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# Crummer SunTrust Scholarship Endowment Fund Portfolio Investment Strategy 2000

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# CRUMMER SUNTRUST SCHOLARSHIP ENDOWMENT FUND PORTFOLIO INVESTMENT STRATEGY

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## EXECUTIVE SUMMARY

After reviewing the investment objective, risk profile and cash flow requirements the Crummer Graduate School SunTrust Scholarship Endowment Fund, it has been asserted that:

⇒ The desired return of the Fund that is competitive with the overall return of the Standard and Poor's 500.

⇒ The Fund will utilize a buy and hold strategy.

⇒ Non-systematic risk is diversified away as much as realistically possible.

⇒ That the Fund should invest in equities and equity funds to increase overall return in the initial years.

In order to decrease the non-systematic risk and to utilize the opportunities available globally, we have invested in companies that generate income internationally and in funds that have presence globally.

The economic and market trends are thoroughly examined both domestically and internationally. Within each industry, funds are allocated on the basis of forward-looking projections along with a fundamental analysis determining the strength of each company and its product line.

Listed below are the companies and funds we are recommending:

Companies

- ADAC Labs (ADAC)
- American Express (AXP)
- Best Buy (BBY)
- Citigroup (C)

- EMC (EMC)
- Enron (ENE)
- Ford (F)
- General Electric (GE)
- Hughes Electronic Corporation (GMH)
- Ingersoll-Rand (IR)
- Pfizer (PFE)
- Texas Instrument (TXN)

Funds

- INVESCO European Fund (FEURX)
- Montgomery International Funds (MNIGX)
- NASDAQ 100 (QQQ)

## INTRODUCTION

After reviewing the existing portfolio, Group Three has made determinations to rebalance and refocus the Crummer Graduate School SunTrust Scholarship Endowment Fund. We are submitting recommendations that are based on value fundamentals. We have also taken into account the new current forces that are effecting equity and mutual fund performance in the year 2000 and forward.

We have integrated "old economy" companies that are using new technologies to cope with the new paradigms of globalization, technology and brand image. Our team has made recommendations to invest internationally and domestically in technology driven companies. We have allocated among small, mid and large size capitalized companies.

## CLIENT PROFILE

The Crummer Graduate School and its SunTrust Scholarship Endowment Fund are the client and portfolio that our group we tailor its recommendations toward. As an educational institution, Crummer is not subject to federal and state taxes. It is our impression that the client prefers a conservative, capital preservation client.

Summary of Investment Objectives:

| | |
|---|---|
| Average annual real return | 6.5% |
| Average annual inflation | 4.0% |
| Average annual total return | 10.5% |
| Average annual distribution | 6.0% |
| Average annual growth in principal | 4.5% |
| Additions to endowment (gifts) | 1.0% |
| Total principal growth | 5.5% |

## RISK PREFERENCES

CONSERVATIVE: We feel that the risk preference should be tailored to generate a return sufficient to achieve Crummer spending objectives while maintaining the real value of the portfolio.

## OBJECTIVES / INVESTMENT PHILOSOPHY

The first objective we tried to clear is capital preservation. The next feature we tried to incorporate is growth to meet the spending desires of Crummer. Those spending objectives falling under a scholarship program to aid student needs.

While we have concentrated on a fundamentalist approach, we have added some hybrid companies that reflect both value and growth. We believe that "old economy" companies that can add new technologies and methodologies will be well placed to thrive in the current market place. The "new economy" recommendations we believe possess value drivers that are as measurable and tangible as "old economy" companies are.

## INVESTMENT VEHICLES

Money markets and capital markets include several investment vehicles. In money markets these vehicles are short-term, marketable, liquid, low-risk debt securities, like money market, Treasury bills, certificates of deposit (CDs), and in capital markets they are longer-term and riskier securities, such as commercial paper, banker's acceptances, repos, T-notes and T-bonds, municipal bonds, corporate bonds, and stocks. Other investment vehicles include commodities, currencies, precious metals, real estate and derivatives.

The client's needs from the Crummer Investment Portfolio can be best satisfied by the use of stocks and international equity funds. The instruments we will recommend are mutual funds, equities and one investment trust fund. The mutual funds chosen will be tools of diversification into international and European markets. The investment trust used will carry the bulk of the portfolio's technology exposure.

**U.S. Economy**

The year 1990 marked the high point of the last business expansion and was followed by a year of recession and several years of slow growth. The causes of the downturn were the collapse of commercial real estate values and the savings and loan industry. To combat these problems the Federal Reserve reduced required reserves by more than fifty percent or $16 billion, and the Federal government expanded $152.6 billion in direct costs to liquidate insolvent S&Ls. These actions provided the monetary background for the present expansion.

| Indicator | 1990 | 1998 | Percent Change |
|---|---|---|---|
| Real GDP (billions of chained 1992 $s) | 6,136.3 | 7,551.9 | 23.1 |
| M-3 money supply ($ billions) | 4,155.6 | 5,997.0 | 44.3 |
| Debt - domestic non-financial | 10,823.2 | 16,026.1 | 48.1 |
| Required reserves as percent of com'l bank dep's | 2.1 | 1.0 | -52.4 |

Real GDP is the most comprehensive measure we have of overall economic activity. The data above show the real substantial growth that occurred during the nineties. Under the concept of a flexible money supply that responds to the needs of business, the M-3 measure should have grown at roughly the same rate as real GDP. In fact, both M-3 and non-financial debt grew about twice as fast, while reserves required to safeguard bank deposits were reduced by one half. The monetary throttle, despite words to the contrary, has been pretty wide open.

The 32.8 percent rise in industrial production through 1998 was more than one-third higher than the rise during the 1980s. Manufacturing, particularly durable equipment, led the rise whereas mining was unchanged, and utilities increased about 13 percent. New construction (in current dollars) fell in the early nineties but then recovered, led by residential construction which reached a new high in 1998. Commercial/industrial and government construction also increased as the decade progressed.

Much of the impetus for this activity has been due to the sharp 65.2 percent increase in real gross investment. During the 1980s this indicator rose 25.7 percent. The fastest growing segment has been producers durable equipment - information processing equipment, industrial equipment,

and transportation and related equipment. Total residential structures also rose strongly. Computers and advances in communications equipment have changed business practices throughout the economy. These developments, along with strong consumer demand, led to the high output gains of the nineties.

Inflation has been the obsession of market commentators in the 1990s. First, the economists were enamored of the "non-accelerating inflation rate of unemployment" which they assumed to be about 6 percent. Now, along with Alan Greenspan, they focus on the "employment cost index", assuming that further rises will cause producers to raise prices automatically. Market observers, of course, see any sign of inflation as a signal for higher interest rates and a threat to stock prices.

| Indicator | 1990 | 1998 | Percent Change |
|---|---|---|---|
| Commodity prices (1990=100) | 100.0 | 86.9 | -13.1 |
| Producer prices (1982=100) | 119.2 | 130.7 | 9.6 |
| Consumer prices (1982-84=100) | 130.7 | 163.0 | 24.7 |

Financially, the nineties have been a period of falling long-term interest rates and rising stock prices. Both reflect the high growth rate of the money supply: 44.3 percent for M-3. This high growth rate substantially exceeded both real GDP growth and consumer price growth. In addition to this domestic stimulus the U.S. experienced a net $998.6 billion inflow of foreign capital. The result has been substantially lower interest rates and higher stock prices. The classical definition of inflation, "too much money chasing too few goods", has been limited principally to financial markets.

Foreign holdings of U.S. Treasury securities and currency increased $1.0 trillion during the nineties while holdings of other U.S. securities rose $1.6 trillion. These increases include price appreciation. In a broad sense, this inflow reflects weakness and lack of investment opportunity in other countries, with the U.S. seen as a safe haven. Western Europe has been the largest supplier of the funds.

The great unanswered question as the nineties draws to a close is how long these trends can continue. Short-term interest rates are currently 2.60 in Euro-11 compared with 4.89 in the U.S. If the inflow of foreign capital slows or reverses, U.S. rates could rise quickly. It is interesting to note that when the Japanese economy slowed, short-term interest rates fell to virtually zero whereas, when the less developed countries' economies declined, their interest rates soared. The difference apparently was due to the degree of dependence on foreign capital. Which way might the U.S. go?

The earnings-price ratio for the S&P 500 index is now below 3 percent compared with 6.47 percent in 1990, and the dividend-price ratio is now 1.21 compared with 3.61. Will shareholders continue to boost these valuations? One key is corporate profits, which rose to a new high in first quarter 1999 after five quarters of no growth. Unless there are further quarterly increases, there will be no logical reason for investors to continue to boost stock prices.

The nineties began in recession after the S&L commercial real estate collapse. A combination of reduced reserve requirements and government bailout restored liquidity to the banking system and launched a new credit boom. The boom was stimulated by a strong upturn in nonresidential fixed investment, especially information processing and related equipment. These stimuli, along with an inflow of foreign capital, supported employment growth in services and high consumer spending. Along the way (to the surprise of politicians) the government deficit was eliminated, helped by an accounting change that recognizes government saving. It is on that note that we approach the beginning of a new millennium.

| International Comparisons | | | | | |
|---|---|---|---|---|---|
| | Canada | Germany | Japan | United Kingdom | United States |
| **GDP** (% change 1 year) | | | | | |
| 1997 | 4.2 | 2.4 | -0.2 | 2.0 | 3.7 |
| 1998 | 2.7 | 2.0 | -2.8 | 1.1 | 4.3 |
| FH99 | 3.7 | 1.0 | 0.8 | 1.2 | 3.9 |
| **Industrial Prod.** (1992=100) | | | | | |
| 1997 | 124.2 | 100.8 | 107.0 | 111.8 | 126.8 |
| 1998 | 127.1 | 105.0 | 99.9 | 112.6 | 131.3 |
| FH99 | 130.1 | 104.0 | 98.5 | 111.8 | 133.3 |
| **Retail Sales** (volume chg. 1 yr.) | | | | | |
| 1997 | 6.8 | -0.1 | -5.9 | 5.3 | 4.7 |
| 1998 | 0.7 | 1.0 | -5.3 | 0.7 | 8.0 |
| FH99 *May. | *3.4 | 2.7 | -1.9 | 3.8 | 7.8 |
| **Consumer Prices** (1982-4=100) | | | | | |
| 1997 | 156.3 | 137.8 | 121.3 | 185.0 | 160.5 |
| 1998 | 157.8 | 139.1 | 122.1 | 191.4 | 163.0 |
| FH99 | 159.5 | 139.4 | 121.9 | 193.4 | 165.4 |
| **Unemployment Rates** | | | | | |
| 1997 | 9.2 | 11.5 | 3.4 | 5.5 | 4.9 |
| 1998 | 8.3 | 11.1 | 4.1 | 4.7 | 4.5 |
| FH 99 | 7.6 | 10.5 | 4.9 | 6.0 | 4.3 |
| **Interest Rates** (3 months) | | | | | |
| 1997 | 3.53 | 3.33 | 0.60 | 6.83 | 5.07 |
| 1998 | 5.04 | 3.54 | 0.72 | 7.33 | 4.81 |
| FH 99 | 4.85 | na | 0.30 | 5.35 | 4.44 |
| **Stock Indices** (ending) | | | | | |
| 1997 | 6,699.44 | 4,249.69 | 15,258.74 | 5,135.50 | 7,908.25 |
| 1998 | 6,485.30 | 5,002.39 | 13,842.17 | 5,882.60 | 9,181.43 |
| FH 99 | 7,006.42 | 5,378.52 | 17,529.74 | 6,318.50 | 10,970.80 |
| **Current Acc't Bal's** ($bn) latest 12 months | | | | | |
| 1997 | -12.2 | -6.3 | 94.7 | 7.3 | -166.4 |
| 1998 | -12.4 | -6.1 | 121.6 | 2.5 | -233.4 |
| FH 99 | -7.3 | -4.4 | 118.3 | 11.8 | -274.5 |
| **Foreign Exchange Rates** | | | | | |
| 1997 | 1.38 | 1.73 | 121.08 | 1.64 | 91.85 |
| 1998 | 1.48 | 1.76 | 130.99 | 1.66 | 96.52 |
| FH 99 | 1.49 | na | 118.65 | 1.62 | 94.99 |

The first half GDP growth rate was somewhat improved in Canada and Japan, but three countries - Germany, Japan, and the UK - experienced rates of 1.2 percent or less. Industrial production increased in Canada and the U.S. but declined in Germany, Japan and the UK. Retail sales volume was higher except in the U.S. where it was still very strong, and in Japan where it was still negative.

Consumer prices rose slightly in Germany and declined in Japan; they continued to increase in the other three economies at recent rates. Japan now has an unemployment rate higher than the U.S., an unprecedented relationship in the postwar world. Britain's rate has increased while Canada's and Germany's have fallen. Short-term interest rates have trended lower, including the Euro-11, which has fallen from 3.90 percent to 2.69 percent as of September 22. The U.S. rate on that date was almost as high as the British. Stock indices advanced strongly in the first half, led by the Japanese. During the third quarter, however, most experienced declines. The New York stock exchange index on the basis of 1995=100 is now over 200.

The U.S. current account imbalance grew to $80.7 billion in the second quarter. As recently as 1993 it was only $85.3 billion for the entire year. Britain's balance also worsened. By September, the Japanese yen had risen to 104 per U.S. dollar. But overall against major currencies, the dollar was little changed.

| Business Activity Indicators - United States | | | |
|---|---|---|---|
| | 1997 | 1998 | FH99 |
| Industrial Production (1992=100) | 126.8 | 131.3 | 133.3 * |
| Capacity Utilization Rate (% total industry) | 82.9 | 81.8 | 80.4 |
| .-1 urvey of Current usiness | | | |
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Real gross domestic product increased 1.6 percent in the second quarter, down from 4.3 percent in the first. This was the slowest rate since second quarter 1995. The decrease was attributed

primarily to slowdowns in consumer and government spending and investment, and to slower inventory accumulation.

Industrial production has risen every month since January, led again by durable goods production. Capacity utilization, after falling in 1998, was little changed. Manufacturers' new orders continued to rise at the same rate as in recent years, but new construction expenditures fell in the second quarter after rising in the first. The contracts index has been flat since April. Real gross investment also rose strongly led by producers' durable equipment.

| Financial Indicators - United States | | | |
|---|---|---|---|
| | 1997 | 1998 | FH99 |
| National Income (billions of $s) | 6,646.5 | 6,994.7 | 7,306.0 * |
| ---Percent change | 6.2 | 5.2 | 4.4 |
| Per Cap. Disp. Personal Income (chained 1992 $s) | 19,349 | 19,790 | 20,137 * |
| vg. Real Gross Wkly arnings (1982=100) | 261.31 | 268.32 | 270.84 |
| Gross aving (billions of $s) | 1,406.3 | 1,468.1 | 1,499.4 * |
| ---Personal (billions of $s) | 121.1 | 27.7 | -62.4 * |
| --- usiness (billions of $s) | 1,020.6 | 1,062.6 | 1,102.3 * |
| ---Government (all) (billions of $s) | 264.7 | 377.8 | 459.5 * |
| Commodity Price Inde (1990=100) | 104.2 | 86.9 | 84.2 |
| Producer Price Inde (1982=100) | 131.8 | 130.7 | 131.9 |
| Corp. Profits (billions of $s) | 817.9 | 824.6 | 864.3 * |
| Interest Rates - 10 year reas. | 6.35 | 5.26 | 5.26 |
| Money upply - M3 (ending) (billions of $s) | 5,403.7 | 5,996.9 | 6,157.2 |
| ---Percent change | 9.1 | 11.0 | 2.7 |
| Fed Res. epen Mkt. eperations (billions of $s) | 40.5 | 27.5 | 10.8 @ |
| Commercial ank Credit (ending) (billions of $s) | 4,103.2 | 4,549.5 | 4,538.3 |
| Consumer Credit (ending) (billions of $s) | 1,234.1 | 1,300.5 | 1,347.0 |
| Credit Market Debt (ending) (billions of $s) | 21,278.1 | 23,402.9 | 24,428.7 |
| ---Percent change | 7.3 | 10.0 | 4.4 |
| * nnual rate<br>@ Net purchases/sales(2 mths.) | | ources conomist, conomic Indicators,<br>F.R. ulletin, F.R. Flow of Funds | |

Manufacturers' and especially retail sales were quite strong in the first half. The inventory-sales ratio for manufacturing and trade fell while the retail sales ratio rose slightly. These gains reflect continuing increases in per capita personal consumption expenditures.

Employment in services continued its strong growth whereas employment in goods production fell 162,000 from January through August, indicating that the "tight labor market" is entirely in services.

National income rose at an annual rate of $81.4 billion in the second quarter after rising $139.2 billion in the first. Real per capita disposable income rose 1.4 percent after rising 2.4 percent; for 1998 the gain was 2.3 percent. Real weekly earning rose 1.3 percent in the first half compared with 2.7 percent in 1998.

Growth of gross saving appears to have decelerated in the first half despite strong increases in business and government saving. The cause, of course, is the reversal of personal saving into personal dissaving - $62.4 billion for the first half. This is an unprecedented development in the postwar period that began in 1997 and has deepened since; it could exacerbate any future down turns.

The depression in commodity prices continued in the first half, and the index was 83.7 at the end of August with metals at 77.6. The producers' price index rose after falling in 1998. Corporate profits rebounded after a fall in the fourth quarter.

The ten-year Treasury rate reached a low of 4.53 percent in October 1998 but was up to 5.97 percent September 4, 1999. The rapid M-3 money supply growth that started in 1995 began to slow in the first half. From a percent change of 11.5 in January (from 6 months earlier), the change fell to 5.3 in July. Federal Reserve open market purchases were close to the pace of last year.

Commercial bank credit has not grown since December, 1998, breaking an uptrend that goes back to the seventies. The slowdown affects several categories but not commercial and industrial

loans. While banks have reduced their exposure to consumer credit, overall it grew $46.5 billion in the first half, which is the fastest pace since 1995. The growth of credit market debt, however, slowed from 1998 as the paydown in Federal debt more than offset increases in the private sector. Since 1997, the amount of Federal debt outstanding has dropped more than $100 billion or about 2-1/2 percent.

The trade imbalance on goods and services for the first half of 1999 was larger than for the entire year of 1997. While the deficit on goods has continued to grow, the excess on services has fallen, mainly due to a slowdown in travel, passenger fares, and other transportation.

With direct investment valued at current cost, the negative international investment position of the U.S. increased $271.0 billion or 28.0 percent in 1998. Financial flows accounted for 209.8 billion of the increase, with the remainder due to valuation changes. The net position breaks down as follows:

| | |
|---|---|
| Net position | -1, 239.2 |
| U. . Government and foreign official assets | -607.7 |
| Direct investment | 244.7 |
| U. . and foreign securities and U. . currency | -1, 008.3 |
| ank and nonbank-reported claims and liabilities | 132.2 |

**Europe & Central Asia**

Countries in the Europe and Central Asia region continued to meet the challenges of transition with varying degrees of progress. Many Central European and Baltic countries are now sustaining growth and attracting external capital and investment. In Eastern Europe, Caucasus, and Central Asia, countries are still facing the challenges of sustained stabilization and making further progress in privatization, liberalization, and preservation of basic safety nets.

Stabilization and liberalization efforts are beginning to pay off in the transitional countries. In 1997, ten of the Eastern Europe and Central Asia countries grew at 5 percent or more, and fourteen at more than 3 percent. Yet underlying the region's general economic improvement is uneven progress among countries. Many have made considerable progress toward meeting the initial challenges of transition—establishing macroeconomic stability, liberalizing markets, and privatizing assets while maintaining social safety nets--and are now confronting a second stage of reform. Now the challenge for these countries includes:

- moving from a focus on reducing the fiscal deficit and inflation to improving the composition of public expenditures and overhauling the tax system;
- complementing mass privatization programs with improvements in corporate governance through increased competition, protection of shareholder and creditor rights, and enhanced prudential regulation and supervision of financial systems;
- moving from preventing the collapse of key infrastructure to expanding the supply and quality through private sector provision; and
- shifting from attempting to prevent the collapse of basic social safety nets to making pension and transfer systems fiscally sustainable and better targeted.

**Financial Services Industry**

The securities and finance sector of the financial services industry, which includes banking, insurance, and real estate. The securities and finance area accounts for about $160 billion of the US gross domestic product (GDP) of the total US output of financial services of $1.5 trillion.

The need to raise capital for enterprise has been around for a long time. Today many companies (often wearing several hats) are involved in raising money. These include investment banks such as Bear Stearns, which underwrite new securities by setting and supporting prices for securities issues; brokerages, such as Merrill Lynch (#1 US brokerage) and close competitor Morgan Stanley Dean Witter & Co., which trade securities and commodities (such as pork bellies and gold); merchant banks (a largely non-US form typified by Lazard Freres & Cie. and Rothschilds), which invest directly in companies; and a variety of investment companies ranging from mutual fund companies that manage assets for small investors, to hedge funds, venture capital companies, and investment partnerships.

Other profitable venues are helping individuals to raise money. Consumers' non-bank options range from mega-finance companies such as Associates First Capital (Ford Motor's former finance unit), #1 in consumer financing, and Household International (#2). More accessible are strip mall storefront operations like the Money Store (now owned by First Union), which allow consumers to consolidate debt into loans. These companies lend against collateral – usually a house – or make unsecured personal loans.

Them that's got, get; those that help them get, get more. Asset managers help their clients maximize assets. They include FMR, The Vanguard Group, and T. Rowe Price, each of which manages mutual fund families sold under its own name. Other companies (such as Franklin Resources) provide asset management for government or public institutions. Most investment banks and brokerages, as well as many banks – Northern Trust is one of the best known – offer asset management services to wealthy individuals.

Sears, Roebuck and Co. and American Express, among others, spent the early 1980s assembling their own financial services supermarkets and the late 1980s and early 1990s disassembling them. Refugees from these consolidations make up most of the top five financial services companies. Wholesale/retail smorgasbord Morgan Stanley Dean Witter & Co., formed from the merger of investment banker Morgan Stanley with former Sears subsidiaries, is #2, behind Merrill Lynch. American Express refugee Lehman Brothers is #4, and Salomon Smith Barney (affilated with Citigroup) weighs in at #5. Only Goldman Sachs, ranked #3, is untouched by consolidation.

