GLOBAL INVESTMENT STRATEGY

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Thematic Investing

Transformers

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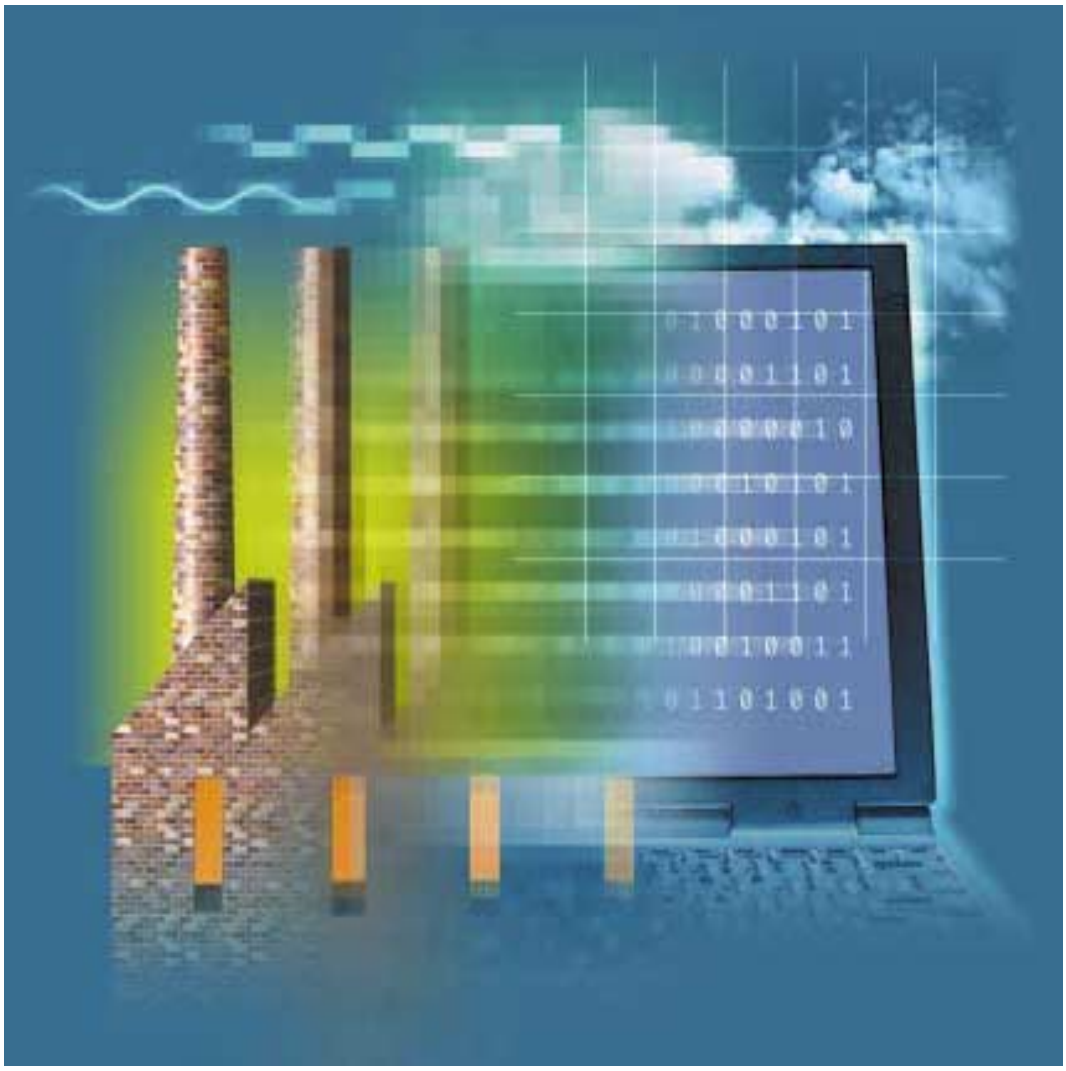
Changing Business Structures for the "Flex Economy" of the Information Age



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Transformers

Changing Business Structures for the "Flex Economy" of the Information Age

- Three potent forces are creating a flexible economy:
  - *Technology*. Thanks to Net, business processes are being reconfigured: (i) Disintermediation of middlemen; (ii) Creation of auction framework; (iii) More transparent and efficient markets; (iv) Reduced brand loyalty; (v) Outsourcing.
  - *Deregulation.* Three industry sectors comprising a third of S&P 500 earnings—finance, telecom, utilities—are in throes of deregulation.
  - *Globalization.* A more capitalistic, flexible economy outside United States.
- In the "flex economy" prices are transparent, competition is intense, and margins are under unrelenting pressure.
- To survive in this environment, *transformers* are moving from bureaucratic, vertically integrated organizations to flexible firms where decisions are driven by market forces.
- Seven key transformations:
  - Building *global* oligopolies.
  - Investing in technology through two-pronged R&D economy. Firms spend heavily on in-house R&D and/or acquisitions of smaller high-tech firms.
  - Continuous investment in advertising.
  - Outsourcing non-core operations—"virtual" support and manufacturing.
  - Coping effectively with the skills shortage.
  - Converting goods into services with recurring revenues, higher margins.
  - Benefiting from disintermediation of middlemen.
- *Transformed* are the victims of change in Information Age—usually because they are trapped by traditional legacy businesses that they refuse to cannibalize.
- "Structure," as much as macro factors (industry, sector, etc.), will determine success in the "flex economy."

Table 1: "Transformers"

Page	Company	Symbol	Rating	11/9/00 Price	Theme
20	AES Corp[2,47]	AES	Strong Buy	$62.44	Global oligopoly
21	Amer Int'l Group	AIG	Buy	100.50	Global oligopoly
21	America Online	AOL	Strong Buy	52.68	Global oligopoly/Investment in advertising
21	American Express[2]	AXP	Buy	58.25	Global oligopoly/Outsourcing
25	Amgen[1]	AMGN	Strong Buy	62.75	Two-pronged R&D economy
29	Auto. Data Processing	AUD	Buy	65.00	Outsourcing
31	Baker Hughes	BHI	Strong Buy	37.13	Outsourcing
31	Bank of New York[2]	BK	Buy	58.06	Outsourcing
30	CH Robinson Worldwide	CHRW	Buy	54.88	Outsourcing
32	Celestica	CLS	Strong Buy	55.50	Outsourcing
26	Chase Manhattan[2]	CMB	Buy	44.13	Two-pronged R&D economy
22	Check Point Software[1]	CHKP	Strong Buy	155.50	Global oligopoly
30	Cigna Corp	CI	Strong Buy	123.20	Outsourcing
22	Cisco Systems[1]	CSCO	Buy	53.25	Global oligopoly/Two-pronged R&D economy
21	Citigroup[2]	C	Strong Buy	52.69	Global oligopoly/Two-pronged R&D economy
27	Clear Channel Comm[2]	CCU	Strong Buy	53.25	Investment in advertising
39	Coach	COH	Not Rated	23.93	Benefiting from disintermediation
24	Corning	GLW	Buy	64.00	Two-pronged R&D economy
21	Costco[1]	COST	Hold	34.06	Global oligopoly
37	Dell Computer[1]	DELL	Strong Buy	28.38	Goods into services
38	Delta Air Lines[2]	DAL	Strong Buy	47.06	Benefiting from disintermediation
36	Duke Energy[2,58]	DUK	Strong Buy	86.50	Goods into services
30	Dynegy[2]	DYN	Buy	48.75	Outsourcing
33	Electronic Data Systems	EDS	Not Rated	52.25	Outsourcing
36	El Paso Energy	EPG	Strong Buy	60.69	Goods into services
20	Enron[2]	ENE	Strong Buy	82.94	Global oligopoly/Outsourcing
33	Exodus Communications[1]	EXDS	Buy	30.19	Outsourcing/Goods into services
29	FedEx Corp	FDX	Hold	46.20	Outsourcing
32	Flextronics Int'l	FLEX	Strong Buy	28.88	Outsourcing
37	Gateway	GTW	Strong Buy	46.20	Goods into services
21	General Electric[2]	GE	Not Rated	54.56	Global oligopoly/Goods into services
39	Gucci Group	GUC	Hold	100.87	Benefiting from disintermediation
32	HCA—Healthcare Co	HCA	Buy	40.81	Outsourcing
38	Hartford Financial	HIG	Strong Buy	74.00	Benefiting from disintermediation
35	Heidrick & Struggles Int'l	HSII	Strong Buy	55.38	Skills shortage/Outsourcing
33	Hewlett-Packard	HWP	Buy	42.94	Outsourcing
35	HotJobs.com[1]	HOTJ	Strong Buy	14.38	Skills shortage/Outsourcing
37	IBM[2]	IBM	Strong Buy	99.44	Outsourcing/Goods into services
22	Intel[1]	INTC	Buy	41.38	Global oligopoly/Two-pronged R&D economy
28	Interpublic Group of Cos	IPG	Not Rated	39.25	Investment in advertising
32	Jabil Circuit	JBL	Strong Buy	$44.94	Outsourcing
24	JDS Uniphase[1]	JDSU	Buy	73.75	Two-pronged R&D economy
19	Johnson & Johnson	JNJ	Strong Buy	93.56	Global oligopoly
22	Juniper Networks	JNPR	Buy	179.63	Global oligopoly

Note: The inclusion of stocks that are Not Rated or rated Hold by UBS Warburg LLC should not be construed as a recommendation for purchase. Rather, their inclusion is simply to illustrate the type of company that could benefit from the trends described in this report. Footnotes are on page 41.

