties, as they did not own stocks or bonds. Lest one dismiss this perspective too quickly as naïve or misguided, one should note its parallel in the assumptions of many academic theorists about corporate finance. They assume that a firm's value is determined solely by the ability of its assets to generate operating income. Thus the proportion of debt to equity in the firm's capital structure, as well as the use the firm makes of the financial results of its operations, are irrelevant to firm value.<sup>1</sup> Like "Main Street's" response to the market collapse, the irrelevance theorems may seem out of touch with the world as we know it, for they begin by assuming away, among other things, the existence of corporate income taxes and of transaction costs, including the cost of acquiring information. In a world with taxes, a world in which the acquisition of information is costly, and in which bankruptcy is not costless for firms' shareholders,<sup>2</sup> capital structure and sources for project funding seem

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1. See generally V. BRUDNEY & M. CHIRELSTEIN, *CORPORATE FINANCE* 372-73 (3d ed. 1987).

2. Some academic theorists assume that the irrelevance hypotheses apply as well in the bankruptcy context to firms that have defaulted on their obligations to many creditors. If one begins with the assumption that questions of asset ownership are separable from questions of asset use, arguing that a creditor should sacrifice some of its ownership interest to enhance the post-reorganization survival of the bankrupt firm is more difficult than it would be in the absence of such an assumption. See Baird, *Loss Distribution, Forum Shopping, and Bankruptcy: A Reply to Warren*, 54 U. CHI. L. REV. 815, 819-20 (1987). Professor Baird's article characterizes "traditional bankruptcy scholars" as "alone in the academy in their belief that the financing decisions of a firm and its investment decisions are inseparable." *Id.* at 819-20. One explanation is that bankruptcy scholars work in a context which belies the empirical credibility of the assumption that bankruptcy is a zero-cost event. Bankruptcy scholars know that assets may be liquidated for less than their economic values and that the bankruptcy process imposes substantial legal and administrative costs.

likely to matter greatly.

One of the most intriguing questions along these lines is the adequacy of financial support for the development and production of innovative goods and services. Without innovation, economies stagnate. Stagnation may occur quickly or slowly and has several different aspects. Talented engineers and managers emigrate to more receptive climes. New products do not take the place of older ones no longer attractive to consumers. By providing new products, innovative competitors, nurtured in other economies, succeed where the indigenous producers fail. Within this gloomy scenario, several aspects of corporate finance are possible villains. Innovative products and services originate in the ideas of individuals and groups of individuals. To develop the idea into a proposal for a new product may require considerable time and effort. In some cases, but surely not all, individuals may be willing to undertake development activities without immediate compensation for the associated costs, looking to future gain as their reward. Further, the production of a new product typically requires funding from some source to pay for the use of factors essential to physical production. Funds for the development and production of new products can come from two basic sources. First, firms that have retained earnings from prior operations may invest them in the innovative project. Second, funding may be obtained from diverse sources other than retained earnings, among them venture capital firms, banks, and wealthy individuals. Each of these sources may present obstacles to the financing of innovative products.

If corporate managers systematically prefer to invest their company's retained earnings in projects generated internally, and if many innovative products do not originate with employees of firms with extensive retained earnings, some worthy projects may not find funding or sufficient funding. Indeed, the projects that managers choose to finance with "captive" funds may be systematically less innovative than the unfunded orphans, and in some instances may even promise less return than the funds would earn on average if distributed to the firm's shareholders as dividends and reinvested elsewhere by them. But greater dividend payments ought not to be assumed to be a panacea for the consequences of overretention: At present United States taxpayers have a demonstrated proclivity for consuming rather than saving and investing monies that come into their hands,<sup>3</sup> and it is not obvious why increased dividends would necessarily evoke a higher sav-

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3. See Summers & Carroll, *Why Is the U.S. National Savings So Low?*, in 2 BROOKINGS PAPERS ON ECONOMIC ACTIVITY 607 (1987). Total capital formation in the United States is more comparable to the totals for other developed countries if the relevant measure is aggregate national savings rather than household savings. See Sheppard, *Is the U.S. a Spendthrift Nation?*, 36 TAX NOTES 939 (1987). But such measures include spending on items that would not directly aid the funding of innovative products, such as educational services and all consumer durables.