Convergence is reuniting banking and securities functions that were separated by the 1933 Glass-Steagall Act (passed when federal probes into bank failures after the 1929 stock market crash identified banks' taking stock in their clients as a problem). Banks were forced to cut their securities operations loose, as when J.P. Morgan & Co. begat Morgan Stanley. The industry has come full circle: Banks are buying securities companies, in particular smaller regional or specialist companies. Bankers Trust bought Alex. Brown to form BT Alex. Brown and BancAmerica bought Robertson Stephens (then sold it to BankBoston when it merged with Nationsbank, which had previously bought Montgomery Securities). Others, include Minnesota's Piper Jaffray (now under U.S. Bancorp's wing) and Tennessee's Morgan Keegan, which remains independent.

The fee income is derived from deal management, company valuation, and advisory services for mergers and acquisitions (M&A) represent big bucks. The M&A binge began in the 1980s with "bust-up takeovers," in which the target company's assets were sold to pay for a takeover. Mike Milken, the wunderkind of Drexel Burnham Lambert (now defunct), pioneered the use of junk bonds (risky, high-yield corporate bonds) to finance deals, but the big name of the 1980s was Kohlberg Kravis Roberts (KKR). KKR achieved the coup de grace of 1980s finance with its $30 billion buyout of RJR Nabisco.

The 1987 crash produced a lull in M&A activity; when M&A re-emerged in the 1990s, it was kinder, gentler, and more focused (like the broadcasting empire being assembled by Hicks, Muse, Tate & Furst) but even more lucrative. In 1997 there were $919 billion worth of deals, up

from $626 billion in 1996. A feature of the 1990s boom was the flowering of small business, providing new opportunities for investment companies such as Thomas H. Lee, and for venture capital firms such as Kleiner Perkins and Austin Ventures. And when IPO time arrives, not only can companies choose a veteran – say, Goldman Sachs – but they can also choose from a host of younger boutiques such as Hambrecht & Quist, a specialist in high-tech companies.

Stock trading has come a long way since 1792, when a group of stock dealers and traders agreed to funnel business to each other in an agreement named after the buttonwood tree at 68 Wall Street where they traded. This group evolved into the New York Stock Exchange (NYSE). Those shut out of the agreement continued trading on the streets – the American Stock Exchange did not come indoors until 1921. Up until the 1970s, trading was carried out as it had been in the 18th century – by men driving hard bargains on the trading floor. Then it changed radically when the National Association of Securities Dealers (NASD) launched its Nasdaq (NASD automated quotations) electronic market. NYSE fought back, touting the superiority of the auction floor over electronic trading even as an increasing number of institutional trades took place off the floor, triggered by computer programs. NASD's revenge was to merge Nasdaq with perennial also-ran AMEX, to provide a choice of venue.

Technology drives the market in several ways. Program trading increases volatility by accentuating market movements. Human decision makers, armed with a new corporate intelligence arsenal, can make instant trades based on real-time information. Electronic financial information companies, led by Reuters America Holdings, Bloomberg, and a host of smaller comers, including Hoover's, Inc., have created a $6 billion industry in just a few years. This structural volatility has coincided with a deluge of private pension money into the seemingly endlessly rising financial markets. To meet this flow of small investors, financial services companies have added mutual funds at a dizzying pace. Nothing succeeds like excess, and some of the largest funds have seen their sheer size adversely affect their ability to post spectacular results.

Also contributing to the volatility of financial markets is industry globalization. The largest US financial services providers compete not merely with each other but also with a raft of foreign

companies, some operating under radically different rules. Deutsche Bank and UBS are two of the largest. In addition, the 1994 Mexican peso crash and the domino progression of financial crashes in Asia in 1997 and Russia and Latin America in 1998 demonstrate the potential vulnerability of world markets. Getting whacked hard is always a possibility in internation markets.

**Banks and Savings Institutions Industry**

Evolution. It's a fact. In a move toward the sort of gigantism that the dinosaurs found so successful, America's megabanks are merging into gigabanks. The 1998 merger of Nationsbank and BankAmerica to form BankAmerica catapulted the new entity past Chase Manhattan (itself a product of megamerging between Chase Manhattan and Chemical) and Citibank (now part of Citigroup following the union of Citicorp and Travelers). Also leapfrogging into new prominence was BANK ONE (offspring of the union of BANC ONE and First Chicago NBD).

It may not seem like it, but there's still some competition in the $520 billion US banking industry: more than 9,100 commercial banks and about 1,800 thrifts. Although the number has fallen steadily (down from more than 3,600 thrifts and more than 14,000 banks in 1987), the consolidation of the industry has paradoxically spurred the founding of new banks intended to appeal to customers repelled by the impersonality of the national chains. Savings banks and S&Ls, which are required to keep large percentages of their assets in home mortgages, have combined assets of about $1 trillion; banks have more than $5 trillion in assets. Additionally, while the industry is still well defined by a web of federal and state regulations, the landscape is changing quickly. Insurance companies and brokerages are increasingly offering basic banking services, and banks are venturing into brokerage, securities underwriting, and insurance. An example of this convergence was the Citicorp/Travelers deal, which allows Travelers to sell its insurance and investment products through Citicorp's worldwide retail branch network, and lets both sides benefit from the other's corporate relationships.

There are also "non-bank" banks, such as MBNA, that exist primarily to offer Visa and MasterCard credit cards. A number of support services have also evolved, such as credit card transaction processing from First Data and data processing from Fiserv.

Although the ferment of modern banking has made the phrase "banker's hours" obsolete, the industry today remains a picture of stability compared to the past. The US banking industry emerged from chaos. Post-Revolution, there were no banks, no national currency, no credit infrastructure (this had been supplied by England), and the colonial economy was in shambles.

Local banks were soon started – including Bank of New York, founded by war hero Alexander Hamilton, who immediately arranged a loan to the US government – but they remained vulnerable to runs and failures throughout the 19th century. In 1907 financier J. P. Morgan (founder of J.P. Morgan and its later spinoff Morgan Stanley) almost single-handedly headed off a banking panic.

Morgan's display of individual power led to the 1913 establishment of the ultimate banking authority, the Federal Reserve System, to regulate the money supply. The Reserve's largest, most influential component is the Federal Reserve Bank of New York; ironically, earlier attempts to establish a central bank, first spearheaded by Hamilton, failed because of populist fears of a too-powerful government (and the Fed is still a favorite target of conspiracy theorists).

The 1929 stock crash and subsequent bank failures inspired further regulatory safeguards. Freshly inaugurated Franklin Roosevelt closed every US bank for examination and pushed through a number of reforms, including the formation of the Federal Deposit Insurance Corporation and the Securities and Exchange Commission. Some institutions never reopened, and many financially sound survivors picked up assets from the losers; companies that grew in this way included Comerica and National Bank of Detroit (now part of BANK ONE via First Chicago NBD).

Industry consolidation has been fostered by successive waves of deregulation. Soaring inflation and interest rates in the 1970s drove bank and thrift customers into higher yield money market funds. Hurt by limits on the size and types of loans they could make, thrifts especially, sought relief. Congress relaxed the requirements in 1982 – with well-known results. Some S&L officers recognized the shady opportunities presented, while even the honest ones had difficulty evaluating complex new loans on energy, land, and resort developments (such as President Clinton's Whitewater). A slew of loans went bad, causing a cascade of thrift insolvencies. The Resolution Trust Corporation (RTC) was formed to find buyers for the assets of shuttered banks, setting off the first wave of acquisitions. Banks that bought assets at the RTC's fire sale prices included First Union and Fleet Financial Group.

The next consolidation wave came as barriers to interstate banking in contiguous states began to fall, creating a new breed of superregional banks, including First Union and PNC Bank, and spurring the nationwide ambitions of Chase Manhattan and Wells Fargo. At the apex of these geographically diverse firms was Citicorp, the only worldwide consumer bank. These companies were still hampered by the need to gain a separate charter for each state in which they did business. This meant extra administrative and managerial expenses. The 1994 Riegle-Neal Act, which allows single-charter interstate banking, has made consolidation easier still. Of all 50 states Texas was the only one to opt out and require separate state chartering.

Consolidation is driven by banks' hunger for market share and the economies of scale that result from the elimination of redundant operations. But that solved only part of the problem. Handcuffed by regulations that did not apply to the companies (such as Merrill Lynch) intruding on their turf, banks sought other ways to build their business. Bankers Trust, for example, moved away from client relationships entirely in favor of "risk management" services, through the structuring of complex derivatives (securities based on the performance of other securities or on external factors such as interest rates). This strategy failed spectacularly. Others took advantage of deregulation that allowed them to underwrite bonds, but their inability to offer one-stop securities shopping made banks less desirable than unregulated securities shops such as Bear Stearns.

The problem has been alleviated by relaxation of the 1933 Glass-Steagall Act, which separated banking from securities underwriting. In 1997 bank holding companies received permission to add securities subsidiaries that can contribute up to 25% of total sales. The result was a flood of deals in 1997 uniting companies such as SunTrust Banks with Equitable Securities, Fleet Financial with Quick & Reilly, and Bankers Trust with Alex. Brown. Some firms, such as BankBoston, are even opening venture units to take direct equity interests in companies.

Banking without borders doesn't simply mean a national branch network. Increasingly it means online banking. Virtual banks that are located only on the Internet are emerging, and any bank can serve any customer, anywhere, with a computer and the right software. Checkbook? – how droll. Two-thirds of the top 50 banks offer home computer banking and electronic bill payment.

In fact, online banking was projected to reach 4.5 million households in 1997, and electronics goes deeper still. Cash? – what's that? Stored-value smart cards are available now (but not widely usable yet) from First Union in partnership with Visa and MasterCard, among others.

The Japanese government has been consistently skewered for not letting its overextended banks (particularly the apparently moribund Long-Term Credit Bank) sink or swim, but US authorities are not above a little intervention themselves. In 1998, in an episode reminiscent of J. P. Morgan's handling of the 1907 crisis, the New York Federal Reserve Bank brokered a bailout of Long-Term Capital Partners, a hedge fund led by former Salomon Brothers Master of the Universe John Meriwether and Nobel Prize winners (in economics) Myron Scholes and Robert Merton. The deal, which involved no public funds, was said to be necessary to prevent a number of high-profile financial companies, including Bankers Trust, Chase Manhattan, Merrill Lynch, and Deutsche Bank (which were also contributors to the bailout fund), from suffering devastating losses on loans that financed highly leveraged bets on Russian securities and currency when Russia devalued the ruble and partially defaulted on its debts.

Until the 1929 crash ushered in an era of strong regulation, it was a common practice for banks to lend for margin purchases of securities. US Banks, striving for elephantine proportions, have yet to develop the pachyderm's fabled memory.

**Pharmaceutical and Medical Equipment Industry**

Nowadays the typical over-65 patient uses three times as many prescription medicines as a younger patient. As that over-65 group expands by 17% over the next 12 years, it will push annual expenditures on health products in the US well beyond its present $111 billion. US expenditures on drugs and other medical non-durables came to about $95 billion in 1997, and spending for medical equipment such as eyeglasses, hearing aids, artificial limbs, and wheelchairs came to about $16 billion.

Many modern surgical practices and vaccines came from the discovery of microbes by Louis Pasteur in 19th century France. Until that time, most medicines had little or no effect, and surgery was downright dangerous. Patients had a fifty-fifty chance of surviving surgery: If they lived through the operation they often died of gangrene from dirty instruments or shock from the red-hot iron used to cauterize the wound. For example, thousands of Civil War soldiers died as a result of amputations, and even more soldiers succumbed to infectious diseases and dysentery than died in battle. Even as the Civil War raged in the States, Pasteur developed his theory that fermentation and souring in alcohol and food was not caused by chemicals but by "germs." He extrapolated that disease might also be caused by germs, an idea widely ridiculed at the time – how could a tiny creature kill a human or an animal? But Pasteur's germ theory was to change medicine forever. In 1865, hearing of Pasteur's work, British surgeon Joseph Lister tried carbolic acid as an antiseptic, dousing instruments, wounds, and dressings, and drastically lowered his hospital's mortality rate. As Pasteur developed vaccines against anthrax in cows and rabies in humans, the laughter over the little germs stopped.

Today drugs and medical products are a huge business. Worldwide drug sales are rising at a rate of 8%-10% a year, and medical device sales at 7% a year. In the international marketplace, US firms account for more than 40% of the $120 billion market for medical devices and more than 30% of the $265 billion pharmaceutical market. That's good news for the top drug makers, Merck & Co. (#1 in the US), Glaxo Wellcome, Novartis, and Bristol-Myers Squibb. These companies and others like them seek to sustain their traditional 30% operating margin, which is twice that of the average S&P 500 corporation. Such astounding numbers are more

understandable when one considers that the top five prescription drugs in 1996 – Glaxo Wellcome's Zantac (losing its patent in 1998), Astra Merck's Prilosec (jointly owned by Merck and Astra), Eli Lilly's Prozac, Amgen's Epogen and Pfizer's Zoloft – generated $7.5 billion in US sales alone. Looking at it another way, the ten biggest US pharmaceutical companies posted almost $22 billion in profits on $127 billion in sales for 1997. Pharmaceutical companies are not in business for their health. They are in it for the money.

Historically, the US pharmaceutical industry has been made up of many medium-sized companies, but this is slowly changing. In 1996 alone there were 27 mergers valued at $9.4 billion in the US and 16 US-international company mergers valued at $1.9 billion. Many companies that depend heavily on one or two drugs for the bulk of their sales will merge or make acquisitions if they lose patent protection on their blockbuster drugs. In 1995, for example, Glaxo Holdings foresaw problems with the pending July 1997 expiration of its Zantac patent and acquired Wellcome to form Glaxo Wellcome. Other mergers – such as the creation of Novartis from Swiss drug makers Sandoz and Ciba-Geigy – are made to broaden a company's pharmaceutical lines and reduce costs. Still others – such as the failed attempt in 1998 of Glaxo Wellcome to merge with SmithKline Beecham – seem to be much more than an attempt to stay competitive. That mega-merger would have created a giant capable of wiping the floor with any competitor.

The key to success in the pharmaceutical industry is to have several strong-selling drugs coming out of the pipeline at all times. Companies usually launch one drug a year, although analysts say that to keep up with the industry growth rate, the top companies must fire off at least five new successful drugs annually. (For example, Pfizer, which launched its highly touted impotence drug Viagra in 1998, has 170 drugs in research and development.) Getting a drug to market takes years of research and millions of dollars to discover, develop, and gain approval for a new chemical compound or final product. The challenge is that only one in 5,000 compounds discovered ever reaches the pharmacy shelf, and fewer than one-third of companies recoup their R&D investment. Additionally, the technology used for discovering compounds is expensive and constantly changing. It's no surprise that pharmaceutical companies often team up, both on research for new products and on disease- and health-management programs, thereby creating

new markets for their products. In addition, biotechnology companies, desperate for cash, have struck deals with or been bought out by cash-rich pharmaceutical companies looking for the next wonder drug. One example is Millennium Pharmaceuticals, a company that hasn't broken the $100 million mark yet, which has deals with billionaires Eli Lilly, Bristol-Myers Squibb, and American Home Products for upfront funding in exchange for royalty payments once one of its drugs hits the market.

To help bring down the high cost of drug development, the FDA began streamlining the review process in 1992. The average review time for a drug introduced in 1997 was 19 months, down from 35 months the year before. Drug approval also increased to 121 new drugs approved in 1997, up from an average of only 70 each year from 1990 to 1994.

Once a drug is approved, manufacturers tenaciously protect it from generic drugmakers such as IVAX, Schein Pharmaceutical, and Mylan Laboratories, whose products can sell for 50% to 90% less than name brands and may erode 80% of a branded drug's business within a year of a patent's expiration. Drugs are patented for 20 years, typically starting with the discovery of the compound. Because development, clinical trials, and FDA approval can take up to ten years for completion, that leaves a shelf life of 10 to 12 years before the patent expires. Major drugmakers use many regulatory tactics to delay approval of cheaper generics. Take American Home Products' Premarin, a popular remedy for menopause symptoms that generates more than $800 million in annual sales. The company has fought off generic drug maker Duramed Pharmaceuticals' attempts to gain FDA approval for its cheaper version for more than a decade. To counteract generic drugs, drug companies also introduce over-the-counter (OTC) versions of prescription drugs. Glaxo Wellcome, whose leading stomach remedy Zantac dropped off the charts when the patent expired, brought out over-the-counter Zantac 75 in a joint venture with Warner-Lambert. Drug developers such as Bristol-Myers, Johnson & Johnson, Pfizer, and Schering-Plough all have firm footholds in the consumer products market. Leading OTC drugs include pain relievers (Johnson & Johnson's Tylenol), stomach remedies (SmithKline Beecham's Tums), and cough and cold remedies (American Home Products' Robitussin), as well as sunscreens, eyedrops, muscle rubs, and all the other quick fixes for minor aches and ailments.

Medical products, the most diverse and fragmented segment of the health care market, include some 130,000 items – everything from flimsy exam gowns and gauze to heart valves and sophisticated diagnostic equipment. The threat of AIDS and other infectious diseases has led to the increased use of protective equipment and disposable products, while the aging population has fueled growth in orthopedic and cardiovascular markets. Companies large enough to offer diverse product lines and aggressive pricing, including Baxter International and leading drug makers Abbott Laboratories and Johnson & Johnson, give stiff competition to more specialized firms. These smaller players – such as surgical device maker Boston Scientific, imaging agent maker Mallinckrodt, surgical stapling product manufacturer United States Surgical, cardiovascular product specialist St. Jude Medical, and dental equipment giant Henry Schein – are concentrating on getting bigger and diversifying through acquisition campaigns. Allegiance is the #1 supplier of medical products to hospitals.

Sweeping changes in health care have had a major impact on how prescription drug and medical device companies market their products. Historically, doctors were deemed the only ones qualified to prescribe drugs, and pharmacists the only ones to dispense them, so advertising and marketing targeted these two groups. Not until a drug was approved for OTC sales did marketing and advertising shift to the ultimate consumers, the patients. All that has changed. In 1997 direct-to-consumer advertising for prescription drugs rose nearly 50%, leading more patients to make brand-name requests of physicians. Drug wholesalers such as McKesson (#1) and Cardinal Health also influence how widely and to whom a drug is distributed; for example, a wholesaler may have an exclusive deal with a pharmaceutical company to distribute certain drugs in certain regions and with pharmacies to act as their main provider. Drug wholesalers distribute about 80% of prescription drugs in the US.

Today managed care providers wield broad decision-making power on which drugs their members can buy. Managed care has taken hold of the medical device industry as well. Although 40% of US medical products are bought by hospitals, that still leaves more than half of all purchases made by managed care buyers, a number expected to rise to 75% over the next five years. Additionally, a new type of organization has sprung up called a pharmacy-benefit management firm (PBM), which processes benefit claims, sells drugs by mail, and negotiates

pricing with drug firms. An estimated 115 million Americans are enrolled in drug programs run by PBMs, which range from independents such as Express Scripts to those owned by companies from other industries, such as insurance company Anthem Insurance and drugstore chain owner Walgreen. To capitalize on these buying trends, many pharmaceutical and medical device firms are trying to control their distribution channels. Merck, Eli Lilly, and SmithKline have even acquired PBM companies to enhance their efforts to target their largest potential customers for their products.

The end result of all these acquisitions is an industry more and more vertically integrated from drug development to marketing to health care to distribution. A growing public concern is that as alliances form and acquisitions are made, the patient is the last consideration in the process. The Justice Department is taking a hard look at some of the largest mergers of drug developers and distribution companies, and the FDA is concerned over the marketing clout of huge PBMs acquired by major drug firms. With major medical breakthroughs hard to come by, one can bet the volatility and jockeying for position that characterizes the pharmaceutical and medical products industry will continue for some time.

**Retail and Wholesale Industry**

US retail cash registers ring up about $2.7 trillion annually in sales, and of that, about a quarter comes from general merchandise, apparel, and furniture (GAF) sales. To grasp the scope of GAF, think of every consumer item sold and take out cars, building materials, and food. The rest – computers, clothing, sports equipment, and so forth – falls into the GAF total. Piped directly from manufacturers or through wholesalers and brokers, GAF is retailed in department stores, high-volume stores, and specialty stores, and via catalogs and Web sites. The US is home to more than 40 of the top 100 retailers in the world, the largest concentration of any nation; however, shopping from home is increasing in popularity through online retailers, catalog companies, and home shopping television channels and infomercials.

At the turn of the century, the US retail market fell into two very different camps. There was the small general store, which had a cracker barrel and a wheel of cheese, and the stately downtown department store, featuring an assortment of pricey merchandise and tearooms serving dainty sandwiches and cake, in the tradition of overseas monarchs such as Harrods. Just as today's US shopper no longer eats just plain crackers and cheese or elaborate finger foods, that same shopper is now faced with a range of retailers clustered in every nook of the American landscape. The grande dames, such as The Neiman Marcus Group and Saks Inc.'s Saks Fifth Avenue, carry on the genteel tradition of gourmet fare, personalized service, and goods to satisfy every taste, for a price (Neiman Marcus' legendary gifts range from first-edition books to His and Her Windjets.) These old-timers have generally given way to suburban malls with department store anchors, strings of specialty shops, food courts infested with teenagers eating pizza, and "power centers" linking large retail and restaurant chains.

The US retail market is maturing, according to industry analysts. Too many retailers trying to peddle too much merchandise is part of the problem. Since 1986, US retail space has expanded by more than 30% to about 20 sq. ft. per person. At the same time, Americans are spending less time and money on the sport of shopping. However, as you weep for retailers' sorry plight, realize that many brought their problems on themselves, compensating for the stagnant sales in their existing stores by opening new stores. As square footage has increased, so has the number

of Chapter 11 bankruptcies (such as Montgomery Ward Holding) and store closings (notably US Woolworth stores). To increase sales, large US companies such as Wal-Mart Stores are reaching abroad to the growing middle classes in Mexico, Brazil, and China. Meanwhile, some European retailers have mounted their own assault on the US pocketbook as their markets change. For example, LVMH Moet Hennessy Louis Vuitton bought into US company DFS Group, the #1 duty-free retailer, to keep its sales of champagne, fragrances, and other luxury items flowing freely.