Page	Company	Symbol	Rating	11/9/00 Price	Theme
26	KLA-Tencor[1,2]	KLAC	Hold	28.50	Two-pronged R&D economy
29	Kimberly-Clark	KMB	Strong Buy	66.13	Outsourcing
35	Korn Ferry Int'l[2]	KFY	Strong Buy	36.63	Skills shortage/Outsourcing
25	Lucent Technologies	LU	Hold	23.31	Two-pronged R&D economy
36	Medtronic[2]	MDT	Strong Buy	56.06	Goods into services
19	Merck	MRK	Buy	90.44	Global oligopoly
21	Merrill Lynch[2]	MER	Buy	67.50	Global oligopoly/Two-pronged R&D economy
22	Microsoft[1]	MSFT	Strong Buy	70.88	Global oligopoly/Two-pronged R&D economy
21	Morgan Stanley DW[2]	MWD	Buy	70.81	Global oligopoly/Two-pronged R&D economy
25	Motorola[2]	MOT	Buy	22.94	Two-pronged R&D economy
21	News Corp	NWS	Strong Buy	38.00	Global oligopoly
24	Nortel Networks	NT	Buy	39.81	Two-pronged R&D economy
28	Omnicom Group	OMC	Not Rated	80.44	Investment in advertising
22	Oracle	ORCL	Buy	26.87	Global oligopoly/Two-pronged R&D economy
29	Paychex[1]	PAYX	Buy	55.13	Outsourcing
25	Pfizer	PFE	Buy	44.63	Global oligopoly/Two-pronged R&D economy
25	Pharmacia	PHA	Buy	59.25	Two-pronged R&D economy
39	Polo Ralph Lauren	RL	Not Rated	22.18	Benefiting from disintermediation
33	Qwest Comm Int'l	Q	Buy	44.19	Outsourcing
36	Reliant Energy[56]	REI	Buy	40.00	Goods into services
30	Ryder System	R	Buy	18.81	Outsourcing
32	Sanmina	SANM	Strong Buy	93.44	Outsourcing
25	Schering-Plough	SGP	Strong Buy	51.88	Two-pronged R&D economy
31	Schlumberger	SLB	Buy	78.88	Outsourcing
33	Scient[1]	SCNT	Hold	14.63	Outsourcing
22	Siebel Systems	SEBL	Buy	103.69	Global oligopoly
36	Southern Co[2]	SO	Strong Buy	28.69	Goods into services
38	Starwood Hotels & Resorts	HOT	Strong Buy	31.81	Benefiting from disintermediation
31	State Street	STT	Buy	133.86	Outsourcing
39	Tiffany	TIF	Buy	38.63	Benefiting from disintermediation
21	Time Warner[2]	TWX	Strong Buy	78.84	Global oligopoly
35	TMP Worldwide[1,2]	TMPW	Strong Buy	70.31	Skills shortage/Outsourcing
36	TXU Corp[2]	TXU	Strong Buy	37.88	Goods into services
30	UnitedHealth Group	UNH	Strong Buy	113.63	Outsourcing
29	United Parcel Service	UPS	Strong Buy	58.63	Outsourcing
21	United Technologies	UTX	Buy	67.94	Global oligopoly/Goods into services
21	Viacom	VIA	Strong Buy	53.38	Global oligopoly/Investment in advertising
21	Wal-Mart Stores	WMT	Hold	47.13	Global oligopoly
27	Walt Disney	DIS	Strong Buy	31.12	Investment in advertising
26	Williams Communications	WCG	Not Rated	17.43	Two-pronged R&D economy
33	WorldCom[1]	WCOM	Strong Buy	16.13	Outsourcing
28	WPP Group	WPPGY	Buy	59.50	Investment in advertising
28	Yahoo[1]	YHOO	Strong Buy	58.81	Investment in advertising

The Perils of Perfection

Today the U.S. economy is just about perfect and, for large corporations, that is the problem:

- Low inflation means lack of pricing power.
- Low unemployment means rising wages and a pervasive skills shortage.
- Declining trade barriers and a strong dollar mean intense global competition.
- Deregulation and the Internet are destroying protected market niches.
- The Internet threatens the corporate "crown jewels"—intellectual property.
- Record-high profit margins mean that the easy cost-cutting and restructuring have been done.
- Strong profits and a healthy venture capital/IPO market have created a capital glut that is funding new competition.
- Peace, prosperity and a budget surplus leave bored bureaucrats with plenty of time to launch antitrust initiatives.

Exhibit 1: The Perils of Perfection

Perfection	Peril
Low inflation	No pricing power
Low unemployment	Skills shortage
Falling trade barriers	Global competition
Deregulation	Open markets
Internet	Copyright threats
Record margins	Restructuring over
Strong profits	Capital glut
Budget surplus	Antitrust

Transformers: Creating the "Flex Economy"

Transformers are flexible firms where decisions and behavior are closely tied to market forces.

How are companies coping with these perils of perfection? The good ones are *transforming themselves* from bureaucratic, vertically integrated organizations to more flexible firms where decisions and behavior are closely tied to market forces. In the process, these firms are creating a highly productive, flexible economy that runs at "Internet speed." For corporate America, this transformation carries huge rewards but also high risks, because companies that do not lead the process are likely to be trampled.

An overarching trait of the new "flex economy" is *the pervasive influence of the stock market*. Once mainly the concern of Wall Street professionals and top executives, the performance of a company's stock is now broadcast far and wide on CNBC, CNNfn, Bloomberg and the Internet, and has a major impact on corporate performance. A depressed stock price harms employee morale, reduces a company's stature, makes it harder to recruit and retain workers, and renders acquisitions more difficult and expensive.

Elements of the shift toward the "flex economy" include the transition from:

- Vertically integrated companies to spinning off *non-core* divisions (e.g., Ford's and GM's parts divisions, Lucent's chip business, Hewlett-Packard's instrument business).
- Horizontally integrated firms to outsourcing *non-core* functions such as data processing, human resources, energy management (i.e., "virtual" support and manufacturing).
- Huge corporate R&D departments to buying technology via M&A.
- Lifetime employment to job-hopping.
- Cash compensation to paying employees with shares and options.
- Regulated to deregulated electricity markets.
- Commercial bank loans to junk bonds.
- FDIC-insured bank accounts to stocks and mutual funds.

Note that at the same time that companies are spinning off *non-core* divisions and outsourcing *non-core* functions, many firms are also looking to offer their customers "one-stop shopping." *These two trends are not inconsistent*. For example, a large financial conglomerate's core competency may lie in offering its customers a full array of financial products (ranging from checking accounts to stock trading), but that conglomerate may well look to outsource non-core functions such as payroll processing and information management.

Exhibit 2: The Transformation to the "Flex Economy"

Transformation From	Transformation To
Vertical integration	Spin-offs
Horizontal integration	Outsourcing
In-house R&D	Buy technology
Lifetime employment	Job-hopping
Cash compensation	Shares & options
Fixed prices	Web auctions
Regulated markets	Deregulation

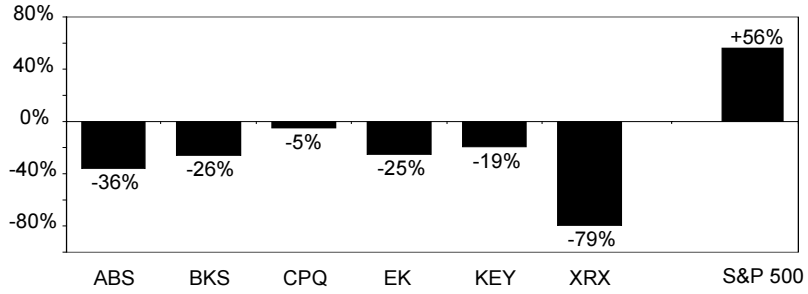
The Transformed: Burdened by Lethal Legacies

The "transformed" are either unable to respond to transformations taking place, or else they respond too slowly.

While the rising tide of the new economy will raise some boats, it will swamp others. The shift to the "flex economy" will occur as aggressive companies use technology to "transform" individual markets to their own advantage—and to the detriment of competitors. The losers in this process, whose stock performance tends to be dismal (Chart 1), are the "transformed"—those companies that do not effectively and promptly respond to transformations in their market.

Chart 1: Stock Price Performance of Six "Transformed" Companies

Three-year performance through 10/31/00



Source: UBS Warburg LLC.

Examples of the "transformed":

- Albertson's has been hurt by Wal-Mart's expansion into groceries.
- Barnes and Noble's franchise was compromised by Amazon.com.
- Compaq was thwarted by Dell's direct-to-consumer model.
- Kodak's film business has been challenged by digital photography.
- Traditional regional banks, such as KeyCorp, have seen their franchises hurt by the commoditization of the commercial loan market.
- Xerox's copiers are being supplanted by printers; information is stored as bits and bytes, and printed if and when needed.

While the stocks of these "transformed" companies have been weak and may look cheap, "bottom fishing" is risky because their business models are seriously (maybe fatally) flawed. Consequently, many of these companies have become "serial disappointers"—Xerox's preannouncement of poor third quarter earnings was its fourth earnings disappointment in the last five quarters. Kodak's shares have been virtually flat for two decades.

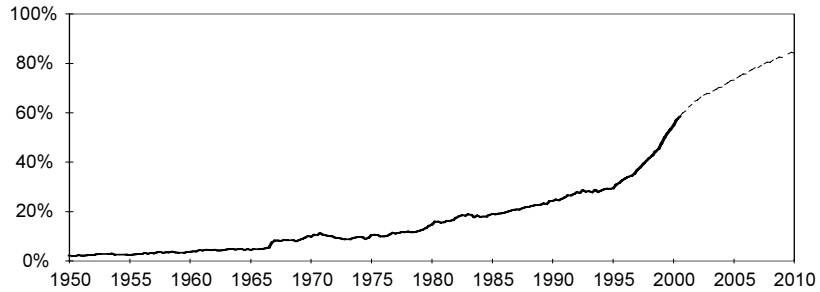
These and other transformed firms are perpetual turnaround candidates. A major reason why they fail to respond successfully to change is their "lethal legacies." When a firm's technology, sales channels, brand ID, core management competency and financial model are geared toward a traditional approach with a history of success, it is extraordinarily difficult to change course, which requires offending distributors, customers, employees and (in the short term, at least) shareholders.

Three Elements of the "Flex Economy"

1. Technology—The Internet Ushers in the Information Age

The last 20 years was *not* the Information Age but, rather, the Automation Age. The Automation Age merely sped up traditional ways of doing business; the Information Age *is radically changing the way business is conducted*. Heavy investment in information processing in recent years has accelerated the shift to the Information Age (Chart 2).

Chart 2: Information Processing
As a percentage of total real equipment investment



Source: Bureau of Economic Analysis, DRI estimates.

The Information Age is radically changing the way business is conducted.

Thanks to the Internet, business processes are being reconfigured in five ways:

- *The disintermediation of middlemen.* The Net offers all sorts of disintermediation opportunities in many industries, as consumers buy directly from producers. Travel agents are disintermediated by online booking services such as Travelocity. Music stores are disintermediated by Web sites such as Napster and MP3.com. Auto dealers are threatened by online shopping sites.

- *The creation of an auction framework.* The Net enables buyers to buy directly from sellers, at the price set by the seller. But because it is a vast network of consumers and vendors, the Net also enables buyers to bid for the products of multiple sellers (the Priceline model), and allows sellers to review the bids of multiple buyers (the Ebay model). While the initial execution of these models has proven problematic, the underlying change in the framework is irreversible.

- *More transparent and efficient markets.* In markets, the advantage goes to the trader with more information, and the Internet makes markets more efficient by vastly expanding access to pertinent information. Car buyers can know the dealer's invoice price for a BMW 330i with leather interior and the Premium Package options. Stock quotes and financial news, once available mainly to investment professionals who subscribed to Reuters and Dow Jones, are now freely available on the Web, along with detailed stock information.

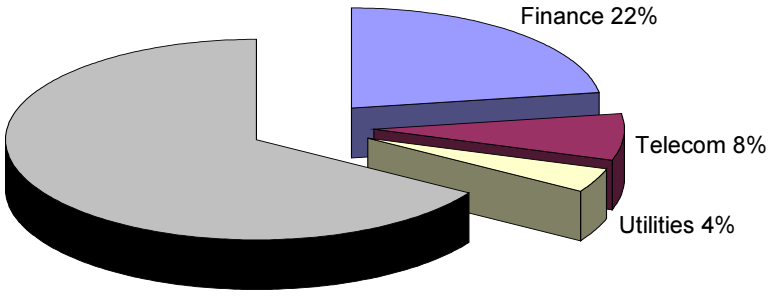
- *Reduced consumer "friction" and brand loyalty*. Consumers used to stick with a product largely because of the aggravation and high cost of switching. For example, buying life insurance was a complex process requiring discussions with a salesman, and after all that hassle, most people did not want to repeat the process by shopping for a new policy. Today, Web sites such as InsWeb.com let consumers quickly and easily compare insurance quotes from many companies.