ings rate.<sup>4</sup>

Originators of innovative projects may, of course, turn to sources of funding other than established firms' retained earnings. Obstacles to success on this front are more diverse, and, for our present purposes, need be sketched only briefly. First, many factors determine whether venture capital firms and investment and commercial banks have funds available for investment. In recent years the pool of funds available for investment in the United States has expanded and contracted sharply as capital from foreign sources pushes into and then retreats from the seductive promises and perils of the United States economy. Various economic circumstances and social policies affect the amounts available for new investment by pooled investment vehicles, like pension funds, life insurance companies, and mutual funds. Second, the types of investment possibilities that attract funding, and their relative attractiveness to different sources of funds, vary considerably, often within a short period of time. Biotechnology start-ups, junk bonds, Brazilian debt, and triple A-rated municipal securities have all in recent years enjoyed and fallen out of favor with investors. And proponents of an innovative project may be unable to attract investment capital that is willing to forgo a current return for a long enough time to sustain the necessary period of cash drain associated with many new ventures.<sup>5</sup>

Regrettably, Professor Merritt B. Fox's *Finance and Industrial Performance* does not significantly advance our understanding of the role played by corporate finance in the nurture or demise of technological innovation. The bulk of the book is an apparently diligent review of critiques of the neoclassical theory of finance, in aid of the author's thesis that the present finance process in the United States is systemat-

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4. Empirical work by public finance economists suggests that the flow of capital income into individuals' hands has an effect on consumption and savings behavior. See Sandmo, *The Effects of Taxation on Savings and Risk Taking*, in 1 HANDBOOK OF PUBLIC ECONOMICS 265, 283 (A. Auerbach & M. Feldstein eds. 1985). A related issue in this literature is whether the value of corporate assets is reflected in individual wealth, and thus whether the retention or distribution of corporate earnings affects personal consumption behavior. If consumers always "see through the corporate veil," the flow of capital income to them should have no effect on personal savings. Empirical results give qualified support to the view that consumers adjust personal savings to offset changes in corporate saving. *Id.* But see Poterba, *Tax Policy and Corporate Saving*, in 2 BROOKINGS PAPERS ON ECONOMIC ACTIVITY 455, 502-03 (1987) (recent study estimating that effects of Tax Reform Act of 1986, by lowering corporate saving, will lower private saving as well).

5. Current financing practices in the biotechnology industry are a good illustration. Some United States companies at present are willing to license their breakthrough technology to large Japanese companies despite the risk that these licensees are potential competitors. A biotechnology company incurs heavy start-up costs and may easily fail, while any commercial success will be long delayed. These factors make traditional "venture capital" difficult to attract. Financing such companies through public offerings of their stock, always a high-risk undertaking, became even more difficult after the stock market crash depressed the price of biotechnology shares. In contrast, Japanese companies are perceived to be a relatively patient source of venture capital. See Wysocki, *Japanese Now Target Another Field the U.S. Leads: Biotechnology*, Wall St. J., Dec. 17, 1987, at 1, col. 6.

ically deficient in its ability to ascertain and fund innovative projects that are deserving of support. The book's empirical data consists of a study of financing practices in the United States semiconductor industry, ending in 1974. But the book omits any treatment of several factors crucial to achieving its ambitious goal. *Finance and Industrial Performance* concludes with a set of proposed policy prescriptions which cannot fairly be supported by the preceding discussion, due to the scope of omissions in it. These policy proposals include a proscription on retention of earnings by corporate managers, integration of individual income taxes with corporate taxes, and application of the liabilities now confined to prospectuses and registration statements to all periodic disclosure mandated by the federal securities laws.<sup>6</sup>