Wal-Mart is the largest retailer of any kind, anywhere. Period. Enjoying rapid annual sales growth (16% in 1998), it alone accounts for about 15% of GAF sales in the US. For Wal-Mart and discount mass-retail brethren Kmart and Dayton Hudson's Target, the trend is to make discount stores bigger, but not too big: While 188,000-sq.-ft. Wal-Mart Supercenters and Big Kmarts successfully combine general merchandise with groceries, Wal-Mart's early experiments with 260,000-sq.-ft. hypermarts overwhelmed shoppers. Discount stores, department stores, and other stores that sell a variety of general merchandise bring in more than $345 billion. Wal-Mart's toughest rivalries are overseas: Global competitor Carrefour originated the hypermarket concept, and METRO Holding, which operates department and specialty stores, is the #3 retailer worldwide (neck-and-neck with #2 Sears, Roebuck and Co.) and the leader in Europe. In 1997 Wal-Mart acquired German hypermarket chain Wertkauf, bolstering its push to conquer Europe as well as the US.

Mass retailers are not the only ones to use price tags as customer lures. Offering a limited product selection and usually charging membership fees, wholesale clubs nonetheless create loyalty with deeply discounted prices. Once accessible only to government workers and small businesses, Costco is now the largest members-only warehouse retailer, with Sam's Club (Wal-Mart's warehouse chain) close on its heels. However, non-membership discount retailers are winning the sales war, and in response, both Costco and Sam's have broadened selection and services.

Mushrooming more quickly than wholesale clubs are "category killers," the giant retailers that dominate one area, such as home improvement kings The Home Depot and Lowe's; toy shop

Toys "R" Us; electronics suppliers Best Buy and Circuit City Stores; office supply specialists Office Depot, Staples, and OfficeMax; booksellers Barnes & Noble and Borders Group; and pet-supplies provider PETsMART. These "big box" stores buy in huge volumes and sell at hard-to-beat discounts. Category killers' annual sales (which are spread across several retail categories) are estimated to be about one-third of US retail revenues.

Accounting for about 10% of US retail sales, today's department stores are increasingly pressured by mass retailers, category killers, and the specialty stores that ring the malls. Onetime world leader Sears has fallen behind Wal-Mart. Department stores have adopted multiple strategies to retain market share. Many have found strength in numbers, merging regional chains into national companies. For example, May Department Stores owns Lord & Taylor, Foley's, and Robinsons-May; and Federated Department Stores is the umbrella for Bloomingdale's, The Bon Marche, and Macy's. Although Dillard's and Kohl's have been very successful by focusing on certain regions, other regional stores such as Saks, Nordstrom, and Neiman Marcus have begun national expansion. Refurbishing the store's image is a popular tactic borrowed from specialty stores. For example, Sears dropped its catalog and brushed up its advertising, and Sears, J. C. Penney, Federated, and Dillard's are pushing private-label brands.

Specialty stores focus on one type of general merchandise, be it casual apparel (The Limited and The Gap) or sunglasses (Sunglass Hut), music (Sam Goody) or video games ( Funco), cookware ( Williams-Sonoma) or high-tech gifts ( Sharper Image), beauty ( Garden Botanika) or fragrances ( Perfumania). In 1998 furniture and home furnishing retail sales grew by about 5%, home improvement sales by about 4%, and apparel and accessory sales by about 2%. To differentiate themselves from look-alike competitors, many specialty retailers promote the store name as a brand in itself, much as Tiffany & Co.'s name carries a certain cachet beyond the sparkle of its jewelry. Many specialty retailers have dropped all other brands to focus on their own private labels. Intimate Brands' Victoria's Secret offers its own perfume, and The Gap sells a store-music CD, reinforcing the idea of store-as-total-experience – go ahead, fall into the GAF.

Electronic data interchange systems offered by companies such as Harbinger, Symbol Technologies, and QRS track the flow of goods, making it easier for retailers to maintain their

own warehouses without extensive paper shuffling. As a result, large retailers increasingly buy directly from the manufacturers. Meanwhile, wholesalers, agents, and brokers that serve small retailers must watch as their customers are wiped out by Wal-Marts. For example, U.S. Office Products has acquired regional office supply wholesalers and complementary coffee services and janitorial suppliers; Advanced Marketing Services preselects books for non-bookstore retailers; and Color Spot Nurseries assists its large customers such as The Home Depot with merchandise displays and promotions.

Not all shoppers frequent the mall. About $87.1 billion went to catalog retailers in 1998 (up 8% from the year before). From glossy wish books to basic brochures, catalogs are popular with those who live away from shopping areas, those seeking the unusual or the obscure, or those who simply hate to shop. Mail order is the most popular: What could be easier than calling a 24-hour, free phone number to order gifts and gadgets from Lillian Vernon and Fingerhut (the latter now owned by Federated)? Although convenience is the main draw, many catalogs project an image, just like the specialty stores. For example, Spiegel and J. Crew sell stylish chic, Lands' End and L.L. Bean sell conservative class, and Victoria's Secret and Frederick's of Hollywood sell sex. Taking a different tack are direct-sales giants (otherwise known as multilevel marketing companies) such as Avon Products and Amway: Catalogs and samples are brought to the customers by sales representatives.

Shopping via TV screen is progressing like a herd of turtles. TV-based home shopping was originally touted as a new era in retail, but its sales never met expectations. The more than $3 billion industry has two main players: Comcast's QVC and USA Network's Home Shopping Network, which have about $2 billion and $1 billion in sales, respectively. Add to that infomercials, which fuel more comedy routines than sales. Why did TV shopping flop? Inconvenience. Few couch potatoes are willing to vegetate through an average 36 hours of watching before making a purchase; the mostly female shoppers who do call tend to be repeat customers.

In contrast, shopping via PC screen, on the Internet, is making like a jackrabbit, despite early failures of online malls and cyber-shops. Expected to hit $30 billion in 2000, sales via the Net

are strongest for companies such as Amazon.com (books), Dell Computer and Gateway (computers), and FTD (floral delivery), whose products don't require help with fit or color. Online access must become ubiquitous, secure, quick, and responsive if Internet shopping is to become more than a minor portion of the retail dollar. However, as more and more shopaholics go online, expect a new phrase: Shop Till Your Fingers Drop Off.

## Telecommunications Industry

Today's telecommunications systems deliver voice, video, and data via a variety of wired and wireless methods. Annual global spending on telecom services, already $726 billion, is expected to grow to $1 trillion by 2001. In the US, local calling revenue was at $92.6 billion in 1997 (although analysts believe it will fall a percentage point in 1998), and long-distance revenue came to $92.7 billion in 1997 and is expected to rise almost 10% in 1998. The defining feature of today's telecommunications market is change, spurred by technological advances and deregulation.

Telephone service was long thought to be a natural monopoly. If the entire nation was to be wired for phone service and all people were to have equal access, then there could be only one telephone service provider. In the US that was, of course, AT&T, founded as Bell Telephone in 1877 by Alexander Graham Bell. The monopoly was a success: Today about 94% of US households have telephone service. But the government, market and technology changes, and one tiny challenger ended AT&T's monopoly. With little reason to keep costs down as a regulated monopoly, AT&T had allowed phone rates to rise, even though more efficient technology could have lowered expenses. Finally, in 1969 a company petitioned for and was granted the right to compete with AT&T on a limited basis. That challenger is now known as MCI WorldCom. MCI filed an antitrust lawsuit in 1974, the US Department of Justice soon followed with another suit, and in 1982 AT&T agreed to split into seven regional Bell operating companies (RBOCs). These Baby Bells were born in 1984. MCI eventually spurred AT&T into a new era of competition, one with cheaper rates, sophisticated pricing management, and a barrage of telemarketing tactics.

For local telephone companies, deregulation finally arrived in the form of the Telecommunications Act of 1996. But the competition it was supposed to bring has been slow to materialize, mired in political and legal battles. Instead, mega-mergers have been the result ($77 billion worth in 1996) as telecom companies buy their customers rather than build new networks. Bell Atlantic acquired NYNEX and is now acquiring GTE, and SBC Communications bought Pacific Telesis and Southern New England Telecommunications and is now buying Ameritech.

In the long-distance arena, AT&T and TCI have merged (TCI is now AT&T Broadband & Internet Services); and Qwest Communications International's acquisition of long-distance carrier LCI International made it a close competitor to AT&T, Sprint, and MCI WorldCom. (Shortly after the Telecom Act was passed, AT&T broke into three enterprises in order to compete more effectively, spinning off its communications equipment and its computer manufacturing businesses.) The acquisition frenzy continues: AT&T and Tele-Communications, Inc. (TCI) have merged (TCI is now AT&T Broadband & Internet Services), and has already purchased local phone company Southern New England Telecommunications. Also, Qwest Communications International's acquisition of long-distance carrier LCI International makes it a close competitor to AT&T, Sprint, and MCI.

MCI left British Telecommunications at the altar for WorldCom, which had already acquired Brooks Fiber Properties (a local phone service provider) and the leading Internet provider, UUNET Technologies. MCI-WorldCom is a $37 billion whopper of a deal that still must pass regulatory scrutiny. The deal highlights how a formerly obscure company such as WorldCom – which started life in 1983 as a cut-rate long-distance carrier called LDDS – can grow into a dangerous rival through acquisitions; the company has acquired about 40 competitors over the years. If WorldCom is married to MCI, the company will become the third-largest US telecommunications company, behind AT&T and Bell Atlantic.

Local telephone markets are largely controlled by GTE and the five remaining Baby Bells – Bell Atlantic (#1), SBC Communications (#2), BellSouth (which follows GTE in revenues), Ameritech, and U S West. These markets are now open to competition, but competitors are finding them tough to crack. The incumbent companies have been accused of dragging their feet in letting competitors interconnect with their networks, both in small ways (causing service delays for competitors, for example) and in more significant ways (refusing to sign interconnection agreements that are not highly favorable to them). GTE has been particularly litigious, leading the charge in the courts against the sections of the Telecom Act that are less advantageous to incumbent local phone companies. Nevertheless, feisty little companies such as ICG Communications, Intermedia Communications, RCN, and NEXTLINK Communications – so-called competitive local-exchange carriers, or CLECs – are building competing networks to

offer local services. Even rural America has seen a rise in competition as companies such as MCI, Century Telephone Enterprises, and a nontraditional provider, gas company KN Energy's en*able (a communications and energy partnership with electric company PacifiCorp) target customers outside of the more crowded metropolitan markets.

The Baby Bells, in turn, are positioning themselves to move into long distance. AT&T, still the top US provider after a quarter-century of competition, has hung on to a 55% long-distance market share but may lose significant business within the next few years. MCI, the #2 long-distance provider, and Sprint (#3) continue to woo away AT&T's residential customers. Meanwhile, companies such as WorldCom's MFS WorldCom and a host of tiny players – Frontier, Telco Communications Group, and the like – are collectively chipping away more profitable business customers. The Baby Bells' entry has been long delayed, because the Bells by law are not allowed to offer long-distance service within their territories until they prove that their marketplace is open to competitors. Ameritech made two attempts at Federal Communications Commission (FCC) approval for long-distance services, and SBC Communications one try, and both were turned down. But in 1997 a federal court ruled that the FCC should have less control than the states over key deregulation issues (such as the fees that the Bells charge for access to their networks). State regulators are less likely to set up high barriers to the Bells entering the long-distance arena. For all these telecommunications competitors, small and large, local and long-distance, becoming a "one-stop shop" is the ultimate goal. Telecommunications companies want to offer customers a bundled package of services including local and long-distance phone service, online services and high-speed Internet connections, wireless phone and paging, pay TV, and tailored billing and incentives.

By merging, companies avoid the pain of building networks to gain competitive clout, temporarily at least. However, more bandwidth is being built to offer more services in new markets. What kind of bandwidth? – everything from plain old telephone service (also known as POTS) to specialized protocols that maximize existing copper lines, coaxial cable, fiber, cellular, personal communications services (PCS), and satellite. Wireless communications companies have multiplied quickly. AirTouch Communications, Nextel Communications, United States Cellular, Western Wireless, ALLTEL, Paging Network (better known as PageNet, providing

only messaging services), and cellular companies operated by the Baby Bells, GTE, and long-distance companies are all greatly contributing to the telecom boom. These companies form a wireless umbrella over the US and collect about $29.7 billion in yearly revenues.

There are more than 50 million wireless phone users in the US, representing a market penetration of about 17%; there are 180 million wireless customers worldwide, which is only about 3% market penetration. That leaves a lot of room for growth. Competition is hot in this sector. The FCC, which learned its lesson after practically giving away cellular licenses in the 1980s, auctioned off spectrum licenses for PCS, the long-awaited digital wireless technology, and raised several billion dollars in the process. Following the PCS auctions in 1995 and 1996, there are about four wireless providers per market. Heavyweights such as AT&T (already a major cellular player), Sprint PCS (a consortium of cable operators led by Sprint), and PrimeCo Personal Communications (a joint venture of BellSouth, AirTouch, and Bell Atlantic), as well as medium-sized companies such as Omnipoint, became PCS players. The problem is that the smaller entrepreneurial PCS operators, such as NextWave Telecom and General Wireless, are still heavily burdened by debt from the licenses. Though the FCC has provided some relief with easier and delayed payment plans, many PCS operators are facing bankruptcy and the necessity of handing back their radio spectrum. At the same time, cellular operators are converting their networks to digital and stepping up marketing and distribution – for example, SIMS Communications' vending machines dispense cell phones.

Data communications, driven by the Internet, are superseding voice communications. Today's networks already carry as much fax and data traffic as they do voice traffic. By 2001 some analysts think that 90% of the traffic carried on telecommunications networks will be data. However, phone networks were designed to handle voice – not data – traffic, and may require extensive upgrades to handle the growing demand for data communications. New entrants such as WorldCom and Qwest, with fiber networks incorporating the latest technologies, may be better poised to serve this new traffic. Also, companies such as telecom company IDT and software provider VocalTec Communications are spreading technologies that allow phone calls over the Internet. Once the quality of Net telephony improves, it could radically change the industry by allowing people to call around the world for the price of a local call.

The cable industry, led by companies such as Tele-Communications, Inc., and Time Warner, at one time seemed well-placed to offer telephone and data services. The industry already has wires going into more than 60% of all US homes, and its coaxial cable has much greater capacity than telephone companies' copper wires. However, expensive network upgrades or digital set-top boxes from General Instrument and Scientific-Atlanta are required for largely one-way cable systems to handle two-way traffic. Add to this the competitive threat of direct broadcast satellite, as well as the heavy debt load of the cable industry as a whole, and cable telephony is on the back burner, at least for the time being.

The rest of the world is deregulating as countries realize that their own state telephone monopolies, such as France Telecom and Deutsche Telekom, will not be able to compete in a global marketplace. Many state monopolies have been privatized as a result. Under a 1997 World Trade Organization agreement, nearly 70 countries, accounting for 90% of world telecommunications revenues, agreed to open their telecommunications markets to competition. Satellite systems, such as Iridium (a consortium led by Motorola), Teledesic (backed by Bill Gates and Craig McCaw) and Globalstar Telecommunications (a joint venture of Loral Space & Communications Inc., QUALCOMM, AirTouch, and other companies), are in the works to offer worldwide data and communications services, even in the remotest areas. Meanwhile, developing nations such as China (served by International Wireless Communications Holdings and many others) and Russia (pursued by PLD Telekom) have discovered that wireless communications allow a telecommunications infrastructure to be quickly established without the expense of wiring every home and building. The rapid pace of change in the telecommunications industry promises that nothing is impossible – beaming ourselves, not just our voices, may be the next step.

**Transportation Industry**

Today, $425 billion worth of US goods are sent via trucks, ships, railcars, and jets. The top freight transport companies depend on high-tech means to grab market share – satellites and other sophisticated tracking devices – so try not to act surprised when they announce the launch of "time travel" operations that really do get the package delivered yesterday.

The oldest, largest maritime companies operate outside US borders – Taiwanese shipping company Evergreen Marine (#1 in the world) battles Denmark's AP Moller to hold the largest container shipping fleet, and the Hyundai Group and Samsung Group are leading shipbuilders. The $5.9 billion US maritime industry is beset by aging fleets that must be replaced by double-hulled tankers in order to meet strict US environmental laws, worldwide overcapacity that is depressing rates, and debilitating union strikes and slowdowns. US shipping lines hope that improved methods for container ships carrying cargo – standardized aluminum containers allow efficient packing – and for tankers carrying petroleum will help them survive in a market based on volume shipping. To help US shipbuilders compete with the lower-cost Japanese and South Korean shipbuilders, the federal government gives the US companies aid that includes assistance with technology and process improvement; meanwhile, shipbuilders have streamlined construction by reassembling large sections of the ships, using new welding techniques. As of 1996, the US was exporting commercial vessels for the first time in 30 years.

Ground transport kicked into gear in the US in the late 1700s, thanks to a venerable government agency, the United States Postal Service. Under the direction of the first postmaster, Benjamin Franklin, the service resembled an unstructured horse race around the country to deliver letters, which at the time had no need for stamps or envelopes. Then, in the early 1800s, Europe's Industrial Revolution arrived in the eastern US in the form of the steam locomotive. Fashioning gun barrels into steam tubes, Baltimore merchant Peter Cooper built the first North American locomotive in the 1830s. Northern rail lines helped the Union defeat the South in the Civil War; the end of the Civil War saw the rise of rail freight giants such as Union Pacific, Canadian Pacific, and Burlington Northern Santa Fe (then called the Great Northern and Santa Fe). These giants came of age in an era when government land grants and subsidies spurred one of the greatest rail expansions in history. Coast-to-coast railroad transport and travel became a reality in

1869, and J. P. Morgan, Cornelius Vanderbilt, and other empire makers built their robber baron reputations making behind-the-scenes railroad deals, manipulating stocks, and draining companies' assets to further their fortunes. By 1896 Charles Dow's index of 11 stocks that investors could use to gauge the market included nine rail transport firms. But even as railways spread, both rail and shipping companies were shortly to be over taken by two new methods of transport: the automobile and the flying machine.

The new century saw the rise of bus companies such as Greyhound Lines (which mainly delivers passengers but supplements its revenues with inexpensive package delivery as well). Mail and freight shipping took to the skies in the 1920s. As air passenger traffic grew, parcel services became less important to commercial airlines, speeding the dominance of air and ground transportation integrators, which today generate 85% of market revenues. Leaders include the world's largest package delivery firm, United Parcel Service (UPS), which had a nationwide delivery by 1975, and FDX's overnight master Federal Express, founded in 1971 and reaching the entire US by the 1980s. Ironically, FedEx founder Fred Smith had the idea for next-day delivery service while a student at Yale in the late 1960s, but the concept didn't exactly bowl them over in New Haven: Smith's term paper on the subject earned a "C." These delivery corporations have been eroding the business of the US Postal Service; though the post office is a masterpiece of reliability, delivering 43% of the world's mail, business customers rely on the just-in-time delivery of Federal Express and UPS. Meanwhile, because airfreight delivery isn't as profitable as truck delivery, the delivery companies have now set their sights on the trucking industry. For example, FDX gained the #2 ground-express trucking company, RPS, as part of a 1998 acquisition.

On-demand airfreight companies such as North American leader Kitty Hawk took flight to cater to large corporations that required door-to-door delivery. Management consulting firm MergeGlobal, which tracks the $40 billion national and international air freight industry, predicts total US international air trade will grow from 5.5 million tons in 1996 to 8.5 million tons in 2002. More trade translates into hotter competition. Regional and national air carriers are scrambling for the latest technologies, from smart drop boxes that "tell" their owners when a package should be picked up to Web sites that give customers the ability to track status instantly.

FDX, for example, spends about $1 billion annually on shipping technology that enables it to act as a warehouse and distribution center for semiconductor and computer companies.

By the 1970s, railroads had grown bloated and were losing business to the rising $360 billion trucking industry. Trucking companies such as Consolidated Freightways, Schneider National, and Yellow Corporation's Yellow Freight, as well as do-it-yourself firms such as AMERCO, owner of U-Haul, and business specialist Ryder System, have come to dominate the freight industry, largely at the expense of the railroad companies. Trucks now carry 80% of all consumer goods and receive about three-quarters of freight shipping dollars. Trucking companies aren't without their problems, however. A shortage of drivers fueled the rise in double- and triple-trailer trucks and led carriers such as J.B. Hunt Transport (the #1 publicly held truckload carrier) to hike wages by one-third. Other truck carriers have yet to recoup business lost during a devastating 1994 Teamsters strike, which has, in turn, led to industry consolidation.

The $19 billion less-than-truckload industry, so named because its companies consolidate smaller loads of various customers' freight that wouldn't fill a trailer, is becoming more important as manufacturers keep fewer goods in stock. In their battle with FDX and UPS, trucking companies are tracking goods around the clock with satellites and are catering to international corporate clients with special logistics branches. Others, such as Roadway Express, augment their traditional trucking with ground delivery and air express operations.

The $36 billion rail industry has not been completely derailed, however; it seems to be back on a track, thanks to the US government. In 1971 Congress created the National Railroad Passenger Corporation (Amtrak) to revive passenger trains, and today, as part of its effort to become profitable, Amtrak is adding delivery services. In 1980, the Staggers Rail Act opened up the US railroads to economic deregulation, clearing the way for a massive restructuring that has reheated competition with the trucking industry. That year there were 40 first-class railroads; now there are a half-dozen. Four companies – #1 company Burlington Northern Santa Fe, followed by CSX, Norfolk Southern, and Union Pacific – are the market leaders. Besides the top-tier lines, the industry includes about 30 regional railroads and more than 500 terminal and switching

railroads. The resurgence has stoked the financial furnace of railcar makers such as ABB Daimler-Benz Transportation, the largest in the world.