- *The facilitation of outsourcing*. The Internet makes it much more feasible for firms to focus on their core competency and outsource non-core functions ranging from data processing to human resources to energy management.

2. Deregulation

Three major industry sectors that account for fully one-third of S&P 500 earnings (Chart 3)—finance, telecom and utilities—are in the throes of deregulation. They are being transformed from sleepy bureaucracies to dynamic industries focused on innovation, mergers, cost-cutting and share buybacks.

Chart 3: Share of S&P 500 Earnings
Of three S&P sectors

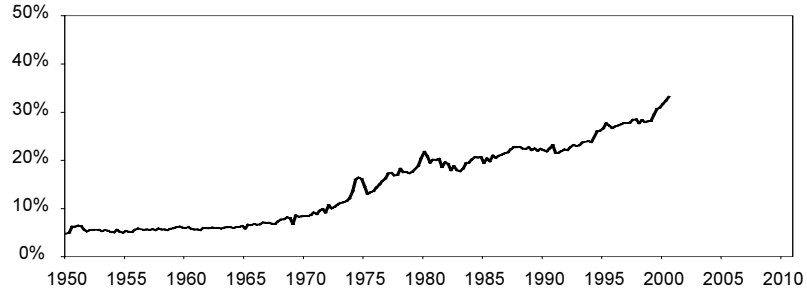


Source: S&P, StockVal, FactSet.

3. Globalization

A more capitalistic, flexible economy is emerging outside the U.S., thanks to trade liberalization (e.g., NAFTA and China/WTO), tax reform, the creation of the European Monetary Union, and widespread privatization of state-owned firms. As a result, today America faces tough competition from nearly every continent, and import penetration is at all-time highs (Chart 4).

Chart 4: Import Penetration
U.S. merchandise imports as percentage of goods production

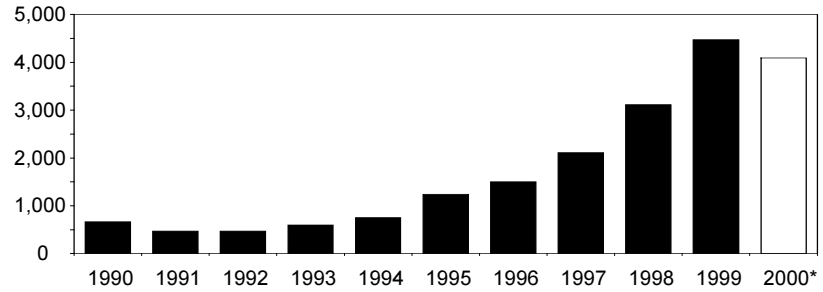


Source: Bureau of Economic Analysis.

Similarly, competition from U.S. firms is sharpening the entrepreneurial instincts of foreign firms; Wal-Mart, for example, has brought deflationary pressure to European retailing.

Another manifestation of intensified global competition is the recent sharp increase in M&A activity (Chart 5). With competition increasingly global rather than national, companies are recognizing the need to reap economies of scale on a global basis.

Chart 5: Global M&A Activity
Announced deals, in $ billions

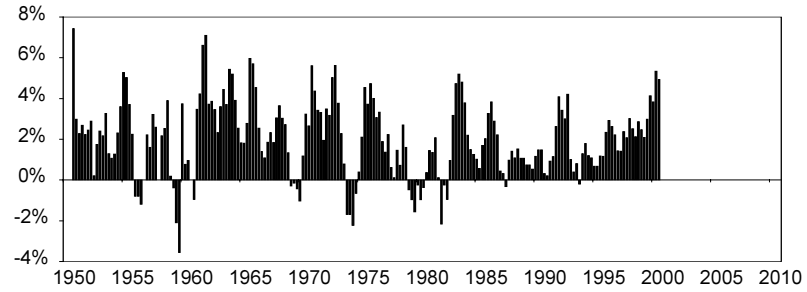


Source: Securities Data Corp. *2000 annualized data through 10/31/00.

The "Flex Economy" Is Bullish for Productivity…

For economic performance, the rise of a less bureaucratic, "flex economy" has a simple but profound implication: *productivity growth will continue to be remarkably strong* (Chart 6). Strong productivity growth will, in turn, lead to low inflation, a muted business cycle and rising living standards.

Chart 6: Productivity—Year-to-Year Percent Change
U.S. non-farm output per hour, quarterly



Source: Bureau of Labor Statistics.

Economists have been amazingly slow to recognize this acceleration of productivity growth in the Information Age. Indeed, it is fair to say that they have had a "Moynihan Moment." Back in 1990, when the Soviet economy was collapsing, Senator Daniel Patrick Moynihan noted that America's "intelligence community totally missed the pending implosion of the Soviet Union." Similarly, most economists have missed the upsurge in productivity in the late 1990s, the most momentous trend since the double-digit inflation of the 1970s (which, by the way, most economists also missed).

Back in 1987 the distinguished economist Robert Solow wryly noted that computers could be seen everywhere but in the productivity statistics. In *The Trouble with Computers*, published in 1995 by MIT Press, Thomas K. Landauer concluded, "The bottom line is pretty smudgy. Not only are the economic data equivocal on the productivity effects of computing, but most direct evaluations of their effects on work efficiency are pretty disappointing—much, much inferior to the hope and hype attached to them in the popular press and mind."

In a similar vein, Princeton economist Paul Krugman three years ago wrote an article in which he "travels ahead in time to report on the presidential election of 2000." In other words, in 1997 he was forecasting how the public would view the economy in the autumn of 2000—i.e., today. Krugman predicted that the public would view the economy with disappointment and despair, because the "new economy" hype of the mid-1990s had turned out to be a chimera and the stock market bubble of the mid-1990s collapsed.

Krugman explained that this grim scenario was entirely predictable because productivity growth was not accelerating:

> "Yet even three or four years ago it was obvious to anyone who thought about it that there were, to say the least, some major problems with the whole new economy idea. Conventional economic measures showed no sign at all of an increase in the economy's potential growth rate. . . . [economic performance in the mid-1990s] suggested that the economy's long-run sustainable growth was considerably less than 2.8%—perhaps no more than 2%. And with a growth rate of not much more than 2%, inflation of less than 3%, and long-term interest rates of more than 6%, it was hard to see how profits could possibly grow fast enough to justify the level of stock prices. The response of the new economy enthusiasts to such dismal calculations was *to insist that a dramatic acceleration of productivity growth had changed the rules. There was not a shred of statistical evidence for such an acceleration*" (italics ours).

Confronted with the phenomenal performance of the U.S. economy over the past seven years—which suggests a sustainable growth rate for the U.S. economy of 4%, versus Krugman's 2.25%—economists have begun to relent, but very grudgingly. Recently Harvard productivity expert Dale Jorgenson and New York Fed economist Kevin J. Stiroh noted, "After a twenty-year slowdown dating from the early 1970s, ALP [Average Labor Productivity] grew 2.4 percent per year during 1995-98, more than a percentage point faster than during 1990-95."

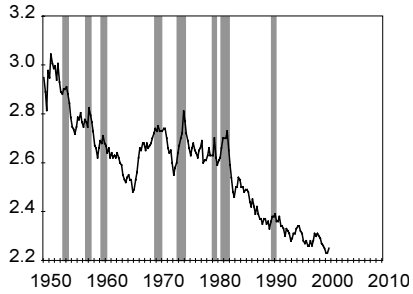
But they remain skeptical, noting that productivity gains are concentrated in the tech sector while computer-using service industries, such as finance and real estate, "have continued to lag in productivity growth." Fortunately, one economist who does believe that productivity growth is accelerating in the Information Age is Fed Chairman Alan Greenspan.

Traditional economics is poorly equipped to measure the productivity gains associated with the rise of the "flex economy" in the Information Age.

Why have economists been so slow to recognize the surge in productivity? Traditional economics is poorly equipped to measure the benefits of the phenomenon analyzed in this report—the rise of a "flex economy" in the Information Age. It is not excessively difficult to measure how many widgets per worker-hour a factory is producing. But it is a lot harder to perceive, let alone measure, all the benefits that come from using electronic networks to closely synchronize the actions of suppliers, producers and consumers. For example, how much money does a new firm save—both directly and through a faster start-up—by outsourcing all of its data-processing to another firm that operates a data center full of computers? How do statisticians measure this improvement?

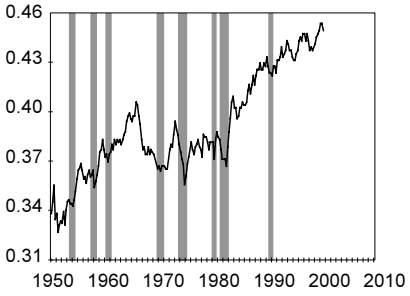
Since 1996 we have been emphasizing one measure that captures fairly precisely some of the gains created by networks—the inventories-to-sales ratio (see "A Muted Business Cycle," July 21, 1996).

Chart 7: Inventories-to-Sales Ratio
Recessions shaded



Source: Bureau of Economic Analysis.

Chart 8: Sales-to-Inventories Ratio
Recessions shaded



Source: Bureau of Economic Analysis.

As Chart 7 shows, this ratio has been plunging for many years, and it still continues to fall. This is not only increasing firms' return on investment but also reducing their inventory risk, and therefore also cutting the risks of a recession for the economy as a whole. The absence of recessions in turn boosts productivity growth, because productivity inevitably declines, or at least decelerates, in a recession—if there are fewer recessions, there are fewer periods of productivity weakness.

With the Internet transforming supply-chain management, inventory productivity has been soaring.

But what is probably the best illustration of productivity gains is the reciprocal of Chart 7—the sales-to-inventories ratio (Chart 8). This figure, which might be called "inventory productivity," shows *the amount of sales generated for a given amount of inventory*. As Chart 8 shows, inventory productivity has been soaring. After being stagnant from 1965 to 1982, it now stands almost 20% above its 1980-84 average. With the Internet transforming supply-chain management, inventory productivity is likely to keep soaring.

…and Is Also Bullish for Stock Prices

The creation of the "flex economy" of the Information Age has two key investment implications:

- *Bullish for P/E ratios.* As outlined above, inflation should stay low given an environment of strong productivity growth and intense competition. Low inflation is bullish for P/Es because the present value of future earnings is worth more in a low-inflation environment.

- Bullish for earnings growth *in the aggregate.* Overall corporate profit growth is boosted because of a "profit transformation" with three causes:

  (i) Rising productivity cuts costs, which boosts profit margins.

  (ii) With inflation in check, the Fed does not need to engineer recessions.

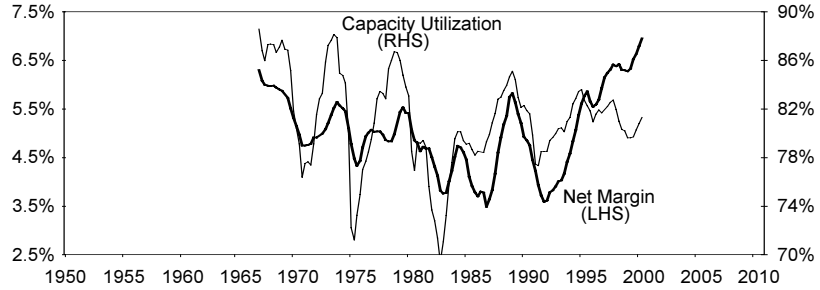
  (iii) Many companies are generating substantial amounts of free cash flow, which is being used to repurchase stock.