For starters, nowhere in its 455 pages does *Finance and Industrial Performance* acknowledge that the economy of the United States is not, if it ever was, an isolated and self-contained system. The book thus omits any discussion of international capital flows into and out of this country as well as any treatment of competition in markets for goods and services between United States firms and foreign firms. This remarkable provincialism undercuts the book's usefulness not only in some large and obvious ways, but in some smaller and more technical respects as well. For example, the role that may be played by financial intermediaries (like investment banks) is described as limited to two functions, speculation in existing investments and providing funds for new investment opportunities offered by new and existing firms. The latter function is characterized as "indispensable . . . since firms almost never receive new funds from savers directly" (p. 151). Firms may, of course, raise funds "directly" from savers by selling securities to the investing public, a process in which investment banks play an underwriting role. Surely it is relevant that in other countries the public offering process is less burdensome for issuers than in the United States. Indeed, in Great Britain, public companies often succeed in raising large amounts of additional investment from their present shareholders through "rights" offerings. As it happens, in recent years underwritten rights issues have been the prevailing method through which British companies raised funds in the capital markets

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6. A key aspect of this last proposal is requiring an investment banker to serve as a "disclosure guarantor" even though the company is not undertaking a public offering, so as to enhance the incentives to disclose more rather than less information in periodic disclosure filings. Pp. 365-67. Although *Finance and Industrial Performance* proposes that the issuer be prohibited or severely restricted in its ability to indemnify the investment banker against liabilities or to purchase insurance on behalf of the bank, it does not consider the fee the investment banker is likely to charge for serving as a "disclosure guarantor." This fee is likely to be set to enhance the banker's ability to self-insure against the legal risks of serving in that capacity. One would want to consider whether, by increasing the costs of remaining a public company subject to the SEC's periodic disclosure requirements, the proposal might enhance the incentives for going private, either through a buyout transaction or some other strategy to exit from this web of regulation.

to finance acquisitions of foreign companies.<sup>7</sup>

Another key omission is the savings rate issue I mentioned above. Clearly a proponent of change in permissible earnings retention of the sort advocated in *Finance and Industrial Performance* needs to present and defend some hypothesis about the likely extent to which enhanced dividend distributions will be saved rather than consumed by their recipients. Indeed, an assumption that enhanced dividend payouts will be saved at the same rate or no lesser a rate than present payouts may be problematic. A large proportion of total financial assets in the United States are held by persons retired from the work force, who may spend more, not less, if their incomes are higher.<sup>8</sup> Empirical studies of the impact of tax changes on the rate of savings reach results that one scholar recently characterized as "inconclusive," illustrating the need for caution in assuming that income-enhancing changes will

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7. See Heleniak & Spera, *Role of British Purchasers In Corporate Acquisitions*, N.Y. L.J., Oct. 7, 1987, at 31, col. 3. The reasons why British acquirors, but not their United States counterparts, can raise funds in the public equity markets to finance a proposed acquisition are of interest. In the United States, if a proposed acquisition will have a significantly material impact on the acquiring company, and the acquiring company proposes to finance the acquisition through a public offering of securities, the SEC's Regulation S-X requires that the offeror's registration statement contain pro forma financial statements restating its prior financial results to show how the proposed acquisition might have affected them. The purpose of this requirement is to provide investors with information about the continuing impact of the proposed acquisition. Preparation of pro forma financial statements is time-consuming and generally impossible without access to the financial records of the acquisition's target. Thus, if the acquisition transaction is time-sensitive (as it likely would be if a hostile tender offer is involved), the offeror is disabled from resorting to the public markets for financing. As a result, acquiring companies in the United States tend to finance acquisitions through retained earnings or funds borrowed from a financial intermediary. If the proposed acquisition occurs, however, the indebtedness incurred to finance it may be retired through a public offering of securities.