Though rail mergers are nothing new – the Canadian National Railway has merged more than 220 railroads since the 19th century – they may have a rough ride on the rails, at least in the early stages. Notably, the 1996 merger between Union Pacific and Southern Pacific resulted in transportation delays that have cost US companies, such as wheat and coal producers, $2 billion as of early 1998. Glitches in the two companies' integrated tracking systems caused trains and railcars to be stranded and deadlines to be broken; some shippers view these problems as a black eye to the rail industry as a whole. The shortage of railcars at West Coast shipping yards also has hamstrung the shipping industry by slowing cargo handling.

Transport facilities in other countries, long government-owned, are falling to privatization. Europe's weakened rail industry has dropped behind Asia in serving crowds of commuters, and the US in freight delivery prowess. In the shadow of NAFTA, Mexican rail privatization is benefiting US cross-border railroad trade. Kansas City Southern Industries has hooked up with Transportation Maritima Mexicana in a bid to operate a 2,600-mile stretch of rail in Mexico, and Union Pacific is in a similar partnership. Railroads such as Kansas City Southern are also taking advantage of outdated equipment overseas to establish a global presence. In the post-deregulation era, US railroads have cut costs and personnel, invested heavily in technology, and worked to take a chunk of the burgeoning intermodal freight traffic that moves between two or more types of carriers. In short, they are working toward the day when trucks, trains, and other transportation blend into one smooth ride.

**Biotechnology Industry**

Virtually every plant and animal grown commercially for food or other applications is a product of crossbreeding, hybridization, or more advanced science, including "FlavrSavr" tomatoes that ripen on the vine (developed by Monsanto's Calgene), corn that is resistant to insects, chemically engineered cheese, and cows genetically modified to produce more milk. These are all examples of biotechnology at work. Simply defined, biotechnology is a collection of scientific techniques that use living organisms or cells and their molecules to make or modify products, improve plants or animals, or solve problems. The many tools developed by the $10.8 billion biotech industry, with 11% revenue growth in 1996, are used by virtually every industry. Besides agriculture, client industries include pharmaceuticals and medical diagnostics, chemicals, textiles, household products, manufacturing, environmental cleanup, food processing, and criminal forensics (identifying criminals through the physical traces left behind at crime scenes). In terms of biotech breakthroughs, more than 1,300 US companies – two-thirds with fewer than 135 employees – dominate this field, although recently Japanese firms (over 200) and European concerns (about 700) have made technological strides forward.

Although biotechnology includes *any* application that uses living organisms to modify human health or the human environment, the key to modern biotechnology is the manipulation of DNA. Until James Watson and Francis Crick's 1953 discovery of the DNA structure, most genetic tinkerings involved whole organisms (for example, hit-or-miss breeding of plants or livestock). Understanding the cell protein production process was a major advancement. Then, in 1973, two scientists snipped a piece of toad DNA and placed it in bacteria, where it resumed its natural function. This discovery of the recombinant DNA process led to the use of clone cells to attack viruses, methods for reading DNA sequencing, and, eventually, the placement of a gene in a mouse. In 1997 The Roslin Institute and PPL Therapeutics bred the first cloned mammal, Dolly the sheep, and, shortly thereafter, monkeys were successfully produced from cloned embryos. In sum, humans use biotechnology to influence the genetic makeup of living creatures, and they are now venturing into genetic xeroxing – the stuff that sci-fi writers' dreams are made of.

Modern biotechnology combines molecular and cellular biology, genetics, and the disease-fighting properties of the human immune system, but the industry has humble origins. Humans have been using living organisms and fermentation to make alcohol, cheese, and bread since 7000 B.C. The biotech wizard of yore – say, a brewer – had one advantage over today's biotechnician: no lengthy US Food and Drug Administration (FDA) approval process. In health care, for example, a new drug can take nearly 15 years to develop and bring to market, at an average cost of $359 million. The top six biotech companies spent an average of $101,000 per employee on research and development (R&D), as compared to top pharmaceutical companies, which spent an average of $29,000 per employee.

A quarter of the US industry's sales come from therapeutic and diagnostic health products. Only one drug in 10,000 makes it to market, but the payoff can be enormous: a potential $500 million or more per year in sales. (For example, Amgen's red blood cell enhancement drug, just one of the company's stable of drugs, made more than $1 billion in 1996 worldwide sales.) Products include biotech medicines, based on human proteins that help the body fight infections or carry out functions; vaccines that don't use weakened or dead viruses, unlike conventional vaccines; simplified diagnostics (such as blood screening or home pregnancy tests); and the fastest-growing category, gene therapy, which transplants genetically altered cells to fight diseases or viruses (such as heart disease or AIDS) or to correct genetic disorders (such as muscular dystrophy and cystic fibrosis). There are more than 40 such FDA-approved medicines, and more than 280 medicines are undergoing human clinical trials.

Because of the staggering costs and length of time involved with bringing a product to market, biotech firms must be as adept with finance as they are with DNA. They must raise capital to sustain the company long enough to negotiate the research, development, and approval processes. Although the federal government has provided funding for three decades, biotech firms have attracted other forms of financing since the early 1980s – after the US Supreme Court ruled that genetically engineered bacteria could be patented, raising investors' hopes of striking it rich. Market capitalization, the value of the US biotech group as determined by the market price of issued and outstanding common stock, increased 60% in 1996, from $52 billion to $83 billion. Funds raised for R&D in 1996 escalated to $7.8 billion, a 97% increase from 1995. Publicly

traded firms such as Amgen (#1 in sales), Chiron (#2), and Genentech (#3) all have track records for bringing drugs to market and making money.

Alas, the biotech industry has failed to deliver many of the wonder drugs it promised in the 1980s, and cures for cancer, leukemia, diabetes, and AIDS still have not appeared. The industry lost $3.5 billion in 1996. The nature of the biotech beast is that investment is not for the faint-of-heart: A biotech firm can't predict whether a drug will be a hit or a miss. No one can foresee when and if a tiny entrepeneurial firm will become a profitable Biogen, IDEXX, NABI, Empi, or TECHNE. In addition, even a relatively large, successful company such as Genzyme may remain unprofitable, because of its high R&D costs, even as its revenues grow. On the plus side, a biotechnology stock can be bought fairly cheap until the firm brings a drug to market, and the returns can be high. Because Wall Street blows hot and cold on biotech stocks, and because secure funding is so important for biotech concerns, many biotech firms look to the $110 billion pharmaceutical industry for help. For example, Centocor's drug ReoPro, which is marketed by Eli Lilly in return for half of profits. Pharmaceutical firms are also building their own biotechnology muscle or, more commonly, snapping up biotech firms as a cheap alternative. Centeon, with sales on par with Genentech's, is a private joint venture of two deep-pocketed giants: pharmaceutical company Rhône-Poulenc Rorer and chemical company Hoechst. Bristol-Myers Squibb conducts its research in tandem with smaller biotech firms. Many biotech companies are owned or partially owned by major drug companies: Glaxo Wellcome bought Spectra Biomedical; Novartis has an almost 50% stake in Chiron, and Hoffmann-La Roche, which is the subsidiary of Roche Holding, owns about two-thirds of Genentech.

Although they do not attract the same attention as a potential cure for cancer, there are other markets for biotech products. Biotech-generated chemicals, environmental cleanup products, mineral recovery products, and energy production generate almost half of sales for the industry. Organic materials (such as starches, celluloses, and oils) are converted into commodity chemicals, specialty chemicals, and energy products such as ethanol. In addition, biochemicals produced by companies such as Life Technologies and ArQule are used both by researchers and by manufacturers of genetically engineered products. For example, the enzymes used in detergents and dyes by companies such as United-Guardian are genetically manufactured to

enhance performance and replace harsh compounds that damage the environment. To clean up environments that have already been damaged, companies such as Strategic Diagnostics and Sybron Chemicals provide the technologies used for bioremediation, employing bacteria that eat industrial waste and turn it into harmless by-products, for example.

Agriculture products – including plant genetics, crop protectants, food processing tools such as biotech-derived diagnostics that trace dangerous food pathogens, and animal health care products – bring in more than 10% of sales for the industry. Sales of the first genetically engineered crops brought in almost $300 million in 1996 to companies such as Monsanto, and DNAP Holding's DNA Plant Technology, and major firms such as Novartis, E. I. du Pont de Nemours and Co., and Dow Chemical are all taking a dip into the agricultural gene pool. Besides modifying the genetic makeup of plants and animals to improve flavor or production, biotechnology replaces chemical pesticides and fertilizers with genetically tailored solutions such as crops that are engineered to resist pests or grow in poor soil. When will agricultural Utopia appear? Only the FDA, the US Department of Agriculture, and the Environmental Protection Agency can say. Simple DNA fingerprinting can cross-match two strands of DNA; companies such as Perkin-Elmer offer applied biosystems that solve crimes and resolve paternity suits. But in the complex search for genetically based cures, computers are the key to progress. Traditionally, a chemist in a white coat would test hundreds of compounds in the laboratory. Now the long trial-and-error gene-manipulation stage takes place using robochemistry, applying automated, large-scale computerization to drug molecule research. Robochemistry depends partly on gene mapping done by companies such as Human Genome Sciences in cooperation with pharmaceutical giant SmithKline Beecham. After testing thousands of compounds against the molecular disease target identified by the gene map, the research company digests all the data using bioinformatics (computer simulation), offered by companies such as Incyte Pharmaceuticals and CuraGen. Computers, not people, crunch the millions of combinations and possibilities, increasing efficiency and the number of likely matches. In biotechnology's future is The Human Genome Project, a mind-boggling effort to map the human body's 100,000 gene sequences, federally funded to the tune of $200 million a year. With a complete genetic blueprint, scientists hope to better understand the sequence interaction and how tens of thousands of amino acids come together to form proteins' intricate shapes and surfaces.

Biotechnology is changing our lives, literally. Bioethics must decide how far man can play God. For example, while The Human Genome Project's aim is to discover the genetic causes of diseases, the fear is that people genetically predisposed toward disease will be discriminated against. In another example of ethical quicksand, scientist Richard Seed of the University of Illinois at Chicago has publicly proclaimed his goal of creating human clones. Whether human cloning should be banned until the ramifications are fully understood is the subject of several congressional bills. Biotechnology may promise to cure human illness, replicate humans – even stop the aging process – but the industry is venturing into uncharted territory.

**Automobile Industry**

In a way, the Model T embodied the Ford Motor Company – it was started by a crank. Henry Ford was as irascible as he was visionary. A staunch prohibitionist and anti-Semite, the misanthropic marvel pioneered the moving assembly line that made cars cheaper and helped his company maintain a leading market share until the 1920s. Ford was not the first, though he did it best. The Oldsmobile was actually the first mass-produced car, but the manufacturer ended up seeking safety in numbers with General Motors (GM). GM was busy uniting carmakers, 17 in all by 1910, including Oldsmobile, Buick, Cadillac, and Pontiac. The car industry gelled rapidly. Of some 500 original auto manufacturers, only 200 survived until 1908. Of those, only 23 made it to 1917. Today, a handful of US manufacturers account for about 23% of the world's motor vehicle production, with Japan a close second at about 21%. The Big Three – General Motors, Ford, and Chrysler – are now the Big Two as Daimler-Benz acquired Chrysler in late 1998 to form Germany-based DaimlerChrysler. GM and Ford sell slightly more than half the cars on the road in the US, although the share for GM, still the world's largest automaker, has fallen below 30% for the first time since WWII. The other US automakers are the so-called transplants – US operations established by foreign carmakers.

After the WWII the demand for the luxurious, fast cars skyrocketed. Throughout the 1950s and 1960s Americans liked their cars big. The 1970 subcompact car selection was sparse, including the chronically underpowered Toyota Corolla, Volkswagen's Beetle, and the only American subcompact, the AMC Gremlin. Then came the 1973 oil crunch. Lee Iacocca, president and heir-apparent to Ford chairman Henry Ford II, worked a deal with Soichiro Honda, Japan's Henry Ford: Honda Motor was to produce fuel-efficient front-wheel-drive engines for a new compact car. No dice, said Hank the Deuce: "No Jap engine is going to be under the hood of a car with my name on it." Henry II fired Iacocca, who re-emerged in 1978 as chairman of Chrysler. After the 1979 oil shortage, the Japanese nabbed nearly 30% of US market share from American automakers.

Cut to the modern day and a newly competitive global industry dominated by ever-growing car manufacturer goliaths offering a vast array of models and options. The world's 40 automakers

face a glut of capacity as car buyers seek lower prices and more add-ons. The need to spread costs over more cars is helping to fuel a drive to consolidate. As the European Union drops trade barriers, European carmakers, accountable for a third of new cars produced worldwide, are getting into fighting shape by cutting bloated employee rolls, reducing overcapacity, and forming joint ventures and mergers. Witness Daimler-Benz's paradigm-shifting acquisition of scrappy Chrysler and Ford's purchase of Volvo's automaking operations. As a result of this trend, European luxury carmakers are slowly disappearing – Ferrari and Maserati are now made by Italy's Fiat, and Jaguar and Aston Martin are owned by Ford. Volkswagen has Bentley and the Rolls-Royce name until 2002, after which Bayerische Motoren Werke (BMW), the technical owner of the Rolls-Royce brand name, assumes the mantle (Rolls-Royce plc no longer makes cars.) Volkswagen's AUDI unit has gobbled up Automobili Lamborghini. The same consolidation is expected in Asia, where carmakers need an influx of capital to survive the economic crisis. For instance, heavily in debt Nissan sold a controlling 37% stake to France's Renault, which installed its own man - Carolos "Le Cost Killer" Ghosn - in the executive suite. Other international joint ventures also abound: GM owns 49% of Isuzu and 50% of Saab, and Ford has a controlling 33% stake in Mazda.

Over the past few years, American automakers have seen steady 2%-3% growth, but future growth requires increased cost-effectiveness. With their urgent need to cut costs, carmakers cannot afford to share Henry II's reservations against using independent suppliers (from whatever country) for inexpensive components: Ford outsources 50% of its car parts. The auto parts industry does more than $50 billion in business and is made up of over 10,000 suppliers in the US; 2,300 in Europe; and 2,100 in Japan. The largest include Delphi Automotive Systems (spun off by GM in 1999), Ford's Visteon division, Toyota affiliate DENSO, steering systems and seat belt maker TRW, German independent Robert Bosch, and seat and battery maker Johnson Controls. This fragmented industry is consolidating as car manufacturers deal with fewer suppliers – seeking out those that build more complete component systems for assembly into cars.

Like the small parts supplier, your neighborhood car dealer is on the endangered list. The 22,000 car dealerships are threatened by smooth-talking regional car dealers such as JM Family

Enterprises, Jordan Motors, and Wayne Huizenga's AutoNation, the first - and largest - national auto sales organization. To meet this consolidation drive and to pare distribution costs, GM is buying up independent dealers in order to sell cars through its own retail outlets.

While cost-cutting has helped automakers' bottom lines, GM and Ford have to deal with a mighty dollar and a feeble post-Asian Contagion yen, which makes American and European cars more expensive for Japanese consumers and Japanese exports more affordable in the US and Europe. To limit their exposure to such undulations in world currencies, such foreign carmakers as Honda, Toyota, and BMW have been setting up shop in the US. These transplants accounted for less than 2% of passenger cars sold in the early 1980s, but now they make up more than a third of US car sales.

Ironically, the big car is back, and sales of trucks and sport utility vehicles (SUVs) are steadily growing. Even stoic Japan is having a go at selling big-car swagger. Its largest carmaker, Toyota, has strikingly redesigned some of its Lexus luxury models, introducing a luxury SUV, to reflect the new aesthetic – emphasizing beefcake over bourgeoisie. Japan's second-largest carmaker, Honda, is rejiggering its Accord model to make it bigger for US consumers, while #3 Nissan contemplates reintroducing a sports car reminiscent of its discontinued 300ZX line.

Sales figures for the big US automakers will likely level off for the next few years as their top markets mature, but opportunity still beckons from developing countries. The current global car market is expected to grow from about 44 million vehicles sold per year to 64 million by 2002. This growth is expected to come from China (with a ratio of 680 people per car), India, the Pacific Rim, South Africa, and South America. Volkswagen, which already controls about half of the Chinese car market, is battling it out for Brazil with GM, Honda, and Fiat; Toyota has also entered the fray.

Expanding into new markets is only one way for automakers to expand sales. Another is to offer new products, and the race is on to see who will successfully offer the first low-emission car. GM's battery-operated EV1 fell flat because it required frequent rechargings. Now the major automakers are investing in fuel cells - devices that convert liquid hydrogen into electricity.

DaimlerChrysler has a prototype that it expects to get to market by 2004; Ford, GM, BMW, and Honda all have announced plans to market competing versions that same year. Whether these environmentally friendly cars will be able to compete in a market where trucks and SUVs are becoming the preferred mode of transport remains to be seen.

**Energy Industry**

The 18th Century's energy industry encompassed timber, coal, water power, and horse power. Then there was electric incandescent light invented in 1879 by Thomas Edison, who later founded Edison General Electric, the forerunner of General Electric. Today, about 85% of the energy we consume comes from three major sources: oil, which is #1 in terms of energy consumption; natural gas, #2; and coal, #3. The electric company uses much of these fuels, and with good reason: close to 100% of US homes and businesses are wired for electricity. Across the board, US expenditures on electricity are outweighed only by money spent on petroleum products, including gasoline. Edison's light, quickly followed by Karl Benz's automobile and a host of other energy

The oil industry, composed of integrated oil companies and oil field equipment and services companies, as well as pipelines, refineries, and resellers, produces the crude oil that is converted to gasoline, heating fuel, jet fuels, and more. Remember John D. Rockefeller's Standard Oil, the monolithic oil trust derailed in 1911 by the Sherman Antitrust Act? Today's $850 billion integrated petroleum industry is commanded by Standard's descendants, including Exxon Mobil, Chevron, and the former Amoco (now BP Amoco), the oil majors that not only explore for oil but refine and market it as well. Exxon Mobil has elbowed aside Anglo-Dutch Royal Dutch/Shell as the world's largest oil company.

These companies are merging operations to compete in a tougher business environment. All told, there are just over 20 major oil producers and refiners that serve the US and 40 or so major worldwide petroleum companies, though hundreds of small, independent exploration and production firms account for about three-fourths of well completions. Also affected by the oil industry's ups and downs are the oil equipment and services companies (with more than $100 billion in revenues). A few giant service providers, such as Halliburton, Schlumberger, and Baker Hughes, dominate this sector, but there are many more smaller companies that provide specialized services, such as contract drillers R&B Falcon, Global Marine, and Noble Drilling, or technology company Dawson Geophysical.

Natural gas is used to fuel factories and electric utilities and heat homes and businesses, bringing in more than $46 billion in revenues to pipeline companies and utilities. Previously strictly regulated for prices, the industry is now learning to do what oil has done all along: compete. Before 1978, producers sold natural gas to pipeline companies, which in turn sold it to gas utilities, known as local distribution companies (LDCs). Wholesale gas pricing was freed by the Natural Gas Policy Act of 1978 and pipelines were deregulated and "unbundled" in 1986 and 1992, respectively, by the Federal Energy Regulatory Commission. The LDC, exemplified by high-dollar earners such as Columbia Energy Group, is now a monopoly, but states are looking here as well with an eye to customer choice. The result of deregulation is that the gas marketer has assumed great weight in the industry; Enron, which is rapidly expanding in the US and abroad under the guidance of CEO Kenneth Lay, is the #1 gas marketer.

King Coal makes about $19 billion in revenues, and although coal no longer heats many homes it has almost made up the difference by fueling electricity-generating plants. The real opportunity now lies overseas, in developing countries that are just beginning the electrification process. With a billion tons in annual output, the US coal industry is #1 in terms of energy production (followed by natural gas, then oil), and unlike the oil and gas industries, it exports more than it imports. Major US coal companies such as Peabody Group (the world's largest private coal producer), Arch Coal, and AEI Resources stand to benefit. They are snapping up smaller companies, the better to compete with global companies Broken Hill Proprietary, Anglo American, and Rio Tinto.

Let's not forget two smaller pieces in the energy picture, nuclear power and renewable energy sources, each contributing less than 10% to consumption. Nuclear power is in disfavor with regulators and the public – where do we put all that nuclear waste? There are approximately 100 US nuclear plants, usually owned by electric utilities, and usually incurring many repair bills and headaches for their owners – ask Northeast Utilities or Unicom's Commonwealth Edison. Renewable energy may still be a real option, albeit an expensive one. Renewable sources include water, earth (heat originating below the earth's crust), wind, and sun. There's even something called biomass, which is all the wastes from modern living – including sludge, municipal solid

waste, tires, and landfill gases – that can be converted into energy by companies such as Waste Management.

Many energy companies have looked abroad for growth. Like the coal industry, the electric industry benefits from increased power usage abroad, as utility giant Southern Company and other power firms invest in power generation and transmission projects overseas. The Asian financial crisis is seen by some US firms as a chance to pick up power assets at fire-sale prices. But in the US, the industry is bracing itself for internal combustion. Historically, $200 billion electric power industry was cocooned in a monopoly. The 1992 National Energy Policy Act (EPAct) changed that. Among other things, EPAct requires electric utilities to transmit competitors' power to customers who buy in bulk, such as big industrial plants. California, always the trendsetter, was the first to pass a law for a version of a retail electricity-free market; not coincidentally, California-based PG&E and Edison International also had some of the highest rates in the country. Other states have followed California's lead. And Congress has several bills before it proposing nationwide deregulation. So far, however, most states put in place protective tariffs and schedules designed to prevent too shocking a transition to the free market – and utilities have kept their competitors at bay.

What does deregulation mean? Taking a tip from the oil companies, which have strong brand names at the gas pumps, the utilities are trying to put some sparkle into their electricity. UtiliCorp United was the first to try branding electricity. Utilities are also looking into completely new business areas: soon the utility man may be selling you a home security system or a cellular phone. The Telecommunications Act of 1996 freed the giant electric utility holding companies to enter telecommunications areas, and Southern Company and American Electric Power are just two of many that are taking the plunge. Some electric utilities, forced to sell off power plants under deregulation initiatives, are focusing on telecom opportunities: NSTAR, the holding company for Boston Edison, is one. But others, such as UtiliCorp, found that consumers were not prepared to buy new services from their old utility.