Profit growth is no longer pricing based.

Chart 9 shows that this profit transformation began in the mid-1990s and coincided, not surprisingly, with a dramatic advance in stock prices. From the 1960s to 1996, S&P profit margins rose and fell with capacity utilization, but this linkage disappeared in the late 1990s, with profit margins trending up even as capacity utilization drifted down. Why? *Because profit growth is no longer pricing based.*

Chart 9: Capacity Utilization and S&P Industrials Net Margin

Margin calculated using rolling four quarters operating EPS for S&P Industrials



Source: Bureau of Economic Analysis, Standard & Poor's, UBS Warburg LLC.

Historically, late in the business cycle capacity utilization would rise, corporate pricing power would increase, sales growth would accelerate, and (thanks to operating leverage) profit margins would soar—until the Fed tightened, the economy slowed, and pricing collapsed (helped along by the unwinding of an inventory cycle). Today companies cannot raise prices much and so are relentlessly cutting costs to boost or maintain profit margins. Low inflation means that economic growth remains strong because, as noted, the Fed need not engineer periodic recessions. With unit growth healthy, companies have pretty good operating leverage.

Table 2: Seven Transformations in the "Flex Economy" of the Information Age

1. Rise of Global Oligopolies

One way to defend and develop a franchise is to expand it globally, through either internal growth or acquisitions. Huge companies have significant advantages, including economies of scale, economies of scope and a global perspective. And the Internet gives giant companies an added advantage because it is infinitely scaleable. But bigger is not always better—size can be one of the reasons why companies lose focus of their core competency.

Attractive global oligopolies: Energy (**AES Corp**, **Enron**), entertainment (**America Online**, **News Corp, Time Warner**, **Viacom**); finance (**American Express, AIG, Citigroup, Merrill Lynch, Morgan Stanley Dean Witter**); multi-industry (**General Electric**, **UTX**); retailing (**Costco**, **Wal-Mart**); Technology (**Check Point Software**, **Cisco, Intel, Juniper Networks, Microsoft, Oracle, Siebel**).

2. Two-Pronged R&D Economy

Firms must invest continuously in technology, either through heavy in-house R&D, or by buying the technological expertise of smaller firms. Propelling the two-pronged R&D economy: Unprecedented amounts of venture capital, a healthy IPO market, heavy M&A by "gorillas," inflows of entrepreneurial talent into large corporations.

Four types of companies benefit from this system. (i) Big firms that are adept at acquisitions (**Cisco, Corning, JDS Uniphase, Nortel**). (ii) Dominant firms whose leadership position gives them the resources to outspend rivals on R&D (**Amgen, Intel, Lucent, Microsoft, Motorola, Oracle, Pfizer, Pharmacia, Schering-Plough**). (iii) Firms that use the venture capital model to improve the productivity of R&D dollars (**Dell, Williams Communications**). (iv) Financial intermediaries who participate in many stages of the financing process (**Chase Manhattan, Citigroup, Merrill Lynch, Morgan Stanley Dean Witter**).

3. Continuous Investment in Advertising

An expanded use of advertising helps companies differentiate their products from other established brands while defending their franchises from new entrants. Two factors, in particular, are leading to heightened competition: (i) Deregulation, (ii) Falling barriers to entry (due, in many instances, to the Internet).

A surge in ad volumes and strong advertising rates are clear positives for three types of companies. Owners of "old" media, such as TV and radio stations (**Clear Channel, Disney, General Electric, Viacom**). Owners of "new" media (**America Online, Yahoo**). Advertising agencies (**Interpublic Group, Omnicom Group, WPP Group**).

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4. Outsourcing Non-Core Operations

One way for a company to protect its core competency is to assiduously focus on it while outsourcing non-core operations—"virtual" support and manufacturing. The Internet makes it much easier to coordinate internal operations with services provided by outsiders.

Five industry sectors where outsourcing is playing an increasingly important role: corporate administration (**American Express, Automatic Data Processing, C.H. Robinson, Cigna, FedEx, Paychex, Ryder System, UnitedHealth Group, UPS**); energy (**Baker Hughes**, **Dynegy, Enron, Schlumberger**); finance (**Bank of New York, State Street**); manufacturing (**Celestica, Flextronics, Jabil Circuit, Sanmina**); technology (**EDS, Exodus, Qwest, Scient Corp, WorldCom**).

5. Coping with the Skills Shortage

To build the core franchise, firms must hire and retain talented workers, but, for many companies, recruiting workers is as challenging as attracting customers. What most companies face is *not* a labor shortage but, rather, a *skills shortage.* Causes of the skills shortage: fewer qualified workers; more selective workers. Beneficiaries of the skills shortage include human capital management firms—"skills brokers"—such as **Heidrick & Struggles, HotJobs.com**, **Korn Ferry International** and **TMP Worldwide**.

6. Coping with Commoditization—Goods into Services

In the "flex economy," businesses are constantly at risk of being commoditized. One strategy for coping with commoditization is turning goods into services. By offering services, manufacturers can generate incremental revenues that, in many cases, carry higher margins than internationally traded goods. An extra benefit of this strategy is that customers may be more loyal if they receive an integrated bundle of goods and ongoing service.

Four sectors where some firms are turning goods into services: energy (**Duke Power, El Paso Energy, Reliant Energy, Southern Company, TXU**); health care (**Medtronic**); multi-industry (**General Electric, United Technologies**); technology (**Dell, Gateway, IBM**).

7. Benefiting from Disintermediation

Sales/distribution systems are being transformed in the Information Age. Low-value-added distributors who are merely "order takers" are being "disintermediated"—i.e., destroyed—as customers use the Web to obtain product information and perform transactions. The resulting cost savings are divided between consumers and the ultimate producer.

Disintermediation is well advanced in the PC industry (**Dell's** direct sales model, **Gateway's** "Store Within a Store"). Within the retail industry, manufacturers run the risk of being disintermediated by powerful retail chains that push their own store brands: **Coach, Gucci, Polo Ralph Lauren, Tiffany**.

Transformations

This report examines a variety of transformations now underway and attempts to differentiate between *transformers* that are driving change (and which tend to be successful growth companies) and the *transformed*, who, as noted, are the victims of change in the Information Age.

An overarching theme is that, in a hypercompetitive environment, firms must *consistently focus on—and invest in—their core competency*. Even powerful firms can fall behind if they neglect to do this:

- AT&T was so preoccupied with dealmaking and with developing its cable units that service deteriorated in its all-important Business Services Division. A shortage of sales and service personnel (partly caused by excessive cost-cutting in the past) led to long delays in servicing valuable corporate customers, who took their business elsewhere.

- In the mid-1990s PepsiCo spent so much time trying to fix its restaurant chains and to battle Coke in foreign markets that it did not maximize the performance of its two best businesses: Frito Lay and domestic soft drinks.

- Procter & Gamble was so preoccupied with developing new products that it neglected its core household and personal care businesses, which generate 85% of revenues. It has been bested by Kimberly-Clark in the diaper market and by Colgate's Total in the oral care market.

Of course, the need for focus does *not* mean that companies can *only* succeed in one business line; such firms as General Electric and Johnson & Johnson prove the contrary. However, a conglomerate structure requires a well-honed management approach. GE's focus on developing superior managers is legendary, and J&J succeeds by giving divisions a great deal of autonomy.

Whether or not they are diversified, firms *must*:

- Defend and develop their core franchise, either through internal growth or acquisitions. The ultimate defense is to become a member of a global oligopoly.

- Invest continuously in technology, either through in-house R&D or by buying another firm's technological expertise.

- Invest heavily in advertising in order to differentiate their products from other established brands while defending their franchises from new entrants.

- Focus on the core competency, while outsourcing non-core operations.

- Not take employees for granted—amidst a pervasive skills shortage—and see them join a competitor, taking customers with them.

1. Building Global Oligopolies

One way to defend and develop a franchise is to expand it globally, either through internal growth or acquisitions. Industries where several firms have done this (thereby establishing global oligopolies) include finance (**American Express, Citigroup, Merrill Lynch**), entertainment (**America Online/Time Warner, News Corp, Viacom**) and pharmaceuticals (**Johnson & Johnson, Merck, Pfizer**). Other industries, including power generation and parts of retailing, are moving toward an oligopolistic structure as they consolidate.

As we emphasized four years ago in a report on "Gorillas" (January 8, 1996), huge companies have significant advantages, including:

- Economies of scale—the ability to spread fixed costs over a huge base of sales.
- Economies of scope—the ability to offer one-stop shopping to customers, whether it is a corporation that needs financial advice or a hospital that needs supplies.
- To serve effectively a giant customer (such as Wal-Mart or General Electric) you need to be very big yourself—which, for example, gives P&G an advantage over Dial.
- Low cost of capital.
- Large, successful companies that can offer interesting jobs in a variety of locations, as well as good benefits and potentially lucrative stock options, are best able to cope with the skills shortage.
- Great buying power with suppliers.
- Ability to invest aggressively to build a brand.
- A global perspective can make an enterprise smarter; lessons learned on one continent can be applied in another. Moreover, well-managed global enterprises have better market intelligence.

The Internet gives giant companies an added advantage because it is infinitely scaleable.

The Internet gives giant companies an added advantage because it is *infinitely scaleable.* The Web removes some of the "diseconomies of scale" discussed below by allowing a firm to manage operations tightly and let employees around the globe communicate effectively, instead of playing multiple time zone telephone tag. However, high-performance Web technology is very expensive, and huge companies are best able to handle the cost. A recent study[1] found that the typical retailer's basic Web site costs about $1.8 million to launch and $1.9 million to maintain annually. However, a leading edge Web site costs $40.5 million to launch and a staggering $48.8 million to maintain. The estimated cost of running a sophisticated Web site is a negligible $0.01 per share for Home Depot but $0.19 per share for OfficeMax.

On the other hand, it must be admitted that bigger is not always better:

- Size can be one of the reasons why companies lose focus of their core competency, as we discussed concerning the missteps of AT&T, PepsiCo and Procter & Gamble.

- Huge companies can become overcentralized. This occurred at Coca-Cola, where marketing decisions for China and Brazil were being made in Atlanta, until Douglas Daft (who has extensive international experience) became CEO and decreed that, in the future, Coca-Cola would "think locally and act locally."

- Simply getting big via acquisitions can be risky, because you may not understand what you are buying. This risk is particularly severe for financial firms, as shown by such problematic deals as First-Union/Money Store, Bank One/First USA and Conseco/Green Tree. Tougher antitrust enforcement in the U.S. and Europe also makes an acquisition strategy risky. Finally, in today's treacherous business environment, some of the perils of prosperity, such as a lack of pricing power and the skills shortage, mean that it is very tricky to operate a company effectively while top management is preoccupied with deals.

- In certain industries, once companies grow to a certain size—and effectively establish a global oligopoly—there are no obvious benefits to added scale. In pharmaceuticals, for example, the key to success is creating good new drugs, and the ability to do this is not really enhanced when two huge companies merge. To be sure, drug mergers initially create cost-cutting synergies, but these are not usually sustainable. On the other hand, niche acquisitions of small health care companies that have promising drugs, but a small sales force, do make sense.