In contrast, a successful rights offering enables a British offeror to finance its acquisition initially through the public offering proceeds. Rights offerings in Britain are underwritten by investment banks. In such an offering, the issuer's existing shareholders are offered new shares on a pro rata basis; indeed under the Companies Act, subject to exceptions, a company's present shareholders have a preemptive right to purchase prorated portions of any new issuance of shares. See Companies Act, 1985, § 89. In general, large rights issues require the approval of the company's existing shareholders. Although shareholders tend to vote to approve rights offerings, they may not subscribe the offer fully. For example, the recent rights offering by WPP to finance its offer for JWT Group (a United States advertising firm) was only 35% subscribed. See Heleniak & Spera, *supra*, at 38, col. 1. Even given the likely need to obtain shareholder approval for the rights offering, British issuers appear to be able within a twenty-day period to conduct a shareholder meeting to approve a rights issue and to gain an unconditional commitment for the offering's proceeds from an underwriter. The twenty-day period is significant for acquisitions in the United States because under the SEC's rules it is the minimum duration for a tender offer.

British securities regulation imposes disclosure obligations on issuers, but in key respects they are less onerous in this setting than the SEC's counterpart requirements. The issuer of the rights must describe the business of its acquisition target and present summary financial statements for it. These disclosure obligations generally can be satisfied with information available about the target from public sources, such as its annual reports. For a more extensive discussion of these matters, see *id.* at 38.

As this discussion illustrates, circumstances that are simply the consequences of particular regulatory regimes should not be confused with circumstances that stem from the inevitable effects of economic behavior. Comparative analysis of legal institutions and practices often alleviates such confusion.

8. See Poterba, *supra* note 4, at 497.

yield enhanced savings.<sup>9</sup> Further, consumption may be enhanced if persons perceive financial assets as increasingly risky uses for their discretionary income. Events like the October 19 collapse cause most investors to perceive differential risks among types of financial assets, and probably cause some individuals to forgo additional investment in financial assets in favor of uses for discretionary income that have immediate and tangible rewards.

The analysis in *Finance and Industrial Performance* may omit the savings rate question because it concludes that the prospective benefits of a universal payout rule greatly exceed the costs of implementing it. Studies (most a bit long in the tooth) of industries with histories of inferior investment performance suggest that gains as great as twenty percent could be achieved by moving funds out of firms within those groups (p. 388). More conservative estimates are of a several percent difference in annual rates of return on marginal projects of firms within these groups and firms outside them, while the approximate cost of moving funds through outside financial intermediaries is 0.25% to 0.45% of the amount moved (p. 389). But even if one indulged optimistic estimates about probable results within these ranges, leakage of funds through shareholder consumption is a noteworthy concern.

Additionally, the attack on overretention of earnings in *Finance and Industrial Performance* is undermined by a further key omission. In recent years, many corporate transactions other than routine dividends liberated retained earnings through distributions to shareholders.<sup>10</sup> Corporate share repurchases, management buyouts, and leveraged recapitalizations — all of which achieve this effect — in aggregate terms distributed large amounts of cash to United States shareholders in recent years. In 1985, nondividend cash payments to shareholders amounted to \$125 billion, almost fifty percent more than total dividends.<sup>11</sup> *Finance and Industrial Performance* comes closest to

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9. See Gann, *Neutral Taxation of Capital Income: An Achievable Goal?*, 48 LAW & CONTEMP. PROBS. 77, 90 (Autumn 1985).

10. Interestingly enough, a footnote in *Finance and Industrial Performance* defines "dividend" broadly, as including "all methods by which a corporation transfers money from its treasury to shareholders." P. 339 n.\*. But the significance and recent magnitude of nondividend distributions are not considered.

11. See J. SHOVEN, NEW DEVELOPMENTS IN CORPORATE FINANCE AND TAX AVOIDANCE: SOME EVIDENCE 11 (National Bureau of Economic Research Working Paper No. 2091, 1986). Shoven's study suggests that firms did not generate the cash to fund these transactions by reducing dividends. *Id.* at 25. Rather, internal cash generated in the corporate sector between 1981 and 1985 increased enough to account for the equity absorbed through these transactions. *Id.* And the data, in Shoven's view, lends weak support to the hypothesis that firms incurred debt to generate the funds to absorb equity so as to achieve target leverage ratios. *Id.* at 25-27. Shoven concludes that these transactions may well have been motivated by "tax minimizing behavior." *Id.* at 33. Most of the cash received by shareholders when a company repurchases its own shares is a return of basis, which is not taxed, and accrued capital gains (represented by shares that are not repurchased) enjoy a tax deferral advantage. Further, if the firm substitutes debt for equity after a share repurchase, it achieves tax savings through the deductibility of its interest payments