Preparing for competition, the big utilities have been positioning themselves to get bigger; for example, the proposed merger of AEP, based in the Midwest, and Central and South West of

Texas would create the largest US utility. The deregulation of electricity and natural gas has also encouraged the convergence of the two industries. Thus we see giant electric company TXU acquire the owner of Lone Star Gas, while Enron walked electric company Portland General down the aisle.

By 2020, world energy demand may double, according to the World Energy Council. To meet the forecast world demand for electricity alone in the next quarter-century, it is estimated that one major power station (1,500 megawatts) will have to be built every week. The growth comes not from the rich countries, as might be expected, but from the developing countries of Latin America and Asia. Asian contagion may temporarily derail new power projects and cripple consumer demand for cars and appliances.

## Consumer Electronics and Appliance Industry

The home appliance and consumer electronics industries ship products worth about $34.6 billion a year. The modern home appliance industry didn't take shape until the early 20th century. Technology was the driver. In 1907 Maytag produced its first washing machine, a hand-cranked wooden tub model. The Nineteen Hundred Corporation (today's Whirlpool) began selling electric washing machines in 1916 and by 1929 was the world leader. Meanwhile, Swedish vacuum cleaner makers AB Lux and Elektromekaniska teamed up as AB Electrolux to improve design and begin mass production. Along came the first electric dishwasher (1913), the first home refrigerator (1918) and the first gas stove (1928). Then, as women left home to enter the workforce, the need to lessen household chore time increased demand for appliances. Washers and dryers became commonplace in US homes in the 1960s, and the microwave followed in the 1970s.

The makers of audio and video (A/V) equipment for the home (about $12 billion worth of US goods shipped in 1997) and home appliances (shipping about $22.6 billion) simultaneously sell high-tech time-savers and time-wasters. As General Electric (GE) touts the "quietest dryer ever, with an electronic sensor to help dry clothes more evenly," Mitsubishi boasts "seamless TV and Internet content integration" through its WebTV receiver. Even as Matsushita Electric Industrial (Panasonic and JVC brands) insists that connecting a TV to its home theater system is simple, AB Electrolux wants you to know that its microwave ovens spares you the burden of remembering that "the perfect combination for clams in white wine is medium heat for three minutes." And what better way to use the time saved by Whirlpool's dishwasher that makes prerinsing "a thing of the past" than by enjoying the 36 in. monitor that Thomson claims is the "centerpiece of a sophisticated home entertainment center or PC Theater"?

Top sellers in small niches include Sub-Zero (freezers) and Emerson Electric's In-Sink-Erator (disposals), Semi-Tech's Singer sewing machines, and Maytag's Hoover vacuum cleaners. Gillette, Sunbeam, NACCO, Windmere-Durable, and Rival lead the US market for small appliances such as toasters, irons, and coffeemakers. Sharp, Samsung, and LG Group are leaders in the microwave market. But let's talk about the big-ticket white goods. The list of market

leaders in the US for stoves, ranges, ovens, refrigerators, washing machines, dryers, and dishwashers is a short one: Whirlpool, GE, Maytag, Electrolux, and, far behind, Goodman Holding, which joined the ranks when it bought the Amana line from Raytheon in 1997. The US industry consolidated in the 1970s and 1980s, as exemplified by the 1986 purchase of the #3 company, White Consolidated (Frigidaire, Kelvinator) by Electrolux. Today the remaining players in the US are restructuring to make all those acquisitions function more efficiently.

Technological advances these days include making appliances quieter, easier to use, and able to automatically adjust such functions as temperature and timing. Be they for enhanced performance, energy efficiency, or the sake of tougher environmental regulations, these innovations are largely driven by market saturation. Upwards of 95% of existing US households have refrigerators, ranges, clothes washers, and microwaves, so appliance makers depend on a healthy new-housing market for much of their domestic growth. At the same time, because three-fourths of major appliance sales in the US are for replacement products, companies focus on brand loyalty. The manufacturers' families of appliances priced at various levels snare everyone from first-time buyers to free-spending baby boomers who want their remodeled kitchens and laundry rooms to feature top-of-the-line amenities.

The home appliance industry, though fiercely competitive, is sedate compared to the consumer electronics crowd. While the former is driven by the same things as always – the need to cook food and clean the house and clothes – the latter is thrust forward by rampant technological development and equally explosive growth in the entertainment industry. The many major players don't just offer up products that compete with each other; they also introduce technologies that vie for supremacy.

For the consumer electronics industry, the 1950s was a pivotal decade, especially for the companies that were to become global leaders. RCA, formed during WWI by federal decree to take control of US radio patents, had already popularized the consumer radio. But it was Sony's 1953 purchase of transistor technology licenses from Western Electric (an AT&T unit) that sparked a Japanese consumer electronics revolution and allowed Sony to create the pocket-sized transistor radio market just in time for the birth of rock & roll. The first US-made TVs rolled off

the RCA assembly line around 1940; though TV production was halted by WWII, after the war it was stronger than before. The 1950s also saw Matsushita make a big push into the TV market – buying a majority stake in Victor Company of Japan (JVC, established by RCA) – and Philips Electronics start marketing TVs.

Today, not far behind the three giants – Sony, Matsushita, and Philips – are Hitachi, Mitsubishi Electric, Thomson, LG Electronics, SANYO, and Sharp. US companies are conspicuously absent. US participants in the consumer A/V business are high-end audio products makers such as Harman International and the #1 manufacturer of speakers, Bose.

The A/V business has a mind-boggling array of components. On the video side, you've got TVs, of course – TV sales account for two-thirds of the US market, and RCA is the nation's largest TV manufacturer. (Sony is the largest in the world, with Daewoo Group's Daewoo Electronics in hot pursuit.) You have VCRs; direct-broadcast satellite receivers from RCA, Sony, Panasonic, Toshiba, Hitachi, and Magnavox for picking up programming from the likes of DIRECTV and PRIMESTAR; A/V receivers from Yamaha, Philips, Pioneer, and Panasonic; and the most promising new product, DVD players that offer improved images and sound and greater storage capacity than videotapes. In audio, the basics are stereo receivers, speakers, CD players, cassette players, and some sort of odd contraption called a "turntable."

The very breadth of product selection and fear of obsolescence – spending a bundle on electronics that will too soon be consigned to the junk pile – deters consumer buying. The best known example: Sony's 1964 invention of the home video recorder set up the battle between its Betamax format and Matsushita's VHS format; the latter ultimately won. Philips and Sony successfully brought out the CD player in 1983, but since then, US consumers have been reluctant to adopt other audio technologies such as digital audio tape (DAT), digital compact cassette (DCC), and the mini disc. It was a long dry spell, after years of squabbling over format between Toshiba and, on the other side, Philips and Sony, before 1997's rollout of the DVD player. Most big-name companies – including Mitsubishi, Panasonic, Pioneer, Sony, RCA, and Toshiba – now have DVD players for sale. Ironically, retailer Circuit City and Zenith, RCA, and Panasonic are backing a DVD rival, Divx, or Digital Video Express, whose discs are watched on

a pay-per-view basis, with billing handled via modem. Divx models can play DVD discs, but DVD players can't play Divx.

TVs are going digital. In 1996, the Federal Communications Commission required broadcasters to convert from analog transmissions to digital transmissions by 2006. In response, the industry is introducing HDTV (high-definition television), which takes advantage of the enhanced signals and produces twice the picture resolution. Now available in the US, HDTV can display computer graphics and show movies in their original widescreen width-to-height ratio. Manufacturers entering this arena include Panasonic, Philips, RCA, and Sony. For the foreseeable future, however, prices for HDTV systems will be prohibitively high ($3,000 and up). The industry is also working on V-Chips to place in all TVs that are 13 in. or larger, in compliance with the 1996 Telecommunications Act. V-Chips allow consumers to block out broadcasts with certain program ratings.

With TVs in just about every US home, manufacturers depend on consumers upgrading to better, or at least bigger, setups. The industry's urging consumers toward "home theater" – recreating the moviegoing experience in your living room, *sans* the sticky floor – is only the latest example of this. (Remember quadraphonic sound?) One in four US households has the basic equipment for a home theater, which marries the big-screen TV, VCR, and stereo system; the price for a complete home theater system has fallen to under $1,000. DVD is considered crucial for encouraging product upgrades and converging home A/V equipment with the PC. Gateway, Toshiba, and the team of Compaq and RCA have introduced PC/TV models that allow TV viewing, videotape editing, and basic computing applications – the latest product for the high-tech home.

## Computer Hardware Industry

In 1982, when Compaq Computer was a daring gleam in its backer's eyes, Digital Equipment Corporation was the world's second-largest computer powerhouse. In 1998 Compaq bought Digital, gaining high-performance techno-credibility and pumping up the muscles of its global services arm. The maneuver made Compaq the third-largest computer company, behind IBM and Hewlett-Packard (HP). Digital is the largest casualty in the $249 billion hardware theatre, a market that includes PCs, notebooks, workstations, and large-scale systems (ranging from servers to supercomputers) – an ever-changing spectacle that marches relentlessly forward.

More than 50 years ago, the ENIAC (Electronic Numerical Integrator and Computer) – considered the first general-purpose, electronic digital computer – cost over $500,000. It also weighed 30 tons and contained 18,000 vacuum tubes, 70,000 resistors, and 6,000 manual switches. It had a random-access memory (RAM) of about 1,000 bits, a tiny fraction of the RAM in PCs today. By 1959, transistors had replaced vacuum tubes and short programming codes had replaced endless streams of binary code when IBM introduced its 1400 series of room-sized mainframe computers. Big companies and universities began to find uses for these large but delicate machines, and IBM established itself as synonymous with the word "computer."

The breakthrough that made the development of the PC possible was the invention of the silicon chip. In 1969, Bob Noyce, Gordon Moore, and Andy Grove became the pioneers of this new technology when they left their jobs at Fairchild Semiconductor to found Intel. By the early 1980s, Intel-fueled desktop computers had become fixtures in networked corporations and, to a lesser degree, in homes. As the industry moved into the 1990s, mass PC technology made the systems powerful enough for more difficult tasks. They began competing with the high-end processing, networking, and graphical systems known as workstations that are geared for scientists and engineers, and made by such companies as Sun Microsystems and Silicon Graphics. PCs outshipped workstations in their own high-end market for the first time in 1997. Sales of PCs grew to an estimated $170 billion in 1998, although growth has fallen from the lofty 30% annual rates of yore.

For more than a decade, the David-and-Goliath story in the PC industry was that of Apple's computers versus those built on the industry standard Intel/Microsoft Windows technology known as Wintel. After struggling for years to maintain its foothold, Apple finally ran out of rocks for its slingshot. The ubiquitous Windows is used on more than 85% of PCs worldwide, including the four top PC manufacturers – Compaq, IBM, Dell, and HP – which together hold more than a third of the worldwide market. Intel's chips are used in about 80% of the industry's PCs. The Wintel dominance forced Apple co-founder Steve Jobs to forge an intriguing development alliance with Microsoft, shaking hands with archenemy and Microsoft founder Bill Gates, to the utter disgust of the Macintosh faithful.

The latest version of the little-guy-triumphs story may be Dell Computer. Dell, which along with Gateway made its name as a direct seller of computers, has become the undisputed master. The company's build-to-order systems created lower inventories and lower costs (no need to add reseller incentives), and cemented Dell's status as the only *FORTUNE* 500 company with annual sales and earnings increases of more than 40% since 1995. That success has left every other major PC maker scrambling to duplicate in some fashion Dell's inventory success.

Though they are thousands of times faster and smaller and many times cheaper than their ancestors, PCs are still not the answer to every computing need. Sometimes, it is still necessary to call in the Big Guns. The explosion of the Internet reinvigorated the market for mainframes, which can store nearly limitless data; they in turn fueled the need for servers that can swiftly handle those data demands. IBM holds more than 70% of the $12.4 billion mainframe market, but rivals Amdahl and Hitachi are nipping at Big Blue's heels. Those companies that decided to eliminate their reliance on the large, expensive, and in many cases still proprietary mainframe systems, have turned to servers. Their ability to distribute applications to hundreds of desktops and share other functions like e-mail have made servers the fastest-growing segment in computer hardware.

PC makers are more interested these days in the other end of the spectrum. According to retail sales tracking firm PC Data Inc., the average PC cost $1,600 in 1997. Two year later, that average price is $950. With analysts gauging US home PC penetration at about 50% of households, and component prices lowering, most manufacturers have intensified the production

of PCs stuffed with the latest technologies yet costing under $1,000. (One upstart South Korean firm, emachines, has priced its fast-off-the-shelves low-end system at $399.) The sub-$1,000 systems are geared for Internet surfing, electronic mail, and basic word processing. Whether the explosive sales of the inexpensive systems have expanded the computer user market or slashed into orders for more expensive systems remains to be seen.

As the charge marches on, computers are readying for a head-to-head clash with information appliances such as handheld PCs, smart phones that act like computers, and digital set-top boxes that bring computer functionality to televisions. E-mail and other tasks can be done on devices such as 3Com's PalmPilot. Microsoft's WebTV offers Internet access through your family room television. The winner of this confrontation will own the title of main computing device at home and at the office.

Meanwhile, it's accessories that help make any computer special: a new disk drive, a color laser printer, maybe a bigger monitor. IBM and HP are running neck-and-neck as the nation's leading peripherals vendors. Canon, maker of such peripherals as fax machines, color scanners, and laser printers, isn't far behind. Disk maker Seagate is the top independent manufacturer of storage devices for computers, while Quantum is finding success with its hard disks and drives, which provide high gigabytes of storage.

Although instantaneous communication among computers in New York, New Zealand, and New Delhi seems like magic, the connections that form the Internet are made possible by practical network linking routers and switches. The $143 billion market is dominated by four market leaders – Cisco Systems, 3Com, Bay Networks (acquired by Nortel Networks in 1998), and Cabletron Systems. Ordinary home computer users, lacking a direct connection to the Internet, can still hook up using modems such as those available from Motorola and 3Com. And if you want more bang for your buck, don't worry. In what is being described by many as an even bigger bang than the convergence of appliances, the entire telecommunications, computer, and satellite communications industries are meshing together with such force that some say it will soon be impossible to distinguish between them.

**Semiconductor Industry**

Strictly speaking, a semiconductor is a substance such as silicon (or, less commonly, gallium arsenide or germanium) that conducts or blocks electric current in order to process and convey information in the form of an electronic signal. By extension, devices made with silicon are called semiconductors, and sometimes microchips or "chips."

Semiconductors fall into two broad categories: discrete devices and ICs. Discrete semiconductors are single-function electronic components such as diodes, transistors, and optoelectronics. Made by companies such as Vishay Intertechnology, discrete devices contribute nearly $12 billion, or 10%, to the semiconductor industry's worldwide sales.

ICs are small pieces of silicon into which multiple devices (diodes, capacitors, resistors, and/or transistors) have been microscopically engineered. Digital, analog, or mixed-signal (performing digital and analog functions) ICs perform a variety of functions. The digital IC, made of gates representing on-off switches, is at the heart of the computer and telecommunications revolution and makes up the largest segment of the chip industry, with 70% of sales worldwide.

Digital ICs perform memory (volatile or nonvolatile) or logic (information processing) functions. Dynamic random-access memory (DRAM) and static random-access memory (SRAM) chips have volatile memories, meaning data is lost when power is turned off. Read-only memory (ROM), erasable programmable memories (EPROMs), and flash memory chips contain nonvolatile memory, meaning data is preserved when power is turned off. South Korea's Samsung is the top maker of memory chips (DRAMs and SRAMs). The most competitive of all chip industry segments, memory chips plunged in price from about $44 per megabyte in 1991 to about $2 per megabyte in early 1998. Overall DRAM sales dropped by one-third to $14 billion in 1998 from $41 billion in 1995.

The microprocessor digital IC, comprising millions of transistors, is the "brain" inside your computer. Intel Corporation, led by Andy Grove, has an 80% share of the microprocessor

market, while rival Advanced Micro Devices has snapped up half of the market for sub-$1,000 PCs. The microcontroller digital IC combines microprocessor and logic and memory functions and is used in everything from home stereos to the security alarms that protect them. Motorola is the top maker of these ubiquitous chips, of which Americans typically encounter 300 each day. The digital signal processor (DSP), which converts sound and light signals into digital information, is used in CD players, digital cameras, and cell phones. Veteran IC maker TI is the leading producer of DSPs, which are driving the market demand for improved digital communications.

Analog (non-digital) chips process real-world phenomena such as sound, pressure, and temperature. Claiming the remaining 20% of semiconductor sales worldwide, analog ICs are used in thermostats and medical instruments. In 1998 TI edged out France's STMicroelectronics for the top spot in the $19 billion analog semiconductor segment. Mixed-signal chips, considered kindred to analog chips because they have similar market characteristics, translate analog signals to digital (and vice versa) for use in digital instruments. The demand for analog ICs is expected to grow 50% over the next four years to $32 billion in sales.

Whereas the granddaddy of semiconductor technology is the analog IC, proof of Moore's Law lives on in one of the industry's more recent developments. Spurred by companies such as LSI Logic, the breakthrough system-on-a-chip IC combines multiple functions (including microprocessor and memory) on a single chip. System-on-a-chip technology helped make Furby, the furry talking toy, a big hit and has enabled rapid advances in the design of cellular phones, DVD players, and set-top boxes.

In the semiconductor industry, where (small) size does matter, developers and manufacturers are on a mission to pack more transistors onto tinier chips. More transistors means more complex functions and greater speeds; smaller chips can fit into ever-smaller, more mobile electronic devices. The manufacturing standard (unit of measure used to build chips) has been shrinking, with the current benchmark now at 0.18 microns (1/500th the width of a human hair). Even smaller sizes have been achieved in the laboratory. Plus, squeezing a higher number of tiny chips

onto a single silicon wafer cuts the industry's high manufacturing costs, prompting the industry to transition from 200-millimeter (8-inch) to 300-millimeter (12-inch) wafers.

The costly, complex chip making process requires more than 300 precise steps using expensive equipment. "Moore's Second Law" asserts that the cost of manufacturing facilities doubles every generation. Estimates peg the cost of opening a new production facility, or "fab," at $2 billion in 1999, a number expected to quintuple to $10 billion by 2005, with more than half of fab investments tied up in capital equipment. The semiconductor manufacturing machinery industry, dominated by Applied Materials, is worth $32 billion. Likewise, with computers guiding semiconductor design, top developers of electronic design automation (EDA) software, such as Cadence (#1) and Synopsys, are cashing in.

For semiconductor developers wishing to avoid the high cost of fabricating the chips they design, companies focusing on niche services have sprung up. They get their business from semiconductor makers who outsource chip making to (primarily Asian) fabs. Taiwan Semiconductor Manufacturing Corp. (TSMC) is the world's leading fab, while Anam Semiconductor is the top chip packager (adding wire leads for connections and protective packaging). Other companies are in the niche business of marketing pre-designed mix-and-match blocks of circuitry code, called "semiconductor intellectual property," or SIP. Sold by companies such as MIPS Technologies, SIP saves chip companies substantial amounts of money, in terms of development funds and time-to-market.

**Machinery and Tools Industry**

Growth rates in both areas have been weak in recent years. High fuel prices (now dropping) did bring business to the oil and gas equipment industry in 1997. However, though companies such as Halliburton, Dresser-Rand (a joint venture between Dresser and Ingersoll), Baker Hughes, and Cooper Cameron have seen increased demand for their products because of increased worldwide exploratory drilling activity, the industry is preparing for a dry spell. Shipments of drilling rigs and tools, pumping machinery, geophysical prospecting machinery, and other equipment pumped out an estimated $4.2 billion in 1996; then the value of shipments slipped slightly in 1997, by an estimated quarter of a percentage point. Like the US oil companies, US mining interests are looking farther afield for profits. Until recently, the US's dominance of the global mining industry (producing more than 40% of ores) made it the largest market for mining machinery, placing Caterpillar in the world's #1 spot and benefiting other top companies such as Harnischfeger Industries and Kennametal. This is changing. US mining companies and others are eyeing developing countries in South America and Asia for bigger profits, and where mining companies go, mining machinery follows.

Brand building -- from the Coke bottle to the L'eggs egg -- is a cornerstone for the packaging machinery industry, with shipments valued at about $4.5 billion in 1996. Packaging machinery turns out more than 100 specialized machines that bottle, bag, can, wrap, and label bulk or finished products -- be they solid, liquid, or gas -- for final shipment to customers. About half of packaging machinery is wrapped up for the food and beverage industries, and the US is the biggest such market. The world leader in packaging machinery and related equipment is Crown Cork & Seal. But with annual growth rates shrinking from 10% (1995) to about 6% (1997), most of the 600 small US manufacturers, typified by companies such as Continental Can and AptarGroup, are planning more exports for the future (currently more than 20% of shipments). Three things are driving the growing markets for packaging equipment in developing countries. First, as workers move from the farm to the factory, prepackaged foods are more in demand. Commodities suppliers are also adding value to products and require more sophisticated packaging. And the improvement of agricultural techniques means that there is more food to package.

The specialty equipment category, also a big part of the production industry, covers machine tools (power-driven machines used to cut or shape metal such as lathes and drills), metal-cutting tools, robotics, special dies and tools, welding apparatus, and Tim "Home Improvement" Allen's favorite, power-driven hand tools. More than 650 manufacturers, including Dover, UNOVA, Lincoln Electric, and Kennametal, reside in the US machine tool industry; the US has been the world's largest consumer of machine tools in recent years. In addition, the $4 billion power tool industry (led by Black & Decker, Snap-on, and Stanley Works) is fed by professional builders and contractors. Robotics and automation systems, which replace men with machines, are included in the specialty equipment category. Robots do the jobs that humans either don't want or can't do, such as cleaning up radioactive waste, installing small chips onto tightly packed circuit boards ( Brooks Automation), and placing packaged goods on pallets ( Flow International). The $930 million industry grew about 4% in 1996. Most robotics hardware manufacturing is done by Japanese and European companies such as Thyssen's Giddings & Lewis and Elsag Bailey Process Automation. The largest market for robotics is in the US, because only 10% of the companies that could benefit from the technology actually have it already.