For all these reasons, it is not easy to become a potent global enterprise—which means that those few companies that do have that status, and still have good momentum and serve large, growing markets, are attractive.

- *Energy oligopolies.* **Enron** enjoys a dominant position in the worldwide wholesale energy markets. The company is the largest wholesale marketer of electricity and natural gas in every deregulated energy market, including North America, the U.K. and Scandinavia, and has established a strong presence in the rapidly liberalizing continental European market. In addition, Enron is helping to create energy markets in Japan, Australia, South America and India, and it has built natural gas and electricity networks in energy-constricted parts of the world, such as India, South America and the Caribbean. **AES Corp**, which is engaged in electricity generation, is another leading global power company. The company operates and owns a portfolio of electric power plants, which are located in North and South America, Europe and Asia. In addition, AES has ownership stakes in a number of distribution companies, which serve millions of customers around the globe.

- *Entertainment oligopolies.* The Web gives leading entertainment companies such as **America Online, News Corp, Time Warner** and **Viacom** yet another platform through which they can push a variety of entertainment products. But the key attribute of the Web is that this is a global platform, which allows these companies to extend their franchise worldwide at relatively low cost. The Web also eliminates barriers such as regulatory restrictions and ownership controls that previously might have kept U.S. entertainment companies out of some markets.

- *Financial oligopolies.* During the 1990s there was significant consolidation of the banking, securities, money management and insurance industries, both within the U.S. and globally. The success of these mergers of the 1990s contrasts with a wave of deals in the early 1980s that were, to varying degrees, failures. (Remember "financial supermarkets?") Financial combinations have worked much better lately primarily because the focus has not been on synergies between disparate businesses but, rather, on consolidating operations. The risk of a consolidation strategy is relatively low because managements are buying businesses they understand, and firms that do many deals become expert at effecting them quickly and efficiently. The result of this consolidation activity has been the emergence of a handful of high-quality, well-run companies that dominate their respective industry sectors globally: **American International Group** (insurance), **American Express** and **Citigroup** (consumer finance), **Merrill Lynch** and **Morgan Stanley Dean Witter** (investment banking).

- *Industrial oligopolies.* With dominant positions in the global markets for everything from aircraft engines to power systems, **General Electric** and **United Technologies** are the quintessential "old economy" oligopolies.

- *Retailing oligopolies.* The Net is not just facilitating the development of global oligopolies in the tech/media/telecom sectors. Huge, global, fully wired companies that operate in "old economy" sectors *prefer to deal with other huge, global, fully wired companies.* For example, the responsibility for replenishing the stocks of many products on the shelves of retail giants **Costco** and **Wal-Mart** belongs to some of their giant suppliers (global manufacturers such as **Kimberly-Clark**). Constant analysis of individual stores' sales by the manufacturers ensures that there is always enough product on the shelves of the retailer. The advantage to Costco and Wal-Mart of this arrangement is better supply chain management, lower inventories, lower costs and higher profit margins.

- *Technology oligopolies.* In addition to the advantages listed above that huge companies enjoy, we pointed out in our January 5, 1997, report "More Gorillas," that high-tech gorillas may also benefit from:

- High up-front costs—the first firm to develop a product has a cost advantage because production costs are low in comparison to R&D costs. (The first disk of Windows to go out the door cost **Microsoft** many millions; the second and subsequent disks cost $3.) Therefore, the first to market with a good product is likely to win. *But first alone is not enough to ensure success*—it must also be a superior product. For example, Lotus 123 predated Excel. Prodigy and Compuserve were Internet service providers before America Online. Radio Shack's early PCs ran under a TRS-80 operating system, and predated early "IBM compatibles" that ran under MS-DOS. So in technology, the winning combination is *first and superior*.

- Network effects—firms that set industry standards have a big advantage.

- Customer groove-in: loyalty is high once customers have invested time and effort in learning how to use a product.

For these reasons, companies such as **Microsoft** and **Oracle** have natural monopolies (in applications software, as well as the operating system)—it is much easier for customers to do one-stop shopping, and it is also perceived to be safer.

These factors also work to the benefit of **Check Point Software** and **Siebel Systems. Check Point** is the gorilla in Internet security. It is the leader in the high-growth markets for firewalls and virtual private networks (VPNs), with dominant positions in both markets (a hefty 52% share of the VPN market). **Siebel** is the leader in CRM, or customer relationship management, software. Large corporations are trying to leverage the vast amount of information they have about their customers by standardizing on a CRM platform. This standardization helps to improve the level of service provided to customers and allows management to better control customer relationships, making them company relationships instead of salesperson relationships. Siebel's software is the most fully functional product in the market and is a logical, well-respected, non-controversial choice for corporate managers. *That is a key point*. Large, well-established firms such as Check Point and Siebel have a natural advantage over upstarts: namely, they are a safe choice, and it is much more time-efficient to select a leading firm than to exhaustively research second-tier players.

Two high-tech companies whose market positions are more monopolisitic than oligopolistic are **Cisco** and **Intel**. Cisco dominates the market for enterprise internetworking software. This software links together the LANs (local area networks) of enterprises to create WANs (wide area networks), the most illustrious WAN being the Internet. Cisco has an estimated 80% market share of the routers that comprise the Internet, with **Juniper Networks** holding an estimated 20% share.

Controlling more than 80% of the worldwide market in microprocessors, **Intel** is the gorilla in the chip market. The company's strong R&D effort, manufacturing prowess and financial resources have helped Intel establish and maintain its dominant role.

2. Investing in Technology: The Two-Pronged R&D Economy

Many high-tech firms are growing rapidly by acquiring small firms, in addition to spending heavily on their own R&D.

Just as historians point to General Motors as the archetype of the modern multi-divisional company, so will they single out **Cisco Systems** as a paradigmatic growth company of the Information Age—not because it is building the Internet, but because of the way it has constructed itself. Cisco and many other high-tech firms *are growing rapidly by acquiring small firms, instead of relying solely on their own R&D*. The emergence of a two-pronged R&D economy is transforming the U.S. industrial structure and helping to accelerate economic growth.

The Linear Model of Product Development

In what economist Roy Romer calls the traditional "linear" model of R&D, scientists in a corporate lab conduct basic scientific research, and their best ideas are passed on to engineers who develop a product. If it wins regulatory approval and survives test marketing, it is launched and marketed by a huge sales force.

From Bell Labs' transistor to **Pfizer's** Viagra, this system has scored many successes, but it also has drawbacks. The process is bureaucratic, and bureaucracies tend to be slow, cautious, and hostile to innovations that upset the status quo. Furthermore, career scientists in a giant lab probably will not work as hard or as fast as those in a small start-up facing much higher risks and rewards. There are many examples of labs being supremely productive when they were working "under the gun"—literally so during World War II, when the Manhattan Project developed the nuclear bomb, and University of Pennsylvania labs developed the ENIAC computer. And as Professor Romer notes, product development is not necessarily a "linear" process. Often the product idea comes *before* the research and development, and entrepreneurs in close touch with customers know which products are needed. For example, Thomas Edison often got the product idea first and then worked day and night for weeks in his New Jersey lab to find the right combination of materials and technologies.

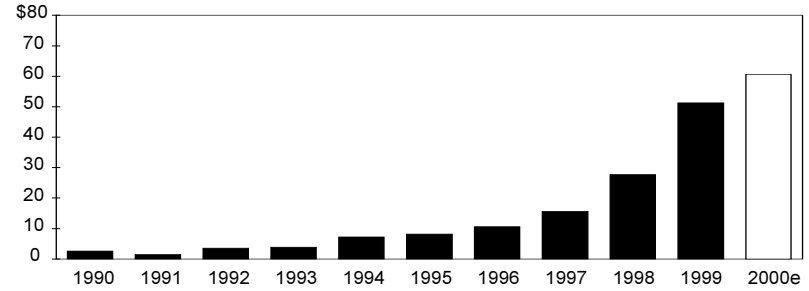
Four Key Elements of the Two-Pronged R&D Economy

This linear R&D process is being supplemented by the two-pronged R&D economy, a dynamic innovation that has been propelled by four key factors.

- *Venture capital.* Unprecedented amounts of venture capital are available—about 20 times as much as in the early 1990s (Chart 10)—and this capital is continuously invested in entrepreneurial start-ups. These start-ups are well configured to develop new products quickly. There is no bureaucracy, the CEO is in close touch with potential customers, and employees work feverishly in hopes of striking it rich.

Chart 10: Flows into U.S. Venture Capital Funds

In $ billions

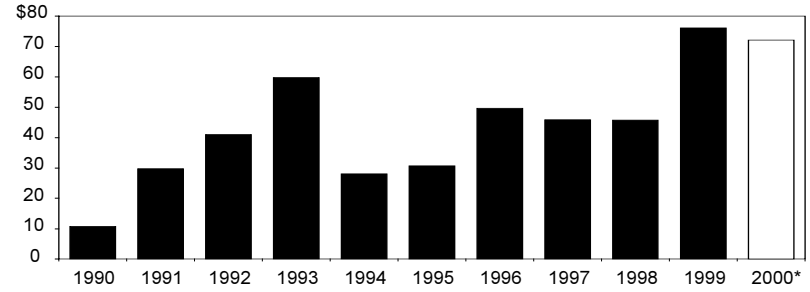


Source: Venture Economics.

- *IPOs.* If they win the backing of investors, the best start-ups go public in initial public offerings. Here, too, there has been a transformation. In the 1960s, 1970s and 1980s, "new issue" booms typically lasted less than a year and were followed by a prolonged period when the IPO window was virtually shut. Today, the IPO window is open most of the time (Chart 11).

Chart 11: Initial Public Offerings

In $ billions



Source: Securities Data Corp. * 2000 annualized data through 10/31/00.

- *Hungry "gorillas."* Whether they are still private or are publicly traded, many of these small, innovative firms are acquired by hungry "gorillas." Gorillas have plenty of capital and giant sales forces, as well as the ability to offers customers "one-stop shopping" for a broad array of products that fall under the gorilla's core competency.

- *The talent flow.* A little-noticed benefit of this system is that large corporations get a constant influx of entrepreneurial talent. For example, when **Nortel** acquired Bay Networks, Nortel CEO John Roth adopted many of Bay's management practices in order to shake up Nortel's rather stodgy corporate culture.

Though not a replacement for the huge corporate lab, the two-pronged R&D model is an invaluable complement to it. Companies that benefit from this system include:

- Big firms that are adept at acquisitions, including **Cisco, Corning, JDS Uniphase** and **Nortel**. As Table 3 illustrates, these four companies have, on average, completed at least one major acquisition in each of the last three years. Their culture and record of long-term success make it easier for these firms to retain employees.

Table 3: Acquisitions by Technology Companies
Number and average value of acquisitions since 1998

	Number of deals	Average value of deals, $m
Lucent Technologies	9	$4,294
Nortel Networks	8	3,502
Cisco Systems	7	2,253
Intel	5	1,160
JDS Uniphase	4	15,013
America Online	3	34,429
Corning	3	1,337

Source: UBS Warburg LLC.