addressing these transactions in its explanation of the inadequacy of the threat of hostile takeover as a check on a corporation's management (pp. 65-68). But this discussion wholly ignores the work of financial theorists, most prominently Michael Jensen, who argue that management buyouts and leveraged recapitalizations are market-generated solutions to precisely the problem of management's propensity to overretain.<sup>12</sup>

These transactions may well have consequences that are significantly different from routine dividend distributions for the availability of funds to finance innovative projects. Firms that undergo these transactions tend in the aggregate to become more highly leveraged; that is, there is a substitution of debt for equity in the firm's capital structure. Between 1980 and 1985, the percentage of the source of funds of nonfinancial corporations attributed to debt instruments grew from 23.4% to 33.9% while domestic undistributed profits, as a source of funds, dropped from 15.4% to 3.7% and net new equity issues from 3.7% to -16.9%.<sup>13</sup> Debt, especially in substantial amounts, restricts the debtor's discretion in its use of cash flows; thus it is not inconceivable that, in the aggregate, these transactions reduce firm expenditures on new projects. Closely related, of course, is the use shareholders make of the cash they receive through nondividend distributions. They may choose to save and reinvest it at a greater or lesser rate than they do routine dividends,<sup>14</sup> perhaps due in part to the differential tax treatment of ordinary income and capital gains under our income tax laws.<sup>15</sup> Indeed, despite its 1987 publication date, *Finance and Indus-*

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on the debt. *Id.* at 33-34. See generally Bryan, *Leveraged Buyouts and Tax Policy*, 65 N.C. L. REV. 1039 (1987).

Following the market collapse on October 19, more than 1400 companies announced plans to buy back shares valued at more than \$80 billion. More than 2.4 billion shares will be absorbed and removed from the market if all of these announced repurchase plans are completed. See Salwen, *Share Buy-Back Plans Proliferate*, Wall St. J., Jan. 4, 1988, at 8B, col. 4. Of course, the crash on average reduced the cost per share of repurchasing shares. For example, in September Citicorp sold \$1.2 billion in stock at \$58.25 per share. On October 20, with the stock's market price at \$37.50, Citicorp announced its willingness to buy back up to five million shares. *Id.*

12. See Jensen, *Agency Costs of Free Cash Flow, Corporate Finance and Takeovers*, in *Papers and Proceedings of the Ninety-Eighth Annual Meeting of the American Economic Association, December 28-30, 1985*, 76 AM. ECON. REV., May 1986, at 323; Lehn & Poulsen, *Sources of Value in Leveraged Buyouts* (Feb. 8, 1987) (unpublished manuscript) (copy on file with the *Michigan Law Review*).

13. J. PECHMAN, *FEDERAL TAX POLICY 387* (5th ed. 1987) (Table D-19. "Sources and Uses of Funds, Nonfarm, Nonfinancial Corporate Business, 1960, 1970, 1980, and 1985").

14. See Summers & Carroll, *supra* note 3, at 621-23. Shoven's study, *supra* note 11, at 23-25, concludes that these payments supplemented rather than replaced dividend payments. Summers and Carroll characterize household use of this "extra cash" as an open question, but report their suspicion that substantial consumption funded by these payments has occurred recently, perhaps at a significant enough rate to cause the personal and private savings rates to fall between one and two percentage points. See Summers & Carroll, *supra* note 3, at 623.