And what about all the springs, screws, gewgaws, and thingamajigs that make up machines? The general industrial machinery and equipment industry is constructed of 10 tongue-twisting categories: custom-designed parts made on screw machines (turning machinery); industrial fasteners, such as bolts, nuts, and rivets; valve and pipe fittings; ball and roller bearings; pumps and pumping equipment; air and gas compressors; industrial and commercial fans, blowers, and air purifiers equipment; speed changers, industrial high-speed drives, and gears; industrial process furnaces and ovens; and mechanical power transmission equipment. The industry's growth level between 1993 and 1995 was a whopping 14% and its value of shipments is currently estimated at almost $43 billion (including packaging machinery). Machinery companies range from billion-dollar giants, including Ingersoll, Halliburton, Parker Hannifin, Tecumseh Products, and Timken, down to tiny companies that depend on one product type, such as IDEX, which makes pumps.

Regardless of the type of machinery that a company makes, they've all had to adapt to a new global market. For example, Sweden's SKF, the world's largest manufacturer of rolling bearings,

had to adjust to Japanese imports in the 1970s, and now, in the 1990s, the company is investing in US plants to compete in the car and truck market. SKF is looking even further abroad, at the vast number of bearings that keep China's trains running. In any country, production machinery is arguably the most vital industry in all of business. Without machinery, no consumer goods get made, and without consumer goods, there is no economy. The world's continued industrial and economic growth relies on one basic condition -- that machinery's big wheels keep on turnin'

## Company Allocation

**ADAC Labs (Nasdaq: ADAC)**

**Business Summary**
ADAC Laboratories designs, develops, manufactures, sells and services medical imaging equipment and radiation therapy planning and healthcare information software systems used in hospitals and clinics worldwide. The Company's Medical Systems business designs, develops, manufactures, sells and services nuclear medicine cameras and related computer systems capable of performing single photon imaging and positron emission tomography imaging. Its Radiation Therapy Products business unit designs, develops, markets and supports turnkey radiation therapy planning systems that assist hospital radiation oncology departments and cancer treatment centers in planning patient treatments. The Company's Health Care Information Systems business unit designs, develops, markets, sells and supports integrated solutions consisting of computer equipment and software applications that offer healthcare providers the necessary tools to process and archive patient and clinical information.

**Financial Summary**
ADAC Laboratories designs, develops, manufactures, sells and services medical imaging and health care information systems used for nuclear medicine, radiology, cardiology and oncology. For the three months ended 1/2/00, revenues fell 4% to $90.3 million. Net loss totaled $4.5 million vs. income of $3.9 million. Revenues reflect a decrease in sales and servicing of medical imaging products. Net loss reflects a $10.3 million legal settlement.

| Current Valuation Ratios[1] | ADAC | Industry | S&P 500 | 5 Year Avg. |
|---|---|---|---|---|
| Price/Earnings | NMF | 84.1 | 43.4 | --- |
| Price/Book | 2.7 | 12 | 10.2 | --- |
| Price/Sales | 0.8 | 6.5 | 4 | 1.3 |
| Price/Cash Flow | 9.2 | 50 | 30 | 34.4 |
| Dividend Yield % | 0 | --- | 0.5 | -- |

| Future Valuation Ratios[2] | ADAC | Industry | S&P 500 |
|---|---|---|---|
| Forward Price/Earnings | 17.9 | 92.6 | 37.9 |
| PEG Ratio | 1 | 4.5 | 2.5 |
| PEG Payback (Yrs) | 7.8 | 15 | 11.8 |

Data through 03-29-00

- Earnings for ADAC are projected to reach $0.65 a share for 2000.
- Profits are again on the rise in 2001, with per share results projected at $1.03.
- The company has an extremely low PEG ratio relative to industry averages, making it a terrific value.

American Express Company (NYSE: AXP)

**Business Summary**
American Express Company, founded in 1850, provides travel-related services, financial advisory services and international banking services throughout the world. American Express Travel Related Services Company Inc. provides a variety of products and services, including global network services, the American Express Card, the Optima Card and other consumer and corporate lending products, stored value products, corporate and consumer travel products and services, tax preparation and business planning services, magazine publishing and merchant transaction processing, point of sale and back office products and services. American Express Financial Corporation provides a variety of financial products and services to help individuals, businesses and institutions establish and achieve their financial goals, insurance and annuities, a variety of investment products, mutual funds and limited partnerships, investment advisory services, and trust and employee plan administration services.

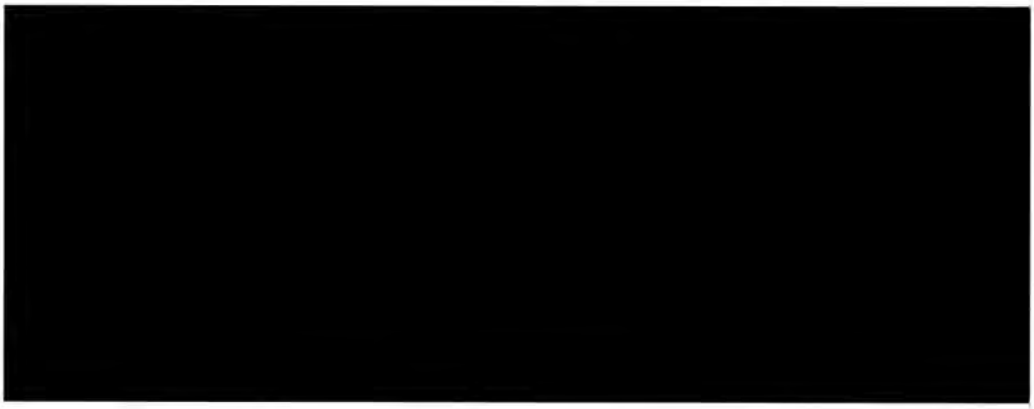
**Financial Summary**
American Express and its subsidiaries provide travel related services, financial advisory services, and international banking services worldwide. For the nine months ended 9/99, revenues increased 11% to $15.58 billion. Net income increased 16% to $1.87 billion. Revenues reflect growth in worldwide billed business, cardmember loans outstanding, higher travel commissions and fees, and wider interest margins. Earnings also reflect improved loss rates.

**Recent Earnings Announcement**
For the 3 months ended 12/31/1999, after tax earnings were 606. (Preliminary; reported in millions of dollars.)

| Current Valuation Ratios[3] | AXP | Industry | S&P 500 | 5 Year Avg. |
|---|---|---|---|---|
| Price/Earnings | 28.0 | 16.6 | 43.4 | 20.4 |
| Price/Book | 7.0 | 3.7 | 10.2 | 4.6 |
| Price/Sales | 3.3 | 2.0 | 4.0 | 2.3 |
| Price/Cash Flow | --- | 37.8 | 30.0 | --- |
| Dividend Yield % | 0.7 | 1.2 | 0.5 | --- |

| Future Valuation Ratios[4] | AXP | Industry | S&P 500 |
|---|---|---|---|
| Forward Price/Earnings | 28.0 | 16.7 | 37.9 |
| PEG Ratio | 2.1 | 1.2 | 2.5 |
| PEG Payback (Yrs) | 11.6 | 8.6 | 11.8 |

Data through 03-29-00



- American Express has a powerful, globally recognized brand name and has built on it through overseas expansion. It is truly becoming a one-stop shop for financial services.
- One of the most consistent players in the financial-services industry, the company regularly achieves its long-term targets of 12% to 15% annual earnings growth, annual revenue growth of 8% or more, and 18% to 20% return on equity.
- The company is covering all the bases on the Internet. Its new Blue card has an embedded smart chip that stores billing information. It also offers Membership Banking, a full-service online bank, and online brokerage.
- Amex recently acquired more than 4,500 ATMs located in 7-Eleven stores. This makes it the second largest ATM owner in the U.S. and further expands its banking presence.

Best Buy (NYSE: BBY)

**Business Summary** Best Buy Co., Inc. is a specialty retailer of name brand consumer electronics, home office equipment, entertainment software and appliances. The Company operates over 310 stores in 36 states. Best Buy's stores usually average 44,000 square feet and have easy-to-locate product groupings with an emphasis on buying decisions. Each store offers product information and demonstration areas to make customers feel more confident about utilizing a self-service, discount style store format. Recently, the Company also has begun to market certain products on its E-commerce site. Merchandise sold by the company includes personal computers, telephones, fax machines, copiers, televisions, car stereos, compact discs, computer software, video game hardware and software, washing machines, dishwashers and refrigerators. In addition, the Company provides service, repair and installation on the majority of the products it sells.

**Financial Summary** Best Buy Company sells personal computers and other home office products, consumer electronics, entertainment software, major appliances and related accessories through 354 retail stores. For the 39 weeks ended 11/27/99, revenues increased 24% to $8.18 billion. Net income rose 71% to $183.3 million. Revenues reflect sales increases in all the major product categories. Earnings also benefitted from faster inventory turns and improved profitability.

**Recent Earnings Announcement**
For the 3 months ended 02/26/2000, revenues were 4,314,615; after tax earnings were 163,805. (Preliminary; reported in thousands of dollars.)

| Current Valuation Ratios[5] | BBY | Industry | S&P 500 | Stock's 5Yr Avg. |
|---|---|---|---|---|
| Price/Earnings | 58.2 | 54.3 | 43.4 | --- |
| Price/Book | 14.5 | 12.2 | 10.2 | --- |
| Price/Sales | 1.4 | 1.3 | 4 | --- |
| Price/Cash Flow | 26.7 | 24.9 | 30 | 26.1 |
| Dividend Yield % | 0 | --- | 0.5 | 0 |

| Forward Vaulation Ratios[6] | BBY | Industry | S&P 500 |
|---|---|---|---|
| Forward Price/Earnings | 51.6 | 30.2 | 37.9 |
| PEG Ratio | 2.2 | 1.8 | 2.5 |
| PEG Payback (Yrs) | 11.3 | 10.8 | 11.8 |

Data through 03-28-00

- The company has demonstrated the ability to generate strong cash flow and growth during fiscal 1998 and 1999, periods of slow new-store expansion.
- Rapid expansion plans for the next several years are fully supported by internally generated cash flow.
- Very low debt levels give the company strong insulation against an economic slowdown.

## Citigroup Inc. ( C )

**Business Summary**
Citigroup, Inc. provides financial products and services to individuals, businesses, governments and financial institutions. Subsidiaries include Citibank, Commercial Credit, Primerica Financial Services, Salomon Smith Barney and Travelers Life & Annuity. Global Consumer delivers banking and lending services in over 50 countries. Global Corporate and Investment Bank provides financial planning and retail brokerage services, banking and other financial services and commercial insurance products in the United States and in almost 100 foreign countries. The Asset Management group offers mutual funds, closed-end funds, managed accounts and unit investment trusts. Citigroup's Investment Activities segment primarily consists of the Company's venture capital activities, the realized investment gains and losses related to certain corporate- and insurance-related investments, and the results of certain investments in countries that refinanced debt under the 1989 Brady Plan or similar plans.

**Financial Summary**
Citigroup, Inc. is a diversified holding company whose businesses provide a range of financial services, including banking, insurance and investment services, to consumer and corporate customers around the world. For the fiscal year ended 12/31/99, total revenues rose 7% to $82.01 billion. Net income before accounting change applicable to Common rose 76% to $9.85 billion. Results reflect increased asset management fees and the reversal of restructuring and other charges.

| Current Valuation Ratios[7] | Stock | Industry | S&P 500 | Stock's 5 Yr Avg |
|---|---|---|---|---|
| Price/Earnings | 21.5 | 16.2 | 43.4 | 16 |
| Price/Book | 4.3 | 2.9 | 10.2 | 2.8 |
| Price/Sales | 2.5 | 1.9 | 4 | 1.5 |
| Price/Cash Flow | --- | --- | 30 | 21.3 |
| Dividend Yield % | 1.1 | 2.3 | 0.5 | --- |

| Future Valuation[8] | Citigroup | Industry | S&P 500 |
|---|---|---|---|
| ForwardPrice/Earnings | 21.7 | 16.4 | 37.9 |
| PEG Ratio | 1.6 | 1.4 | 2.5 |
| PEG Payback(Yrs) | 10 | 9 | 11.8 |

Data through 03-29-00

- Despite a risky 1998 merger with Travelers Group, Citigroup is a dominant, well-run financial-services powerhouse with consistent financial performance.
- The recent anti-bank-stock sentiment on Wall Street has punished Citi's shares, but that price weakness makes this stock even more attractive.
- Former Treasury Secretary Robert Rubin is a welcome addition to the office of the chairman. Rubin's ability to make deals and woo Wall Street should help Citigroup remain on top.
- Citigroup has been growing profits at a rate faster than most Wall Street analysts expected.
- The company's plans to expand in Europe and Asia appear strong.

**EMC Corp. (NYSE: EMC)**

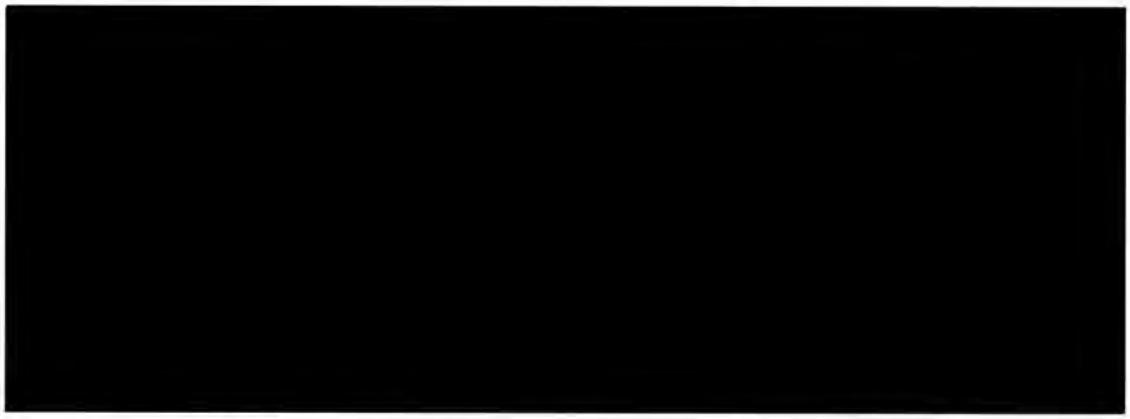
**Business Summary**
EMC Corporation designs, manufactures, markets and supports a wide range of storage-related hardware, software and service products for the open systems, mainframe and network attached information storage and retrieval system market. The Company's customers are located worldwide and range in size from Fortune 100 companies to small businesses, and national to local governments. McDATA Corporation, a subsidiary of the Company, designs, manufactures, markets and supports high performance fibre channel information switching products, which are key components of the EMC enterprise storage network. McDATA also produces the ESCON Director series of products, high-speed fiber-optic-based network switches that connect computers and peripherals within the data center. The Company offers software-based capabilities, which include enhanced backup/restore, disaster recovery, business continuance, data migration and data movement.

**Financial Summary**
EMC Corporation and its subsidiaries design, manufacture, market and support a range of hardware and software products and provide services for the storage, management, protection and sharing of electronic information. For the fiscal year ended 12/31/99, revenues rose 24% to $6.72 billion. Net income rose 55% to $1.01 billion. Results reflect strong demand for the Company's Symmetrix series of products and higher margins due to higher software revenues.

| Current Valuation Ratios[9] | EMC | Industry | S&P 500 | 5 Year Avg |
|---|---|---|---|---|
| Price/Earnings | 142.2 | 125 | 43.4 | 43.6 |
| Price/Book | 27.5 | 20 | 10.2 | 9.6 |
| Price/Sales | 20.3 | 20.3 | 4 | 7.9 |
| Price/Cash Flow | 99.3 | 50 | 30 | 42.7 |
| Dividend Yield % | 0 | --- | 0.5 | --- |

| Future Valuation Ratios[10] | EMC | Industry Average | S&P 500 Average |
|---|---|---|---|
| Forward Price/Earnings | 124.6 | 127.4 | 37.9 |
| PEG Ratio | 4.1 | 4.1 | 2.5 |
| PEG Payback (Yrs) | 12.7 | 12.7 | 11.8 |

Data through 03-29-00



- Even though EMC Corp. looks like a growth company that would not be consistent with our stated "value" investment philosophy, it gains value in other ways. The company has virtually cornered the market in data warehousing solutions.

- The rapid growth of the Internet is driving up the demand for data storage by 80% per year. With 35% of the high-end data-storage market, EMC is well placed to satisfy this burgeoning demand.

- The company is moving into the market for midpriced storage systems through its acquisition of Data General. This deal greatly expands EMC's total market opportunity.

- The company has a very strong technological lead over its rivals, so it can charge premium prices for its storage systems.

- Software revenues have been rapidly increasing as a percentage of total revenues. As software sales are very profitable, this helps keep margins high.

**Enron Corp. (NYSE: ENE)**

**Business Summary**
Enron Corporation is one of the world's leading electricity, natural gas and communications companies. The Company, which owns approximately $34 billion in energy and communications assets, produces electricity and natural gas, develops, constructs and operates energy facilities worldwide, delivers physical commodities and financial and risk management services to customers around the world, and is developing an intelligent network platform to facilitate online business.

**Financial Summary**
Enron Corporation is engaged in the exploration for and production of natural gas and crude oil; transportation of natural gas through pipelines; generation and transmission of electricity; and the development and operation of power plants, pipelines and other energy related assets. For the nine months ended 9/99, sales rose 24% to $29.14 billion. Net income applicable to Common before acct. change rose 41% to $723 million. Results reflect acquisitions and a $468 million gain on sale of assets.

**Recent Earnings Announcement**
For the 3 months ended 12/31/1999, revenues were 10,973,000; after tax earnings were 259,000. (Preliminary; reported in thousands of dollars.)

| Current Valuation Ratios[11] | ENE | Industry | S&P 500 | 5 Year Avg. |
|---|---|---|---|---|
| Price/Earnings | 69.5 | 62.5 | 43.4 | 47.6 |
| Price/Book | 5.9 | 2.5 | 10.2 | 3 |
| Price/Sales | 1.4 | 1.3 | 4 | 0.8 |
| Price/Cash Flow | 33.7 | 26.6 | 30 | 27.9 |
| Dividend Yield % | 0.7 | 0.7 | 0.5 | -- |

| Future Valuation Ratios[12] | N | Industry | P 500 |
|---|---|---|---|
| Forward Price/Earnings | 64.8 | 63.6 | 37.9 |
| PEG Ratio | 4.1 | 3.6 | 2.5 |
| PEG Payback (Yrs) | 15.7 | 14.3 | 11.8 |

Data through 03-29-00

- Enron has already built a whole new main business with lots of growth potential, and it has some high-growth businesses in the wings.
- It isn't nearly as cyclical as other energy companies are.
- Enron is an energy company unlike any other. Its revenues have increased at a 50% clip annually during the past three years.
- Enron was the first company to trade as a wholesaler between power generators and suppliers and is by far the major player in this rapidly growing field.
- It will soon offer wholesale trading of broadband capacity--which has the potential for massive growth--and has already laid a fiber-optic network to transport this commodity.

**Ford Motor Company (NYSE: F)**

**Business Summary**

Ford Motor Company produces cars and trucks and provides financial services. Ford's automotive segment consists of the design, manufacture, assembly and sale of cars and trucks and related parts and accessories. The Company's cars and trucks are sold and manufactured throughout the world, with the United States and Europe being Ford's biggest markets. Ford's automotive segment produces vehicles under the brands Ford, Lincoln, Mercury and Jaguar. The financial services segment conducts financing operations, leasing and rental operations and insurance operations. This segment is conducted mainly through Ford Motor Credit Company, which is responsible for vehicle financing and leasing operations, and The Hertz Corporation, which consists of automobile rentals and leases.

**Financial Summary**

Ford Motor Company manufactures, assembles and sells cars, trucks and related parts and accessories. Ford Financial Services provides financing, insurance and vehicle and equipment leasing. For the fiscal year ended 12/31/99, revenues increased 13% to $162.56 billion. Net income applicable to Common decreased 67% to $7.22 billion. Results reflect higher automotive sales volumes, offset by the absence of a $15.96 billion gain on the spin-off of Associates First Capital.

| Current Valuation Ratios[13] | Ford | Industry | S&P 500 | 5 Year Avg. |
|---|---|---|---|---|
| Price/Earnings | 7.6 | 14.7 | 43.4 | 7.7 |
| Price/Book | 2 | 2.5 | 10.2 | 2 |
| Price/Sales | 0.3 | 0.4 | 4 | 0.4 |
| Price/Cash Flow | 1.8 | 12.8 | 30 | 2.5 |
| Dividend Yield % | 4.6 | --- | 0.5 | --- |

| Future Valuation Ratios[14] | Ford | Industry | S&P 500 |
|---|---|---|---|
| Forward Price/Earnings | 7.7 | 14.8 | 37.9 |
| PEG Ratio | 0.9 | 3.4 | 2.5 |
| PEG Payback (Yrs) | 5.8 | 11.3 | 11.8 |

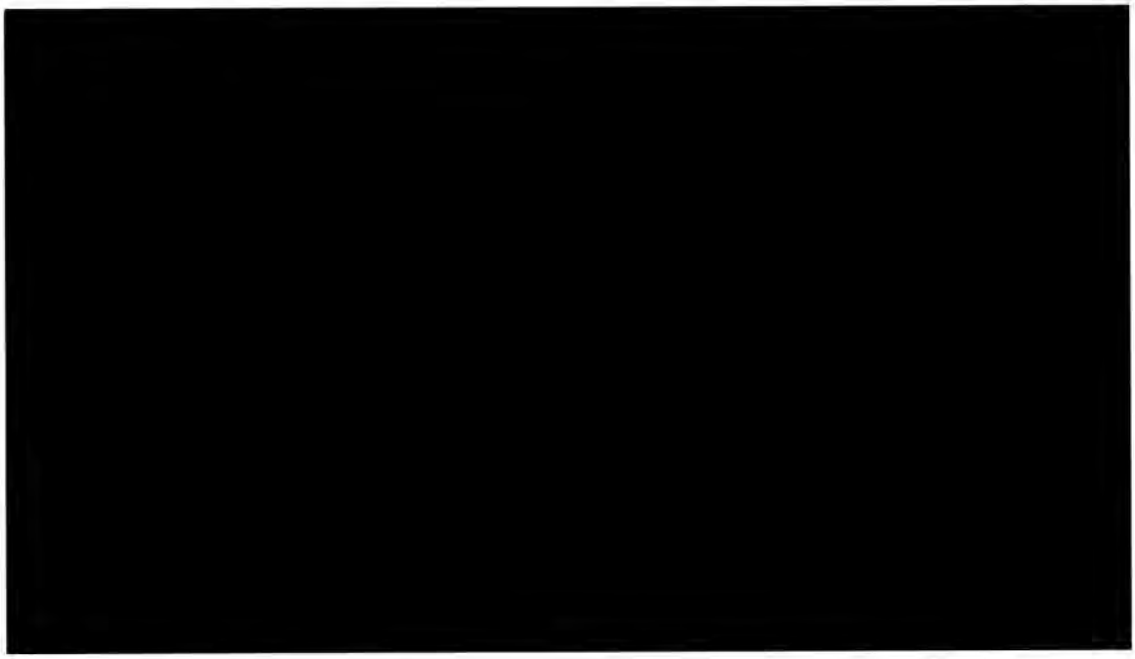
Data through 03-29-00

- The economy is strong, and the outlook for near-term earnings remains positive.
- While a strong economy is pumping up the top line, Ford is adding to its bottom line by cutting costs. For the first nine months in 1999, Ford cut $700 million in costs and it's on track to cut $1 billion for the entire year.
- Demand for light trucks, Ford's strongest product segment, remains healthy. Of the traditional big-three car manufacturers, Ford has the highest concentration of sales from light trucks.
- Ford's profits are booming thanks to strong U.S. new-car sales. In fact, U.S. new- car sales in 1999 are on track to beat the previous record of 16 million units set in 1986.
- Emerging markets are projected to have double-digit growth in new-car sales, which may drive Ford's sales in the future.