■ Dominant firms whose leadership position gives them the resources to outspend rivals on in-house R&D. As Table 4 illustrates, four leading tech companies spent over $3 billion on research in 1999: **Intel, Lucent, Microsoft** and **Motorola**. And while **Oracle** "only" spent $800 million on R&D, on average it spends roughly the same percentage of revenues on R&D (9.7%) as Intel does (9.8%). In the health care sector, while there are tremendous advances being made in science and technology, it is only those companies that can pour huge amounts of money into R&D that are developing breakthroughs. Table 4 shows that **Amgen, Pfizer, Pharmacia** and **Schering-Plough** are among the biggest spenders on R&D in the health care sector.

Table 4: R&D Spending by top 20 S&P 500 Firms
Sorted by R&D spending as a percent of revenue, average for last 3 years

	R&D spending in 1999, $m	As % of revenues 1996-99 average
Amgen	$823	25.1%
AMD	636	21.5
Eli Lilly	1,784	17.9
Pharmacia	2,807	17.8
Microsoft	3,775	16.2
Applied Materials	682	14.7
Pfizer	4,035	14.0
Nortel	2,908	13.6
Cisco	2,704	13.4
Texas Instruments	1,254	12.7
Schering-Plough	1,191	12.6
Amer Home Prods	1,740	12.0
Agilent	997	12.0
Lucent	4,510	11.9
Sun Microsystems	1,263	10.6
Motorola	3,438	10.1
Abbott Labs	1,194	10.0
Intel	3,111	9.8
Oracle	841	9.7
Johnson & Johnson	2,600	9.6

Source: UBS Warburg LLC.

■ Firms that use the venture capital model to improve the productivity of R&D dollars.

- Dell Ventures was formed and funded to enable **Dell** to gain an early access to new technologies that Dell may want to either incorporate in its product lines or acquire outright and develop internally.

- **KLA-Tencor**, the semiconductor capital equipment manufacturer, recently announced the formation of KT Venture Group. This venture capital fund is chartered with investing in early-stage start-up companies in industries that complement KLAC's product lines.

- **Williams Communications** proactively makes significant investments in start-up technology companies in order to stay in touch with (and influence) the development of insurgent technologies that could ultimately improve the productivity of its fiber-based network.

■ Financial intermediaries, such as **Chase Manhattan, Citigroup, Merrill Lynch** and **Morgan Stanley Dean Witter**, participate in many stages of the R&D financing process, including venture capital investment, IPOs, high-yield bonds, M&A, and trust services for wealthy entrepreneurs.

3. Continuous Investment in Advertising

Continuous investment in advertising helps companies differentiate their products from other established brands while defending their franchises from new entrants.

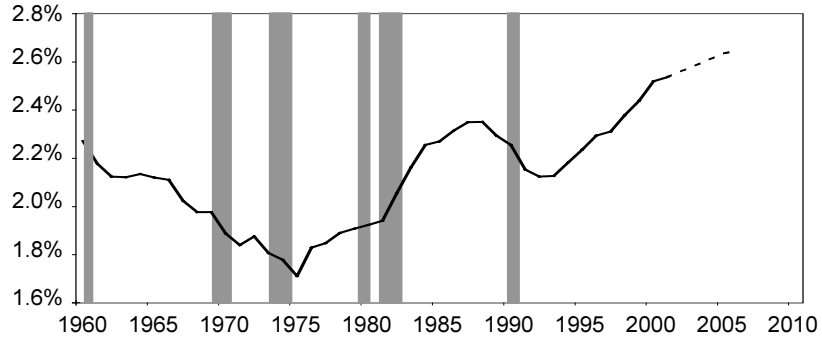
One way for companies to avoid commoditization is to invest continuously in advertising in order to differentiate their products from other established brands while defending their franchises from new entrants. Two factors are leading to heightened competition in many sectors:

- *Deregulation* in such areas as health care, finance, energy and telecom has given consumers much more choice, while forcing service providers to battle for market share. Entire industries that had little to do with Madison Avenue ten years ago, including pharmaceuticals, wireless telephone, Internet service providers and (over the next couple of years) energy providers, are major advertisers.

- *Falling barriers to entry*. The Internet has facilitated the entry of new players in industries ranging from book retailing to stock trading. Newcomers use ad spending to build their brands, which forces incumbents to respond in kind.

While these new players are buying advertising space, traditional firms such as food and auto companies still need to keep their brands strong. Therefore advertising spending, which used to stay in a stable range of 1.7-2.3% of GDP, now accounts for 2.4% of GDP and is likely headed higher (Chart 12).

Chart 12: Advertising Spending as a Percentage of GDP
With recessions shaded



Source: McCann Erickson and UBS Warburg LLC estimates.

This trend is a clear positive for three types of companies:

- *Owners of "old" media*, such as television and radio stations. With "shelf space" on the big three networks (**Viacom's** CBS, **Disney's** ABC and **General Electric's** NBC) relatively limited, this surge in volume has led to strong advertising rates. And following its recent acquisition of competitor AMFM, **Clear Channel Communications** is the gorilla of radio land. With its 1,000-plus radio stations around the country, CCU is the only radio company that can offer marketers a national platform.

- *Owners of "new" media*. Although it will never be a great advertising tool that can substitute for a witty spot on Monday Night Football featuring girl-crazy, beer-guzzling lizards, the Internet is still a powerful marketing tool because consumers can immediately take action by, say, entering a sweepstakes or requesting information on a new product. And although banner ads have miserable click-through rates, it is effective for a brand to sponsor a relevant service—e.g. the allergy medicine Claritin sponsoring **Yahoo** weather reports. Marketers are turning to what **America Online** calls "integrated marketing solutions"—a company such as **Disney** can offer an attractively priced package of ads to be placed in many different Disney's properties ranging from ABC to ESPN.com to Disney.com.

- *Advertising agencies*. The advertising boom is bullish for such firms as **Interpublic Group, Omnicom Group** and **WPP Group**. As the advertising market has become more fragmented between network, cable, and Internet, the expertise of these companies has become more valuable than ever. Their knowledge of fast-growing foreign markets, such as China and eastern Europe, is also valuable. Indeed, ad agencies are something of an "outsourcing" play because they enable companies to operate with a smaller in-house marketing department (we discuss the important trend of outsourcing later in this report). Revenues of the major advertising firms have climbed at a 17% annual rate over the past five years.

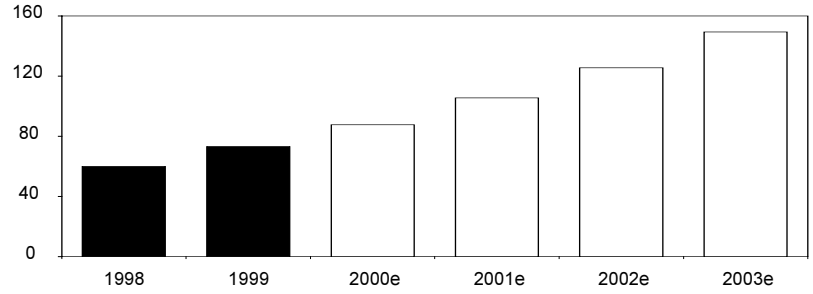
4. Outsourcing Non-Core Operations

Another way for a company to protect its core competency is to assiduously focus on it while outsourcing non-core operations, using what is effectively a "virtual" support and/or manufacturing infrastructure. The Internet makes it much easier to coordinate internal operations with services provided by outsiders.

Although outsourcing might seem to be costly because the vendor earns a profit on what used to be internal activities, this is more than offset by outside vendors' greater economies of scale and superior ability to recruit skilled workers. An excellent example of this is the electronics sector, where the fact that some firms are expert in the design of electronic products, while other firms are expert in their manufacture, has driven explosive growth in outsourcing in recent years (Chart 13).

Chart 13: Outsourcing of Electronic Manufacturing

Total electronic manufacturing services industry revenues, $ billions



Source: Technology Forecasters.

Below we discuss five industry sectors where outsourcing is playing an increasingly important role.

Outsourcing Corporate Administration

As detailed later in this report, such companies as **TMP Worldwide** are benefiting from the outsourcing of the job search function. Other "corporate administration" activities that are commonly outsourced include:

- *Payroll processing*. **Automatic Data Processing** (AUD) pioneered outsourcing in the 1960s when it processed payrolls for corporations. The company has expanded its offerings, and a major source of revenues is back-office business for brokerage firms. A related play is **Paychex**, the number two provider of payroll services in the U.S. after AUD.

- *Logistics*. **FedEx** and **UPS** are two leading providers of logistics support, providing everything from package delivery to the management of inventory for retailers. Retailers are also outsourcing logistical functions to their suppliers. For example, **Kimberly-Clark** is in charge of keeping Costco stores properly stocked with Pampers; since late 1997, inventories have been cut from one month to two weeks worth of sales.

While **Ryder System** is perhaps best known as the largest truck leasing business in the world, it also has a competitive logistics business. The company is the premier provider of dedicated contract carriage services in the U.S. (effectively a lease in which Ryder also supplies the driver and a freight routing manager). **C.H. Robinson** is a non-asset-based transportation logistics company. The company links its clients to the most optimal shipping mode and, since it does not have investments in trucking, air, ocean or rail equipment, CHRW is not confined to any particular method of transportation for a job.

- *Health management*. Health Maintenance Organizations such as **Cigna** and **UnitedHealth Group** manage the health care needs of corporate employees.

- *Travel*. **American Express** manages the travel requirements of many large corporations. Amex uses this platform to promote the use of its flagship corporate T&E charge card, a key driver of profitability for the company.

Outsourcing Energy Supply and Management

More and more industrial and commercial businesses are outsourcing the functions of energy purchase and management, for three reasons:

- Now that electricity has been deregulated, there is much greater variance in energy prices, meaning you can be at a competitive disadvantage if the widget factory down the street has 20% lower energy costs than you do.

- Following deregulation, markets have become increasingly complex, risky and volatile (with occasional spikes in price), so it pays to get expert advice.

- As with many other activities, outsourcing enables industrial and commercial businesses to focus on their core competencies.

Power managers such as **Dynegy** and **Enron** offer three different types of outsourcing services:

- Energy supply. A power manager may offer electricity to its industrial clients at a guaranteed cost per kilowatt-hour, and then trade in the electricity market (using risk management programs) in order to fulfill those commitments.

- Energy management in the retail sector. An energy manager may contract to manage the energy needs of an industrial client's production facility, which would involve supplying the power to that facility and also ensuring the most efficient use of that power.

- Energy management in the wholesale sector. Not only will a company such as Dynegy or Enron manage the power needs of industrial and commercial businesses, they will also manage the power needs of a regional utility. So, for example, a power manager may agree to supply the energy needs of a regional utility, and also manage the assets of that utility on an ongoing basis.

In the oil service sector, companies such as **Baker Hughes** and **Schlumberger** are excellent outsourcing plays on high energy prices. When oil prices collapsed in 1986, oil companies slashed expenses and outsourced more and more of their exploration activity to service companies. Ultimately, however, the pendulum swung too far and oil companies felt that if they outsourced too much they would not get the best price/value proposition and, even more serious, would lose their core competency of finding oil and gas, becoming little more than a bank. But although the degree of outsourcing may not increase further in the energy sector, current industry economics are very favorable for service firms. The excess capacity in the industry has been worked off over the past 15 years of retrenchment and consolidation, giving the surviving companies plenty of pricing power. Moreover, the supply/demand balance in the industry should be favorable so long as crude oil is above $20 per barrel.