15. Tax economists disagree as to the likely impact of changes in the rate at which capital gains income is taxed. See Gravelle, *Will Reducing Capital Gains Taxes Raise Revenues?*, 36 TAX NOTES 419 (1987). It is nonetheless a plausible assumption that taxes, including those on

*trial Performance* fails to note that the changes in relative individual and corporate income tax rates wrought by the 1986 tax reform legislation eliminate any tax-driven incentive to incorporate or, for that matter, to retain earnings.<sup>16</sup>

Most regrettably, the book's study of the semiconductor industry ends in 1974. The next thirteen years were eventful ones for this industry, and I suspect that useful work could be done in examining the relationship between these events and the availability of finance to the industry, in particular to its most innovative segments. Yet even if history between 1974 and 1987 repeated history through 1974, it is far from obvious why we would only be interested in knowing the story up to 1974.

In any event, to premise significant policy changes on a study of one industry raises a number of questions, none of which is addressed by this book. Is the industry typical in a relevant sense? Or if not typical, is it important for other reasons? Cross-sectional and aggregate data would also surely be helpful in assessing the need for policy change. Do firms in industries characterized by a relatively high level of product innovation have similar capital structures that differentiate them from participants in other industries? And surely one would not confine the study, however formulated, to data ending in 1974. This point is illustrated by the semiconductor industry itself.

In its first twenty-five years, the United States semiconductor industry grew at a spectacular rate. Semiconductors are manufactured devices that modify electrical signals, and the industry grew with the invention of ever-more complex devices that integrated multiple electronic functions into single semiconductor devices. Sales increased from \$90 million in 1956 to \$1.8 billion in 1973, and between 1957 and 1972, the number of semiconductor units sold increased thirty-five-fold. Throughout this era, the industry had "distinct organizational characteristics" (p. 254). It was relatively concentrated, but industry domination by major tube manufacturers declined progressively. New successful firms continued to enter the industry, and firms' relative rankings fluctuated. These characteristics stemmed from the rapid rate of technological change in the industry and its relatively low entry

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capital gains, affect international flows of capital. See Gordon, *Taxation of Investment and Savings in a World Economy*, 76 AM. ECON. REV. 1086 (1986).

16. Under the Tax Reform Act, in 1988 the top corporate rate (34%) will be higher than the top individual rate (28%). These rate differentials should stimulate distributions to shareholders to the extent corporations choose between retention and distribution so as to minimize taxes and maximize their shareholders' wealth. If a corporation retains earnings, it would continue to pay tax at the higher corporate rate on the earnings' yield. The continuing corporate tax on yield would exceed the tax cost of the immediate tax (at individual rates) paid by shareholders when they receive a dividend. One recent study estimated that the changes in personal and corporate taxation resulting from the 1986 Reform Act might depress corporate saving by more than one percent of net national product by 1989, a change that would only partly be offset by changes in private savings. See Poterba, *supra* note 4, at 503.

barriers.<sup>17</sup> Although large established firms were responsible for most of the industry's technological advances, newer firms "seem[ed] more willing to try a new technology" and gradually came to dominate the market (p. 257).

Survival in the semiconductor industry during this era depended on firms' ability to implement innovations quickly. During the subsequent life of the innovative product, the firms that initially produced it dominated the market. Firms tended to view their retained earnings as a source of cheap finance and thus a firm's profit position, derived from prior successes, enhanced the likelihood that it would invest in a new innovation.

The types of new products in which firms invested differed, however, depending on the firm's nature. Diversified electronics manufacturers tended to invest in innovations with internal end uses as components in other more complex products manufactured by the firm, lending a conservative bias to the pattern of their investments. Smaller firms, in contrast, funded more innovative products. Despite these divergent patterns, the study in *Finance and Industrial Performance* does not demonstrate that managers in the larger diversified firms invested in projects that were such suboptimal uses of retained earnings that their projected rate of return was less than the firm's cost of capital. There may be, as the book observes, "good theoretical and empirical reasons to believe that some firms are investing in projects inferior in predicted return to some projects that go unfunded" (p. 338). But the semiconductor study does not support a conclusion that firms in that industry used retained earnings to fund projects with a lower projected return than alternative investments available on average to firm shareholders for reinvestment of funds distributed to them as dividends. That some worthy projects go unfunded does not, of course, establish that on average shareholders' reinvested dividends would find their way to ventures promising higher returns than the projects actually funded.