## General Electric Company (NYSE: GE)

**Business Summary**
General Electric Company is one of the largest and most diversified industrial corporations in the world. The Company's products include lamps and other lighting products, major home appliances, industrial automation products and components, motors, electrical distribution and control equipment, locomotives, power generation and delivery products, nuclear reactors, nuclear power support services and fuel assemblies, aircraft jet engines, plastics and a wide variety of high-technology products, including products used in medical diagnostic applications. The National Broadcasting Company, Inc., a wholly owned affiliate, furnishes network television services, operates television stations and provides cable programming and distribution services. Through General Electric Capital Services, Inc., the Company offers financial services including real estate financing, asset management and leasing, mortgage services, consumer savings and insurance services, specialty insurance and reinsurance.

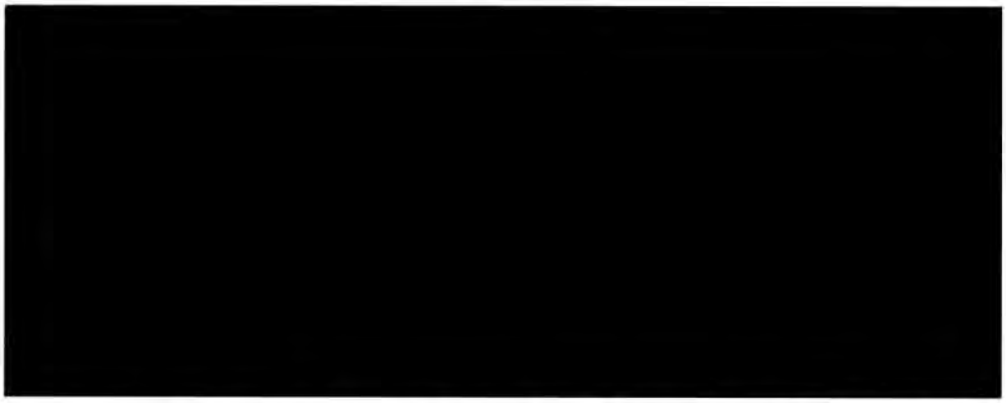
**Financial Summary**
GE is a diversified industrial corporation whose products include appliances, lighting products, aircraft engines and plastics. GE also provides television, cable, internet, distribution, engineering and financial services. Total revenues for the fiscal year ended 12/31/99, rose 11% to $111.63 billion. Net income rose 15% to $10.72 billion. Revenues reflect increased global activities and growth in all businesses. Earnings also reflect an improved operating margin.



| Current Valuation Ratios[15] | GE | Industry | S&P 500 | 5 Year Avg. |
|---|---|---|---|---|
| Price/Earnings | 50.8 | 46.9 | 43.4 | 31.2 |
| Price/Book | 12.7 | 11.7 | 10.2 | 7.5 |
| Price/Sales | 4.8 | 4.5 | 4 | 2.9 |
| Price/Cash Flow | 21.9 | 20.2 | 30 | 18.5 |
| Dividend Yield % | 1.1 | 1.1 | 0.5 | --- |

| Future Valuation Ratios[16] | GE | Industry | S&P 500 |
|---|---|---|---|
| Forward Price/Earnings | 50.9 | 47 | 37.9 |
| PEG Ratio | 3.6 | 3.3 | 2.5 |
| PEG Payback (Yrs) | 14.9 | 14.4 | 11.8 |

Data through 03-29-00



- General Electric has been an incredibly steady profit machine under legendary CEO Jack Welch.
- It's so diversified that it will be able to withstand any economic downturns without much trouble.
- Its stock has been one of the most reliable performers of the past decade.
- One of the largest and most diversified companies in the world, with 10 divisions ranging from electrical products to the NBC television network, GE still was able to increase its revenue 15% and increase earnings at a 16% clip.
- For 1999, revenue was up 11% and earnings rose 15% its stock has been a stellar performer, rising 40% to 50% annually from 1995 through 1999.
- GE's valuations have tended to follow the S&P 500's. This isn't surprising--it's such a diversified company that it almost represents a microcosm of the index.

**Hughes Electronics Corp. (NYSE: GMH)**

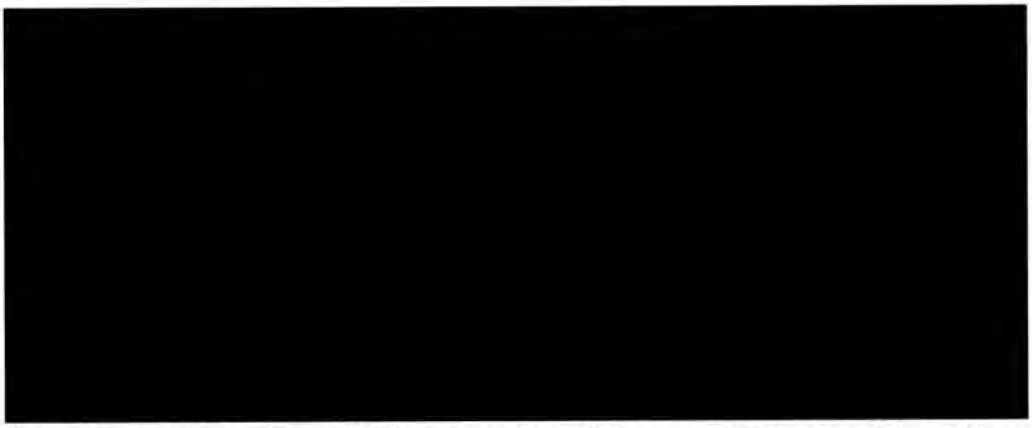
**Business Summary** Hughes Electronics Corp. is a leading global provider of digital direct broadcast satellite entertainment services, satellite communications services and satellite-based private business networks. Hughes, a wholly owned subsidiary of General Motors Corporation, is also a leading global manufacturer of satellite systems. The Company's businesses includes DIRECTV, which is the world's leading digital direct broadcast satellite service based on number of subscribers; PanAmSat, which owns and operates the largest commercial satellite fleet in the world; Spaceway, which is a planned satellite-based broadband communications platform that is expected to provide customers with high-speed two-way multimedia transmission beginning in 2002; Hughes Network Systems, which is a leading provider of satellite and wireless communications ground equipment and services; and Hughes Space and Communications, which is a leading satellite manufacturer.

**Financial Summary** Hughes Electronics provides digital entertainment, information and communication services and satellite-based private business networks through its fleet of commercial satellites. For the fiscal year ended 12/31/99, total revenues rose 60% to $5.56 billion. Net loss from continuing operations before acct. change applicable to Common totaled $421 million vs. an income of $84.5 million. Results reflect an increased number of DIRECTV subscribers, offset by an increase in special charges.

| Current Valuation Ratios[17] | GMH | Industry | S&P 500 | 5 Year Avg. |
|---|---|---|---|---|
| Price/Earnings | NMF | 125.1 | 43.4 | NMF |
| Price/Book | 1.6 | 20 | 10.2 | --- |
| Price/Sales | 2.3 | 11.3 | 4 | 1.8 |
| Price/Cash Flow | 42.8 | 50 | 30 | --- |
| Dividend Yield % | 0 | 0.2 | 0.5 | --- |

| Future Valuation Ratios[18] | GMH | Industry | S&P 500 |
|---|---|---|---|
| Forward Price/Earnings | NMF | 100 | 37.9 |
| PEG Ratio | --- | 3.8 | 2.5 |
| PEG Payback (Yrs) | NMF | 13.3 | 11.8 |

Data through 03-29-00



- Hughes Network Solutions (HNS), provider of the award-winning DirecPC service, is a leading supplier of broadband satellite and wireless products and services, voice and telephony solutions, and DIRECTV(R) digital satellite systems. HNS and America Online, Inc. (AOL) have entered into an alliance to develop AOL TV interactive television and high-speed AOL-Plus services.

- Hughes' DirecTV service is the No. 1 direct broadcast satellite (DBS) television service with more than 8.2 million subscribers, outpacing rival Echostar's Dish Network.

- To increase its customers and broadcast channels, Hughes in 1999 bought United States Satellite Broadcasting for $1.6 billion and the satellite business of rival PRIMESTAR (now PhoenixStar) for $1.3 billion. Also that year Hughes began building its Spaceway broadband satellite network (expected to launch in 2002). America Online invested $1.5 billion in the company, with plans to develop a satellite-based Internet service.

**Ingersoll-Rand (NYSE: IR)**

**Business Summary**
Ingersoll-Rand is a diversified industrial and components manufacturer of primarily non-electrical machinery and equipment serving industrial and commercial markets. The Company manufactures air compressors, construction and mining equipment, bearings and precision components, tools, locks and architectural hardware and industrial machinery, as well as agricultural sprayers, air balancers and controls, air motors, hydraulic excavators, drills, hoists and electrical security systems. Ingersoll-Rand also supplies Bobcat skid-steer loaders, Blaw-Knox Pavers, Club Car golf cars and light utility vehicles, and Thermo King transport temperature control systems. Ingersoll-Rand products are sold primarily under the Company's name and also under other names including ABG, Blaw-Knox, Bobcat, Charles Maire, Club Car, Dixie-Pacific, Ecoair, Fafnir, Falcon, Ingersoll-Dresser Pumps, Johnstone, LCN, Legge, Monarch, Montabert, Normbau, Steelcraft, Thermo King, Torrington, Von Duprin and Zimmerman.

**Financial Summary** IR is a multinational manufacturer of nonelectrical industrial machinery and equipment. IR's principal lines of business include air compressors, architectural hardware products, construction equipment, automotive parts and temperature control systems. For the nine months ended 9/30/99, net sales rose 4% to $5.78 billion. Net income from continuing operations rose 23% to $403.7 million. Results reflect higher specialty vehicles and hardware sales and a lower interest expense.

**Recent Earnings Announcement**
For the 3 months ended 12/31/1999, revenues were 1,887,500; after tax earnings were 141,200. (Preliminary; reported in thousands of dollars.)

| Current Valuation Ratios[19] | IR | Industry | S&P 500 | 5 Year Avg. |
|---|---|---|---|---|
| Price/Earnings | 12.0 | 14.7 | 43.4 | 15.1 |
| Price/Book | 2.4 | 2.6 | 10.2 | 2.6 |
| Price/Sales | 0.9 | 0.7 | 4 | 0.9 |
| Price/Cash Flow | 9.6 | 6.3 | 30 | 10.2 |
| Dividend Yield % | 1.7 | 3.6 | 0.5 | --- |

| Future Valuation Ratios[20] | IR | Industry | S&P 500 |
|---|---|---|---|
| Forward Price/Earnings | 12.3 | 14.9 | 37.9 |
| PEG Ratio | 1.0 | 1.5 | 2.5 |
| PEG Payback (Yrs) | 7.4 | 8.9 | 11.8 |

Data through 03-29-00

- Ingersoll-Rand has one of the lowest PEG ratios of all the large-cap stocks in the NYSE, meaning that its price is relatively low in comparison to its growth.
- Its P/E ratio is well below the industry average while maintaining its status as market leader
- Ingersoll-Rand announced the formation of an electronic commerce business unit to capitalize on opportunities for integrating e-business initiatives throughout the corporation's four global growth sectors.

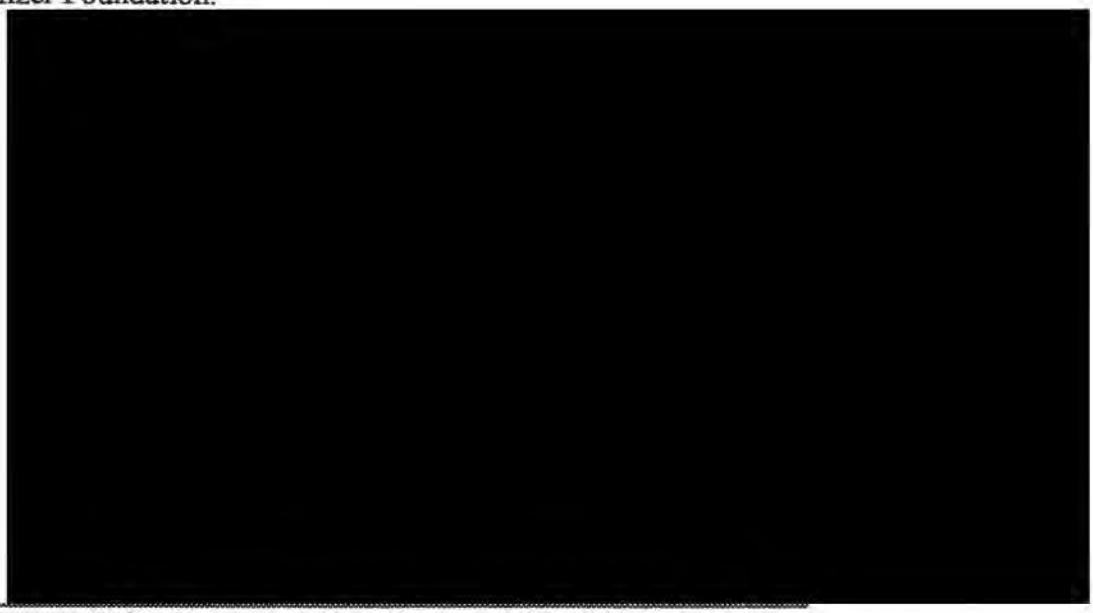
**Pfizer, Inc. (NYSE: PFE)**

**Business Summary**

Pfizer Inc. is a global health care company operating in two business segments. The Pharmaceutical segment includes prescription pharmaceuticals for treating cardiovascular diseases, infectious diseases, central nervous system disorders, diabetes, erectile dysfunction, allergies, arthritis and other disorders, as well as non-prescription medications. The Animal Health segment comprises antiparasitic, anti-infective and anti-inflammatory medicines, and vaccines for livestock, poultry and companion animals. Pfizer's major pharmaceutical products include Norvasc, Procardia Xl, Cardura, Zithromax, Diflucan, Trovan, Zoloft, Viagra, Glucotrol XL and Zyrtec. Pfizer's better-known over the counter brands in the United States are Visine, Bengay, Cortizone, RID, Unisom, Desitin, Bain de Soleil, Plax and Barbasol. Pfizer's Animal Health products include Dectomax, Rimadyl, Anipryl, Terramycin LA-200, Banminth, Nemex, Valbazen, Paratect, Coxistac, Aviax and Mecadox.

**Financial Summary**

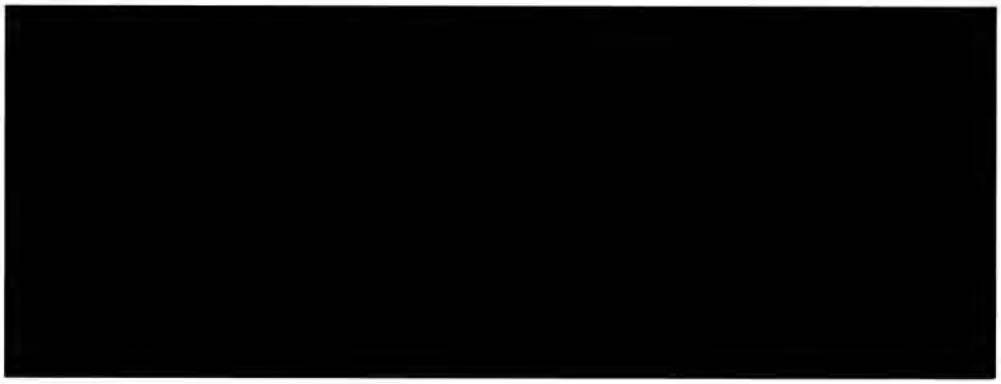
Pfizer is a research-based, global pharmaceutical company which discovers, develops, manufactures and markets innovative madicines for humans and animals. For the fiscal year ended 12/31/99, total revenues rose 20% to $16.2 billion. Net income from continuing operations rose 64% to $3.20 billion. Revenues reflect increased product alliance revenue and increased sales volumes of in-line products. Earnings reflect the absence of a $300 million contribution to the Pfizer Foundation.



| Current Valuation Ratios[21] | PFE | Industry | S&P 500 | 5 Year Avg. |
|---|---|---|---|---|
| Price/Earnings | 44.7 | 33.7 | 43.4 | 37.1 |
| Price/Book | 16.1 | 12.8 | 10.2 | 12 |
| Price/Sales | 8.8 | 5.4 | 4 | 7.7 |
| Price/Cash Flow | 41.6 | 27.2 | 30 | 45.6 |
| Dividend Yield % | 1 | 1.5 | 0.5 | --- |

| Future Valuation Ratios[22] | PFE | Industry | S&P 500 |
|---|---|---|---|
| Forward Price/Earnings | 43.1 | 29.5 | 37.9 |
| PEG Ratio | 2.4 | 2.3 | 2.5 |
| PEG Payback (Yrs) | 12.2 | 12 | 11.8 |

Data through 03-29-00



- Pfizer's planned merger with Warner-Lambert has been finalized, and the combined company should be a force to be reckoned with. The merged firm will boast a formidable research staff, talented sales and marketing teams, and a strong portfolio of products. Lipitor alone is expected to rack up $5 billion in sales this year.

- Pfizer is planning to boost research-and-development spending to $4.7 billion in 2000. This is a much heavier commitment than any other company in the industry.

- Pfizer expects earnings growth to increase to 25% per year starting in 2001, up from the 20% it had projected before the merger.

- Most of the company's core products--including Zoloft, Norvasc, Diflucan, Zithromax, and Viagra--have continued to show strong growth rates.

- In contrast to many of its competitors', patents on most of the company's product lines won't expire for several more years.

- Pfizer's sales force is viewed as the best in the industry, which has contributed to hugely successful comarketing arrangements on products like Celebrex and Lipitor.

**Texas Instruments (NYSE: TXN)**

**Business Summary**
Texas Instruments, Incorporated (TI) is a semiconductor company that designs and supplies digital signal processors and analog integrated circuits, and designs and manufactures other semiconductor products including standard logic, application-specific integrated circuits, reduced instruction-set computing microprocessors and microcontrollers. TI's semiconductor products are used in a diverse range of electronic systems, including digital cell phones, computers, printers, hard disk drives, modems, networking equipment, digital cameras and video recorders, motor controls, autos and home appliances. TI has two other principal segments, Materials & Controls (M&C) and Educational & Productivity Solutions (E&PS). M&C sells electrical and electronic controls, electronic connectors, sensors, radio-frequency identification systems and clad metals into commercial and industrial markets. E&PS supplies educational and graphing calculators.

**Financial Summary**
Texas Instruments is a global semiconductor company and a leading designer and supplier of digital signal processing solutions. For the fiscal year ended 12/31/99, revenues rose 10% to $9.47 billion. Net income totaled $1.41 billion, up from $416 million. Revenues reflect increased semiconductor shipments. Net income benefitted from the absence of $219 million in consolidation charges and improved operating margins due to the absence of the low margin memory business.

| Current Valuation Ratios[23] | TXN | Industry | S&P 500 | 5 Year Avg. |
|---|---|---|---|---|
| Price/Earnings | 101.5 | 106 | 43.4 | 62.1 |
| Price/Book | 17.5 | 16.5 | 10.2 | 4.8 |
| Price/Sales | 14.7 | 16.4 | 4 | 3.3 |
| Price/Cash Flow | 93.8 | 50 | 30 | 29 |
| Dividend Yield % | 0.1 | 0 | 0.5 | --- |

| Forward Valuation Ratios[24] | TXN | Industry | S&P 500 |
|---|---|---|---|
| Forward Price/Earnings | 99.7 | 82.9 | 37.9 |
| PEG Ratio | 4.1 | 3.2 | 2.5 |
| PEG Payback (Yrs) | 13.9 | 13.5 | 11.8 |

Data through 03-29-00

- Texas Instruments dominates the market for digital signal processor (DSP) chips, which are one of the key components in cell phones. As of the end of 1999, Texas Instruments increased its DSP market share to about 50%.
- The next player is Lucent, with about 25% share.
- Because of the widespread use of DSPs in the wireless-telecom industry, the market for the chips is expected to grow between 25% and 30% per year for the next several years.
- Texas Instruments is also number one in analog chip market share. Although TI doesn't dominate this market, it is a big part of the company's sales and has proved to be a steady source of growth.
- The company's margins continue to improve. Operating margins (a measure of the company's core business) have consistently improved over the past several quarters to about 22%. Moreover, there still seems to be plenty of upside with TI's operating margins, which should filter down to its bottom-line.