Outsourcing Financial Back Offices

In the asset management industry, the speed of technological change is encouraging executives to rethink their back office needs. Keeping them equipped with state-of-the-art technologies and up-to-date processes is becoming increasingly complex and costly. After spending millions of dollars on Y2K and the advent of the euro, many companies do not have the appetite for additional large investments to keep up with new techno-problems. The headaches on the horizon are:

- T+1. Settlement on the day after trade date ("T+1") is expected by June 2002. T+1 challenges technological capabilities because most of the time it takes to settle trades now (T+3) is used to communicate between various participants in the trade settlement process, as well as to fix errors.

- Decimalization, which, along with longer trading hours, should result in higher volumes, further pressuring back offices.

Given these trends, asset managers are increasingly looking to outsource their back-office functions, especially since managing money—and not trade processing—is their core competency.

Two beneficiaries of these trends are **Bank of New York** and **State Street**. Both companies have a leading-edge technological infrastructure, which gives them a clear advantage over their rivals amidst the increased trend toward outsourcing in the financial services industry. And both companies also have enormous economies of scale, which gives them low unit costs.

Outsourcing Health Care Information Management

As the health care sector—which constitutes 14% of the U.S. economy—is successfully brought online, it will deliver enormous benefits to the overall economy. Of course, hospitals already have plenty of computers, but this is an excellent example of the limitations of automation—computers have merely sped up the performance of discrete tasks without simplifying and streamlining the *interaction of* various parts of the system. This is a huge problem because the health care system is fragmented among the: patient, doctor, specialist, hospital, lab, Medicare, primary insurer and pharmacy.

Untold millions of frustrating hours are spent shuffling paper—medical charts, test results, prescriptions, bills, checks—among these various parties. What is needed is for all parties to settle on one standard—the Internet—and fundamentally change the way health care information is handled. No one is better positioned to lead this transformation, and to benefit from it, than **HCA—The Healthcare Co.**

This giant hospital chain has both the resources and the market clout to lead the transformation from a health care system choking on paper to one where all pertinent information is online. Recently, HCA awarded a major IT contract; the contestants were not narrowly focused health care technology companies, but huge software firms including IBM, Oracle, Peoplesoft and SAP.

Outsourcing Manufacturing

Information Age technology companies such as Cisco, Lucent and Motorola are increasingly outsourcing the manufacture of devices to contract manufacturing firms, which own numerous design centers and assembly plants in low-labor-cost areas around the globe, from Poland to China to Mexico. For example, **Motorola** recently entered into a $30 billion deal to outsource 15% of its communications operations (i.e., cellular phone, pager and switch production) to **Flextronics**, which (along with **Celestica**, **Jabil Circuit** and **Sanmina**) is a leading beneficiary of outsourcing. These global outsourcing companies have been growing rapidly by acquiring plants from big technology companies, which then become their customers.

Contract manufacturers offer several benefits to their corporate customers:

- Lower risk because the contract manufacturer owns the plant. If MOT designs a phone and builds an assembly plant, but orders are poor, it will take a big hit to earnings. By contrast, if Flextronics makes it and orders are poor, another one of FLEX's clients can take up the slack. Just as a portfolio is less risky if it is diversified, so is it less risky for FLEX to build a plant that assembles many different products from diverse companies.

- Contract manufacturers have enormous economies of scale and also economies of skill—they are able to attract the best and the brightest in their line of work.

- Minimizing time to market is critical for high-tech firms. Contract manufacturers can help because they have specialized facilities for designing and testing devices, and they have the capacity to get them into global distribution quickly.

Leading auto parts companies are also benefiting from outsourcing. This industry has been consolidating for more than a decade; the remaining players manufacture not just "parts" but entire modules of the vehicle, such as the interior or the frame. Suppliers are delivering, on a global basis, more technologically sophisticated products than ever before. They are truly strategic partners of the automakers, and their financial strength is improving now that acquisitions are slowing down and free cash can be used to strengthen balance sheets or repurchase shares. **BorgWarner, Lear** and **Superior** seem to be particularly well positioned.

Outsourcing Technology Management

In our February 13, 2000 report, "Building the 'Info Utility' Industry," we argued that "just as, in the early 20th century, electric utilities permitted firms and households to 'outsource' the age-old function of power generation, so is the Internet making it possible to outsource another age-old function: information management." Specifically, information management is being outsourced to "server farms"—giant warehouses where hundreds of computers operate Web sites and run other applications, such as e-mail or payroll, for customers. Although now used primarily for Web hosting and e-commerce, the role of server farms should expand rapidly over the next few years to include storing electronic data and hosting "application service providers"—firms that rent software to customers.

Among the beneficiaries of the outsourcing of information management are:

- Advisors (**Electronic Data Systems, Scient**). As it becomes increasingly difficult for corporations to hire high-tech talent, they are being pushed toward using outside advisors.

- Operators of server farms such as **Exodus**, the leader in the space.

- Bandwidth providers (**Qwest Communications, WorldCom**).

- Software (**Microsoft, Oracle, Siebel Systems**).

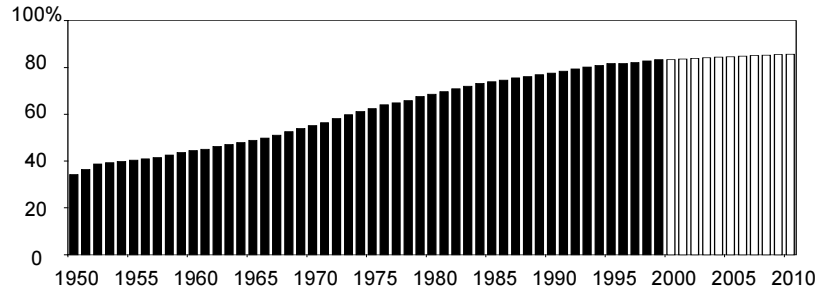
- Hardware—*enterprise hardware* (**IBM, Intel**); *printers* (**Hewlett-Packard**); *telecom equipment* (**Cisco, Lucent, Nortel Networks**).

5. Coping with the Skills Shortage

To build the core franchise, firms must hire and retain talented workers—a daunting task in an environment of 4% unemployment. With the exception of highly labor-intensive industries such as restaurants and nursing homes, the problem lies not in finding *enough* workers but, rather, the *right* workers—those with the requisite skill-set. What most companies face is *not* a labor shortage but a *skills shortage*. This contrasts with the Industrial Age, when unskilled workers predominated, and the key issue for employers was the quantity rather than the quality of workers. As Chart 14 illustrates, in the 1950s, over 60% of workers were "unskilled" (i.e., less than 40% had completed high school or college) versus just 20% of workers who are "unskilled" today.

Chart 14: Percentage of Workers Who Are Skilled

Percent of people 25 years old and over who have completed high school or college



Source: Census Bureau and UBS Warburg LLC estimates.

Just as companies are focusing on core competencies, so are workers becoming skilled in a specialized occupation. So companies face two problems in hiring staff:

- Fewer qualified workers because of low unemployment, slow labor force growth, and a mediocre educational system.

- More selective workers. Many highly specialized workers may not want to work for a firm that is not a leader in their particular field of competency. (Boeing has a hard time hiring software engineers in the Seattle area, who prefer the likes of **Microsoft** and Amazon.com.)

For many companies, recruiting skilled workers is as important and challenging as attracting customers. And it is not just high-tech personnel who are hard to find; so are good senior managers and salesmen. Recently, several companies, including Xerox, have been hurt severely by sales force problems. There is no quicker path to an earnings disappointment than having a rebellious or ineffective salesforce.

In the battle for skills, huge, prestigious, dynamic companies—gorillas—have a definite edge. They can recruit talent around the globe, and they have the flexibility to offer interesting, challenging jobs to smart people. They also tend to have strong stocks, and so can offer enticing wealth accumulation packages that include restricted stock and options. (Of course, the reverse is true for firms with floundering stocks, such as Eastman Kodak and Xerox.)

Enticing wealth accumulation packages were the primary reason that many talented employees left established corporations for dot.com startups in the last few years. However, the collapse in the stock prices of many dot.com companies has halted, and even reversed, that outflow. For example, Heidi Miller, Citigroup's former CFO, recently resigned as the CFO of Priceline.com because, as *The Wall Street Journal* noted, "she wants to be at a growing company."

The Skills Brokers

Beneficiaries of the skills shortage include human capital management firms such as **Heidrick & Struggles, HotJobs.com, Korn Ferry International** and **TMP Worldwide.** As the job market gets tighter, it becomes more difficult, time-consuming and expensive to recruit workers. No longer can a busy executive get a fistful of high-quality resumes by running an ad in the Sunday edition of *The New York Times*. Therefore, more companies are outsourcing this function to search firms.

The human capital management industry is consolidating because clients want:

- One-stop shopping (i.e., being able to recruit anyone from a secretary to a CEO).
- Global reach.

Partly because scale is so important, one of the best-positioned firms is the industry gorilla, **TMP Worldwide**, which operates:

- The world's leading online recruitment network (Monster.com).
- The world's largest recruitment advertising agency.
- The world's largest yellow pages advertising agency.
- One of the world's largest executive and middle-management search agencies.

Over the past year TMP has dramatically built out its recruitment business by acquiring a network of middle-management recruiting and senior-level executive search companies. TMP has positioned itself to offer its *clients* one-stop shopping for all human capital sourcing needs, and its *candidates* a career management service throughout their careers—from intern to CEO.

6. Converting Goods into Services

Companies' basic problem is that in the "flex economy" prices are transparent, competition is intense, and margins are under continuous pressure. Therefore, businesses are constantly at risk of becoming commoditized—less proprietary and less profitable. One strategy for coping with commoditization is turning goods into services, in order to generate incremental revenue that, in many cases, carries higher margins than internationally traded goods. An extra benefit is that customers may be more loyal if they receive an integrated bundle of goods and ongoing services.

However, the shift-to-services strategy carries definite risk. For one thing, it is a covert form of diversification, which may lead a company to compete with more focused and capable competitors. For example, **IBM's** move into services (discussed below) brings it into competition with Web-hosting powerhouse **Exodus**. And because services are more labor-intensive than manufacturing, firms become more vulnerable to the skills shortage. Arguably the best strategy is that used by **Medtronic**—using wireless technology to turn a high-tech device into a service. The customer is more or less "locked in" while technology costs keep dropping, which tends to boost margins even as the quality of the service improves.

Energy Services

Instead of just generating power, companies such as **Duke Energy, El Paso Energy, Reliant Energy, Southern Company** and **TXU** are offering energy services. This means helping big customers, such as factories or retail chains, reduce their energy bill, whether through more energy-efficient machinery, better insulation, or smarter purchasing in increasingly complex deregulated energy markets.