Another striking characteristic of the semiconductor industry is the mobility of engineers, designers, and managers, in many instances from established firms to "spinoff" ventures. *Finance and Industrial Performance* characterizes the spinoff phenomenon as a symptom of inadequacy in the industry's financing practices: "A spin-off represents a failure on the part of the internal finance process of the spawning firm," because its managers failed to recognize the value of the

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17. P. 257. Indeed, given these organizational traits, one might well wonder how typical the semiconductor industry is. Do other industries that appear to generate a large number of innovative products — biotechnology, financial services, consumer electronics, advanced weaponry — share similar organizational characteristics? But perhaps the semiconductor industry, even if not typical, is highly significant for other reasons. Its product innovations may enable the downstream development of innovative products in industries that use semiconductors as components. *Finance and Industrial Performance* neither asks nor answers these questions.

project proponents' proposal, which ultimately received funding through an outside source (p. 310). Events subsequent to 1974, however, suggest that this description is insensitive to the culture of the industry itself and not especially helpful in explaining the industry's later evolution.

After 1974, many product lines within the semiconductor industry came to be substantially dominated by Japanese producers. The industry worldwide scrambled to develop lowest-cost production processes, and sales and profitability within the industry became notoriously cyclical.<sup>18</sup> At present in the United States, however, the fastest-growing market segment is "niche" products, that is, the design and production of application-specific semiconductors. This phase in the United States industry's development has been supported by a veritable "flood" of venture capital.<sup>19</sup> Of significant support also is the mobility of semiconductor designers, programmers, and marketers, who readily join start-up ventures.<sup>20</sup> The industry seems populated with restless individuals who value highly the opportunity to join a company designed to showcase their abilities. Indeed one prominent venture capitalist, Arthur Rock, who invested in several preeminent semiconductor firms, wrote recently that "[t]he biggest problem in starting high-tech businesses is the shortage of superior managers. There is too much money chasing too few good managers."<sup>21</sup>

In any event, recent experience suggests that the survival of the United States semiconductor industry turns on its present ability to develop niche products suited to an increasingly fragmented market so as to flourish in the highly design-intensive albeit low volume end of the business.<sup>22</sup> If so, existing firms' generation of spinoff firms signifies not "failure" but a crucial mode of organizational adaptation. Also small semiconductor firms increasingly ally themselves with very large diversified corporations, exchanging, for equity capital and easier access to bank financing, access to cutting-edge technology and preferential supply of product in tight supply markets.<sup>23</sup> And over eighty percent of semiconductor assembly by United States firms now takes

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18. See Kotkin, *The Third Wave, INC.*, Feb. 1984, at 57.

19. *Id.* at 62.

20. See *id.* at 66 (reporting industry accusations that venture capitalists play the role of Darth Vader, "luring innocent young engineers and managers to the 'dark side' of entrepreneurial capitalism").

21. Rock, *Strategy vs. Tactics from a Venture Capitalist*, HARV. BUS. REV., Nov.-Dec. 1987, at 63, 66. As it happens, officials of Arthur Rock & Co. were interviewed by the author of *Finance and Industrial Performance* in 1974. P. 245 n. 1. See also M. Fox, *The Role of Finance in Industrial Organization: A General Theory and the Case of the Semiconductor Industry* 187 n.1 (Ph.D. Diss., Yale Univ. 1980).

22. See Arnold, *Customizing a Market Can Put You in the Chips*, ELEC. BUS., Mar. 1984, at 102; Kotkin, *supra* note 18.

23. See Kotkin, *The Age of Alliances, INC.*, Feb. 1984, at 68.

place offshore.<sup>24</sup> A study of the significance of finance to the United States industry's various modes of adaptation to changes in technology, labor costs, and product markets would be of value, but regrettably *Finance and Industrial Performance* does not undertake it.

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24. See Davis & Hatano, *The American Semiconductor Industry and the Ascendancy of East Asia*, 27 CAL. MGMT. REV. 128, 129 (Summer 1985).