# MUTUAL FUNDS

Group Three has made a top-down then a bottom-up approach to our mutual and index funds. Our group realizes that we are not following either the Morgan Stanley EAFE index or the International Finance Corporation asset allocation template. And that our funds are over-weighted in Europe. The first argument we will make is that we feel that European freedom indexes, which are based on social and political freedoms, make European investments safer and more stable. Additionally, tax reform movements in Europe especially asset unwinding not being subject to capital gains and economic/currency unification will be drivers for growth and capital appreciation.

Secondly, we have used a bottom-up approach to evaluate the funds performances over the last year as well as over the last several years. We have also tried to integrate our funds selection with our equities selections to find revenue streams that are truly global. Following is a cursory narrative of the existing funds and our recommendation to maintain existing positions within the funds.

## MONTGOMERY INTERNATIONAL GROWTH FUND (MNIGX)

The fund has had an excellent performance over the last twelve months returning 34.51%. We feel the fund will have an expected return of 23.02 % over the next three years. The fund has a beta of 0.83. It has an R-Squared of 57 with a standard deviation of 22.74. The Sharpe and Treynor Ratio's are 0.78 and 24.89 respectively.

The fund has a policy to obtain capital appreciation by investing two-thirds of its assets into foreign companies with market capitalization's greater that $ 1 billion in at least three countries. With its net assets, the fund invests in services (32 %), financials (22%), and technology (12 %.) The fund has 64 % position in Europe, 31 % of its holdings in Asia and the remainder in Latin America.

## INVESCO EUROPEAN FUND (FEURX)

PX Invesco European Fund seeks capital appreciation. The FEURX fund returned 30.84 % over the last twelve months. The funds objective is to invest at least 80% of assets in equity securities domiciled in the following European countries: England (24%), France (17 %), Germany (14%), Belgium, Italy, the Netherlands, Sweden, Switzerland, Denmark, Norway, Finland, and Spain. Currently, equities encompass 92 % of the funds allocation.

Roughly one-third of the portfolio funds $ 743 million are in technology. Industrial Cyclicals represent one-eighth of the fund's invested assets. The three-year alpha is 20.57 %. The fund has a beta of 0.58. The R-Square is 17 with a standard deviation of 32.60. The Sharpe and Treynor Ratio's are 1.03 and 60.69 respectively.

## NASDAQ 100 (QQQ)

QQQ is an investment trust formed by NASDAQ-Amex Investment Product Services to enable investors with the opportunity to purchase units of beneficial interest in the Trust. The Trust represents proportionate undivided interest in a portfolio of securities; consisting of substantially all of the securities approximately weighted the same, as the component securities of the NASDAQ-100 Index. The price of the trust is one-twentieth of the value of the NASDAQ-1000. The Fund has a Price to Earnings ratio of 19.5. It has a price to cash flow ratio of 14.4. The Fund has a price to book ratio of 4.8. The Fund has 269 million shares outstanding. The fund has an R-Squared of 99.6 with a standard error of 2.05. The annual return of the QQQ was 29 %.

## Portfolio

### Composition of the Original Portfolio

The original portfolio allocated most funds to the US equity markets. These funds were allocated at similar weights among the selected stocks and sector funds. The original composition of the portfolio was as follows:

| Symbol | Purchase Date | # Shares | Share Price | Market Value | Beg. Weight |
|---|---|---|---|---|---|
| T | 5/11/99 | 91 | 58.96 | $ 5,364.91 | 5.36% |
| AXP | 5/11/99 | 40 | 132.33 | $ 5,293.20 | 5.29% |
| BUD | 5/14/99 | 76 | 70.21 | $ 5,335.58 | 5.34% |
| C | 5/11/99 | 108 | 49.51 | $ 5,347.30 | 5.35% |
| DAL | 5/11/99 | 79 | 67.64 | $ 5,343.80 | 5.34% |
| GE | 5/11/99 | 48 | 111.52 | $ 5,352.86 | 5.35% |
| GMH | 5/11/99 | 87 | 61.27 | $ 5,330.23 | 5.33% |
| FEURX | 5/12/99 | 603 | 16.58 | $ 9,999.99 | 10.00% |
| JNJ | 5/11/99 | 57 | 93.39 | $ 5,323.34 | 5.32% |
| MCK | 5/11/99 | 138 | 38.83 | $ 5,358.54 | 5.36% |
| MNIGX | 5/13/99 | 529 | 18.91 | $ 9,999.99 | 10.00% |
| QQQ | 5/11/99 | 49 | 108.58 | $ 5,320.42 | 5.32% |
| ODP | 5/11/99 | 250 | 21.52 | $ 5,379.50 | 5.38% |
| PFE | 5/11/99 | 141 | 38.03 | $ 5,361.76 | 5.36% |
| STI | 5/31/99 | 1,068 | 1.00 | $ 1,067.89 | 1.07% |
| T-Bond | 5/13/99 | 10,000 | 93.84 | $ 9,384.37 | 9.38% |
| Cash | 5/11/99 | | | $ 132.18 | 0.13% |
| *GNE** | *5/11/99* | *61* | *86.96* | *$ 5,304.26* | *5.30%* |
| **Total** | | | | **$100,000.12** | **100.00%** |

**Equity has been sold.*

| eg. Weights | |
|---|---|
| Equities | 64.10% |
| Mutual Funds | 25.32% |
| Bonds | 9.38% |
| Cash Equiv. | 1.20% |
| **Total** | **100%** |

**Holding Period Performance**

The performance of the portfolio was analyzed by taking the weekly returns of all the stocks and the mutual funds for a period of 44 weeks. The first observation took place on May 10, 1999 and the last one took place on March 6, 2000.

The amount invested in bonds, cash equivalents and cash was assumed to remain constant in order to simplify the analysis of the performance of the portfolio. Note that equity GNE was sold earlier in the year, so the weekly returns of this equity are not included in the portfolio's analysis. The end results of the portfolio were as follows:

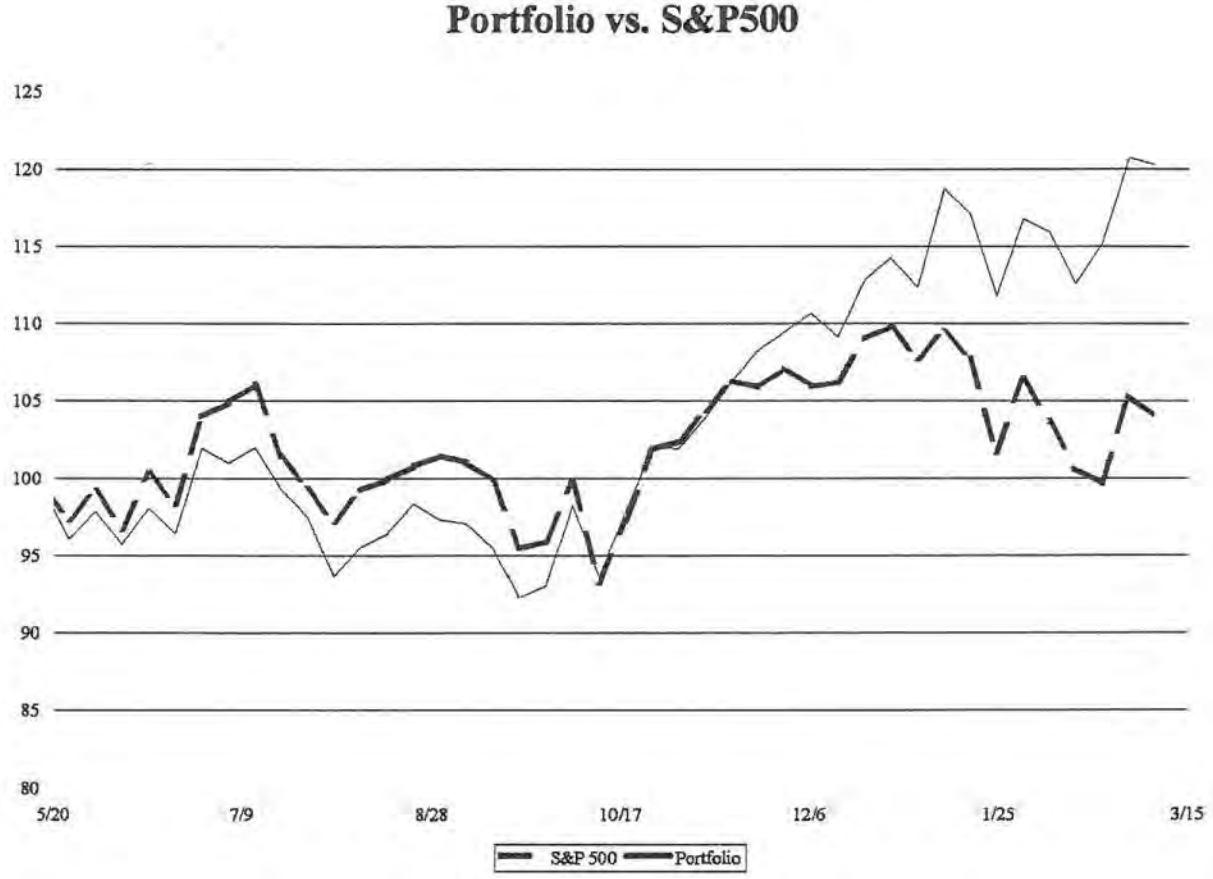
| Symbol | Current Date | # Shares | Share Price | Current Market Value | Current Weight |
|---|---|---|---|---|---|
| T | 2/8/00 | 91 | 50.38 | $ 4,584.58 | 4.00% |
| AXP | 2/8/00 | 40 | 163.00 | $ 6,520.00 | 5.69% |
| BUD | 2/8/00 | 76 | 66.56 | $ 5,058.56 | 4.41% |
| C | 2/8/00 | 108 | 56.00 | $ 6,048.00 | 5.28% |
| DAL | 2/8/00 | 79 | 48.88 | $ 3,861.52 | 3.37% |
| GE | 2/8/00 | 48 | 137.06 | $ 6,578.88 | 5.74% |
| GMH | 2/8/00 | 87 | 107.50 | $ 9,352.50 | 8.16% |
| FEURX | 2/8/00 | 684.826 | 28.17 | $ 19,291.55 | 16.84% |
| JNJ | 2/8/00 | 57 | 82.06 | $ 4,677.42 | 4.08% |
| MCK | 2/8/00 | 138 | 20.38 | $ 2,812.44 | 2.45% |
| MNIGX | 2/8/00 | 778.063 | 23.28 | $ 18,113.31 | 15.81% |
| QQQ | 2/8/00 | 49 | 205.25 | $ 10,057.25 | 8.78% |
| ODP | 2/8/00 | 250 | 12.00 | $ 3,000.00 | 2.62% |
| PFE | 2/8/00 | 141 | 37.81 | $ 5,331.21 | 4.65% |
| STI | 2/8/00 | 233 | 1.00 | $ 503.01 | 0.44% |
| T-Bond | 2/8/00 | 10,000 | 87.47 | $ 8,631.30 | 7.53% |
| Cash | 2/8/00 | | | $ 157.47 | 0.14% |
| *GNE** | 2/8/00 | - | *0.00* | *$ -* | *0.00%* |
| **Total** | | | | **$114,579.00** | **100.00%** |

**Equity has been sold.*

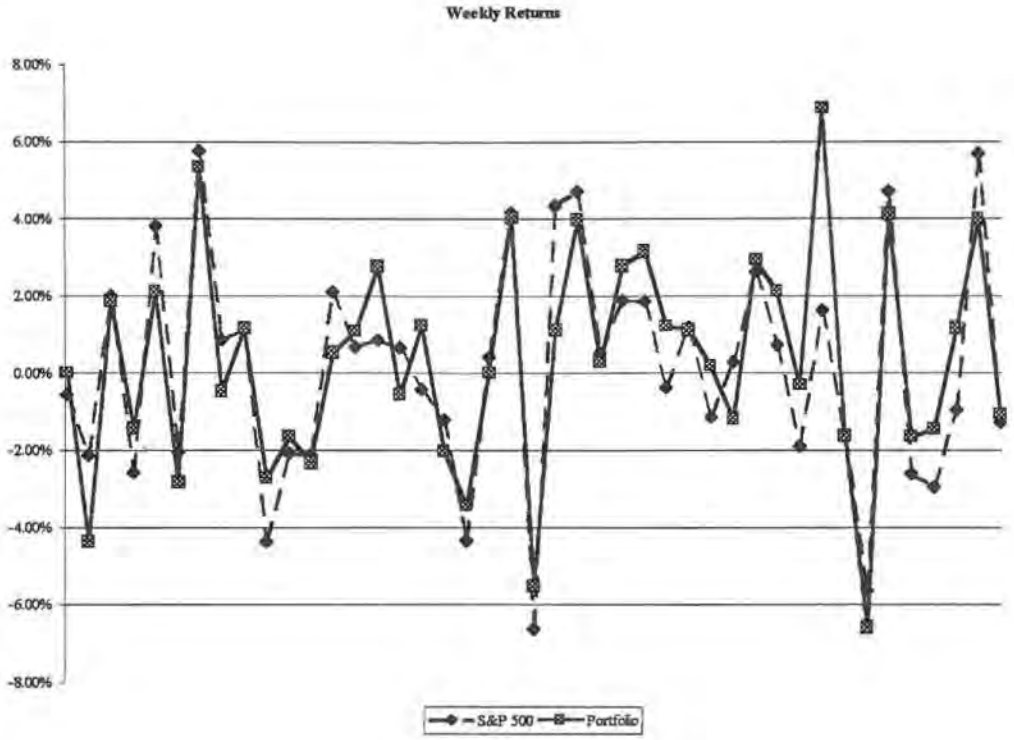
| Current Weights | |
|---|---|
| Equities | 50.47% |
| Funds | 41.42% |
| Bonds | 7.53% |
| Cash Equiv. | 0.58% |
| **Total** | **100%** |

| Portfolio | |
|---|---|
| HPR | 12.34% |
| Beta | 0.73 |

| | |
|---|---|
| $R^2$ | 0.7569 |
| Sharpe | 2.61 |
| Treynor | 0.08 |
| Jensen | 0.02 |
| St. Dev. | 121.3% |




The graph above shows the performance of the portfolio vs. the S&P500 Index. The portfolio performed slightly higher during the observed 44 weeks holding period. The graph below compares their weekly returns.

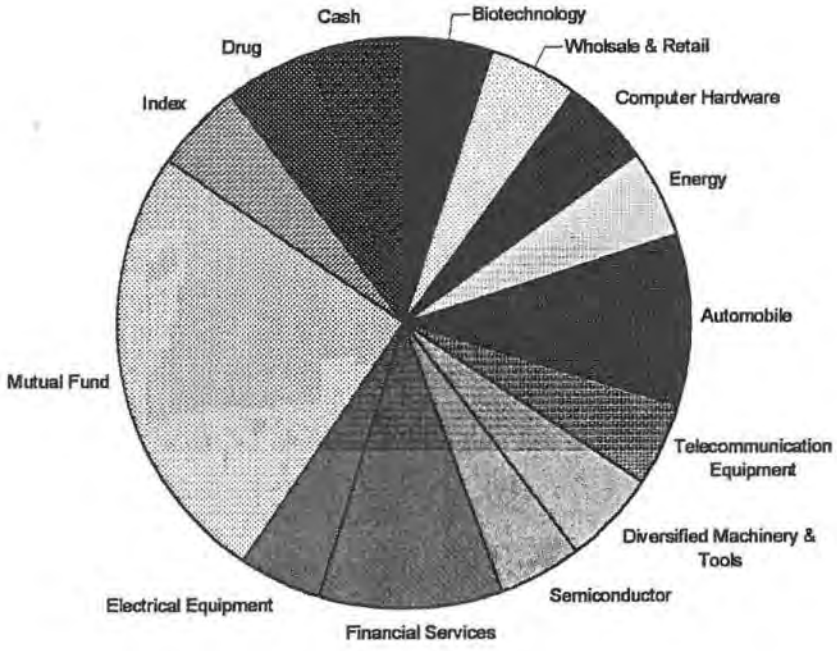



## The Proposed Portfolio

After studying the performance of the portfolio, it was decided to make several changes. The proposed new portfolio is to be made up of fifteen investments made up 12 equities and 3 funds. As mentioned earlier the selected investments are as follows:

1. Best Buy (BBY)
2. ENRON (ENE)
3. Citigroup ( C )
4. GE
5. ADAC
6. Ford ( F )
7. American Express (AXP)
8. Hughes Electronics (GMH)
9. Nasdaq 100 (QQQ)
10. Pfizer (PFE)
11. Ingersoll-Rand (IR)
12. EMC (EMC)
13. Montgomery International Growth Fund (MNIGX)
14. Invesco European Fund (FEURX)
15. Texas Instruments (TXN)

## Industry Allocation



**Efficient Frontier**

In order to determine the proportions to be invested in each of this investment, the efficient frontier for portfolios made up of these investments was calculated. This calculation gave us the following results:

After having determined the efficient frontier for the assets, we selected a weight for each of the assets in order to maximize the expected return of the portfolio while lowering its total risk.

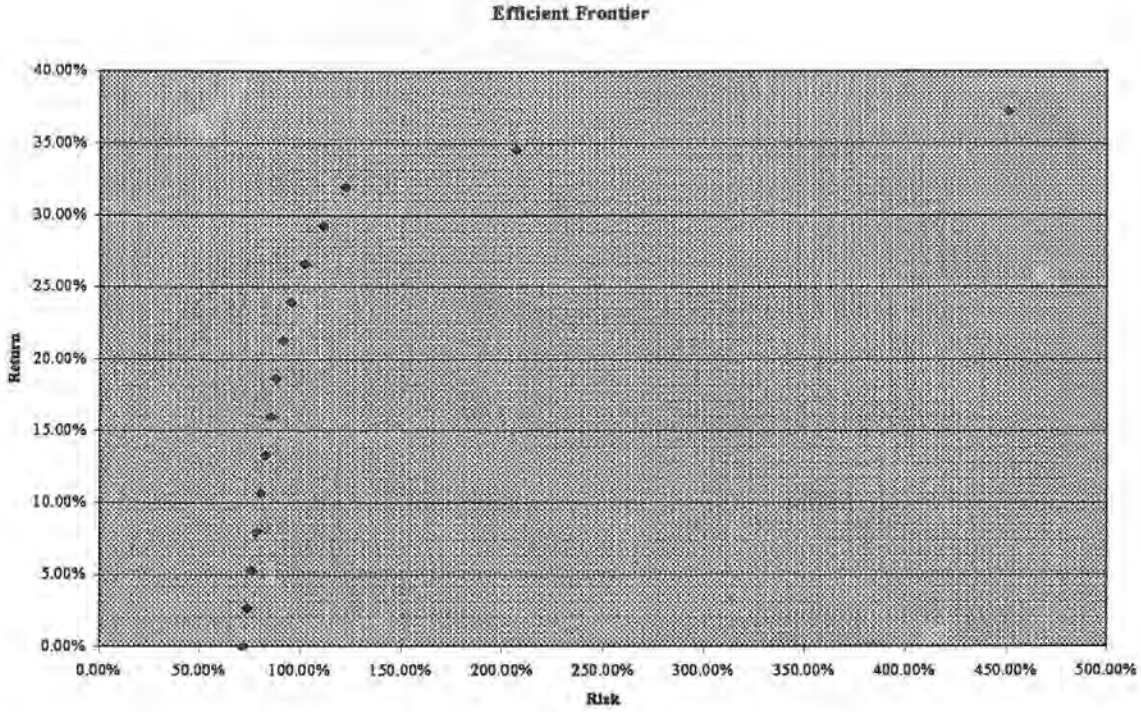
| Company | Weight | Share Price | # of Shares | Market Value |
|---|---|---|---|---|
| ADAC | 5% | 12 | 833 | $ 9,996.00 |
| BBY | 5% | 63.5 | 157 | $ 9,969.50 |
| EMC | 5% | 120.125 | 83 | $ 9,970.38 |
| ENE | 5% | 68.75 | 145 | $ 9,968.75 |
| F | 9.50% | 41.9375 | 453 | $ 18,997.69 |
| GMH | 5% | 125.875 | 79 | $ 9,944.13 |
| IR | 5% | 37.3125 | 268 | $ 9,999.75 |
| TXN | 5% | 186 | 53 | $ 9,858.00 |
| AXP | 5% | 129.25 | 77 | $ 9,952.25 |
| C | 5% | 52.1875 | 191 | $ 9,967.81 |
| GE | 5% | 137.438 | 72 | $ 9,895.54 |
| FEURX | 10% | 32 | 625 | $ 20,000.00 |
| MNIGX | 15.5% | 24.65 | 1,257 | $ 30,985.05 |
| QQQ | 5% | 223.875 | 44 | $ 9,850.50 |
| PFE | 5% | 31.6875 | 315 | $ 9,981.56 |
| Cash | | | | $ 10,663.10 |
| **Total** | | | | **$ 200,000.00** |

In order to make these estimates, expected returns from analyst reports were used to calculate the portfolio return.

| Proposed Weights | |
|---|---|
| Equities | 64.25% |
| Funds | 30.42% |
| Cash | 5.33% |
| Total | 100% |

| Portfolio | |
|---|---|
| Expeted Return | 44.00% |
| St. Dev. | 133.00% |
| Beta | 0.80 |
| Sharpe | 0.2838 |
| Treynor | 0.446 |
| Jensen | 0.33 |

Jensen 0.33


Efficient Frontier
40.00%
35.00%
30.00%
25.00%
20.00%
15.00%
10.00%
5.00%
0.00%
Return
0.00%
50.00%
100.00%
150.00%
200.00%
250.00%
300.00%
350.00%
400.00%
450.00%
500.00%
Risk

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