Health Care Services

Medtronic is beginning a long transition from being a "medical device" company to one that provides ongoing "chronic disease management" using implanted sensors and wireless technology. Today, pacemakers and other devices are "dumb" because they are connected to nothing, just like PCs of the early 1980s. In about five years many implants will likely be "smart" devices, connected to networks offering continuous patient monitoring and downloadable therapy and software upgrades. The new products Medtronic is developing, such as the Chronicle for heart failure, would alert doctors to a change in a patient's condition that may necessitate intervention. This dramatic technological change will be accompanied by a shift of the business model from purchase to leasing.

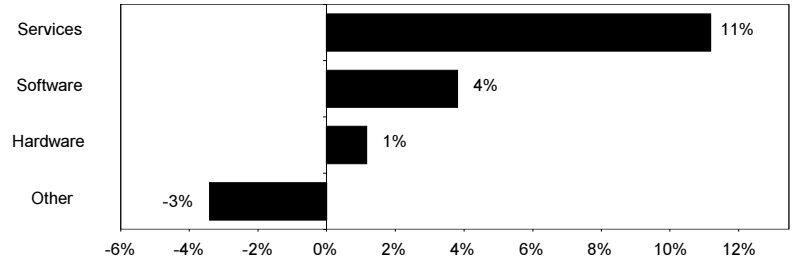
Industrial Services

General Electric and **United Technologies**, which make most of the world's jet engines, are moving into the business of servicing engines for airlines. For example, United Technologies and UPS recently signed a ten-year service pact worth $410 million, for servicing 12 Boeing planes. Unfortunately, the airlines are not a wonderful outsourcing market because the machinist union is so powerful.

Technology Services

In response to increasing commoditization in the computer hardware sold to large corporations, **IBM** has moved aggressively into computer service, a huge market that includes everything from consulting to actually running data centers. Although many investors still tend to focus on IBM's hardware revenues, the growth of the company's service revenues has been very strong in recent years (Chart 15). Big Blue competes in this market with such firms as **EDS** and **Exodus**.

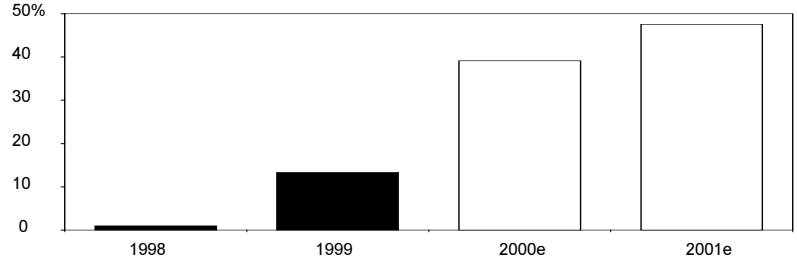
Chart 15: Revenue Growth of IBM Business Lines
CAGR 1996-2000e



Source: IBM and UBS Warburg LLC.

Similarly, in the consumer sector, with PC hardware profitability in secular decline, companies are moving "beyond the box" to provide ancillary services and products. For **Dell** it means leveraging sales to small businesses by also offering ISP services, Web page design, etc. And **Gateway** is opening "country stores," where, after selling a PC to a customer, it can sell him Internet access or a digital camera. Gateway is on track to derive 40% of its pretax profits from "Beyond the Box" sources (ISP bundling, financing, training, service/repair etc.) by year-end (Chart 16).

Chart 16: Gateway "Beyond the Box" Profits
As percentage of pretax total



Source: Gateway, UBS Warburg LLC.

Helix Technology Corp. is a leading manufacturer of vacuum pumps and related peripheral devices for the semiconductor equipment industry. In 1998 Helix introduced GOLDLINK, a real-time, centralized, online monitoring service that some observers believe could revolutionize the industry. Using sensors, Helix personnel continuously monitor and diagnose problems of pump, valve and related instrumentation in customers' semiconductor fabs. Though unique at the moment, this may become a standard feature in the semiconductor equipment industry and, for that matter, many other industries.

7. Benefiting from Disintermediation

Sales/distribution systems are being transformed in the Information Age. Low value-added distributors who are merely "order takers" are being "disintermediated"—i.e., destroyed—as customers use the Web to obtain product information and perform transactions. The resulting cost savings are divided between consumers and the ultimate producer, be it an airline (such as **Delta**) or hotel chain (such as **Starwood**). Producers also benefit indirectly in two ways: they get closer to the customer, and lower distribution costs mean that more consumers can afford the product.

Importantly, complex financial products—whether home insurance, whole life insurance, or estate planning products—are *unlikely* to be disintermediated by the Net. Most consumers need assistance in mastering the complexities of the choices, and they may also need help in overcoming "analysis paralysis" and actually executing a decision. The value of individualized insight in these areas should prevent the Net threat from seriously undermining the franchise of insurance firms such as **Hartford Financial** and full-service brokerage firms such as **Merrill Lynch**. And these firms can also creatively combine the capabilities of the Web and of Real Live People to provide their customers with full service at a reasonable cost.

Computers: Look Ma, No Inventory!

Disintermediation is well advanced in the personal computer industry. The percentage of sales handled by dealers fell from 43% in 1997 to an estimated 26% in 2000; three distributors have filed for bankruptcy while two others have pulled out of the business. To survive, dealers will have to shift to installing and servicing systems. On the retail side of the PC business, inventories are disappearing. A recent report[2] pointed out that "by optimizing their distribution centers around full-truckload economics, PC retailers are normally holding up to six weeks of PC inventory in their stores." This inventory depreciates 0.75% per week, or 4.5% over a six-week period—enough to wipe out retailers' operating margin.

Therefore, the industry will shift toward the direct sales model of **Dell** or—for the customer who needs to touch the merchandise before buying—**Gateway's** inventoryless "Store Within a Store" (SWIS), wherein a single Gateway employee sells computers in a 600 square foot "store" within an OfficeMax office superstore. Gateway would eventually like to have 5,100 locations, including 300 Gateway Country Stores and 4800 SWIS in major retailers.

Manufacturers: Disintermediated by Store Brands

With the retail industry rapidly consolidating, manufacturers also run the risk of being disintermediated as powerful retail chains push their own store brands. As we discuss elsewhere, the only solution is for manufacturers to constantly invest in the brand with R&D and consistent advertising to keep it fresh and compelling. Manufacturers with the strongest brands and biggest market shares are best able to compete with store brands.

Of course, the ultimate "store brand" is **Tiffany**; the company sells only its own product, and the brand conjures up both a glamorous store on Fifth Avenue and one of the foremost figures in the history of American design.

Other retail chains that push their own store brands:

- **Coach**, the designer and marketer of accessories such as handbags, business cases and travel accessories.

- **Gucci**, the designer and marketer of high-quality personal luxury accessories and apparel.

- **Polo Ralph Lauren**, which is associated with premium lifestyle products in four categories: apparel, home, accessories and fragrance.

Travel: Disintermediating the Agent

Airlines have taken the lead in disintermediating travel agents. Five years ago, travel agents sold 78% of domestic airline revenue; today the figure is about 70% and, by some estimates, it is headed toward about 60%, much of which will be handled by online agents, such as Travelocity. Airlines, such as **Delta**, pay $35 to sell a ticket through a traditional agent, $18 to sell through an Internet agent, and only $5 if they sell it directly over the Internet. The $17-$30 savings from selling a ticket on line is big, when you consider that the average gross profit on an airline ticket is about $30.

Other travel industries should also disintermediate the middleman. Casino operator Mandalay says that it sells 10-15% of its Las Vegas rooms over the Web; look for more casinos and hotels to encourage Web-booking. Travel agents sell well over 90% of the cruises that vacationers take; over time, Carnival and Royal Caribbean are likely to cut costs by selling over the Web and eliminating the agents' 10-15% commission.

Vehicles: Gradual Disintermediation of Dealers

Consumers will increasingly shop for cars, trucks, and tractors on the Web. This will cut costs, simplify transactions, and give the manufacturer more direct contact with the customer. The dealer's retail margin will be pretty much wiped out and replaced with a small fee for delivering the product. However, this does *not* spell the demise of dealers, but rather their changing role in the economy.

In the future, dealers will make most of their money from service and repairs. Inventory will shrink drastically, as will the balance sheets of dealerships. Dealers' assets are now roughly 10% land, 20% building, and 50% inventory. Twenty years from now, the dealer will have the same building with less land and no cars on the lot. The business will employ less capital and fewer people (particularly salesmen) and will generate less revenue, but for dealers who deliver good service it will still be an attractive business, with higher return on assets and lower risk.

Good dealers will be able to strike remunerative bargains with manufacturers, because in a commoditized, hypercompetitive market for manufactured products, excellent service will be a key differentiator between, say, a Lexus, Mercedes and a Lincoln. Such firms as Caterpillar, Deere, Ford and GM will benefit from:

- Being in closer touch with customers, and better able to discern consumer trends;
- Lower inventories, which will make the business less volatile and therefore worth a higher P/E ratio;
- Reduced delivery costs, which will make their product more affordable and desirable.

Structure

The "flex economy" will see a shift toward those companies driven by supply-push and away from those driven by demand-pull. With the business cycle of the Information Age muted, and GDP growth strong but not booming, top-line/revenue growth may no longer be the key determinant of corporate success. Just as disinflation meant that pricing alone no longer would determine revenue growth, the "flex economy" means that revenues alone will no longer determine profit growth. While the markets have recently been fixated on revenues, the key determinants of corporate success are shifting away from macro/top-line/revenue and toward micro/bottom-line/profitability. As such, *structure*, as much as product, will be the focus in the "flex economy" of the Information Age.

[1] "The Web at What Cost," March 28, 2000, PaineWebber Retail Group
[2] "PC Outlook—July 2000," July 7, 2000, Don Young

Additional information available upon request.

Prices of other companies mentioned as of November 9, 2000:

Abbott Laboratories		ABT	$52.38
Agilent Technologies		A	$43.56
Albertson's Inc		ABS	$24.69
Amazon.com, Inc.	1	AMZN	$31.25
American Home Products		AHP	$59.69
Applied Materials	1	AMAT	$43.38
AT&T Corp	2	T	$21.19
Bank One Corp	2	ONE	$37.25
Barnes & Noble	2	BKS	$18.56
Carnival Corporation		CCL	$22.75
Caterpillar Inc		CAT	$36.56
Coca-Cola Co.		KO	$62.31
Colgate-Palmolive		CL	$58.85
Compaq Computer		CPQ	$27.11
Conseco Inc	2	CNC	$7.69
Deere & Company		DE	$37.19
Dial Corp	2	DL	$12.25
Eastman Kodak Co		EK	$47.75
Eli Lilly		LLY	$89.69
First Union Corp	2	FTU	$30.94
Ford Motor	2	F	$25.44
Helix Technology Corp	1	HELX	$27.50
Home Depot		HD	$38.81
Insweb		INSW	$2.94
Keycorp		KEY	$24.75
MP3.com		MPPP	$3.81
Officemax		OMX	$2.69
Oracle Systems	1	ORCL	$27.19
Peoplesoft Inc	1	PSFT	$45.94
PepsiCo Inc.		PEP	$49.00
priceline.com	1	PCLN	$3.22
Procter & Gamble	2	PG	$69.50
SAP	2	SAP	$49.12
Sun Microsystems	1	SUNW	$97.63
Royal Caribbean Cruises Ltd		RCL	$21.51
Reuters		RTRSY	$108.75
Texas Instruments		TXN	$41.88
Xerox Corp	2	XRX	$8.81

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