

The Continuing Evolution of the Pharmaceutical Industry: Career Challenges and Opportunities

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Acknowledgements

We had three goals in writing this study. First, we wanted to provide people who work for pharmaceutical companies with a “30,000 foot” perspective on how and why their industry is changing. We also tried to identify those parts of the industry that we believe will do particularly well over the next decade and thus, will provide exceptionally good job opportunities. Finally, and most importantly, our study is intended to provide individual participants with a framework they can use to better plan their careers and lives.

It took 11 months of work by a team of 14 people to prepare this report. As part of our research process we reviewed numerous studies and reports on different aspects of the biopharmaceutical industry.

In many ways more integral to our work, however, was the help of more than 100 individuals who either work in the industry or have studied it closely. These people were extremely generous with their time and ideas and included current and former pharmaceutical company CEOs as well as senior managers, marketers and researchers who currently work at companies throughout the industry. We were also aided by several distinguished members of the academic world, senior managers of executive recruitment firms, outplacement specialists and attorneys.

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I. Executive Summary

Everyone working in the pharmaceutical industry cannot help but notice that it is undergoing a vigorous evolution. Much has been written about how pharmaceutical companies will need to change the way they do business in order to remain profitable in a new and unfamiliar competitive landscape.

To date, however, there has been little published on what this evolution will mean for the careers and lives of industry participants. Similarly, there is a paucity of information on what people who work in this industry can do to prepare for the new environment in which they will soon find themselves.

This study's goal is to fill this gap. We hope to provide a roadmap for industry professionals to better understand what the coming macro changes to the business will mean for their careers and where the best pharmaceutical job opportunities will be. More importantly, it is intended to identify the career planning steps that can be taken today that will allow them to capitalize on the many changes coming in the future.

To provide a foundation for understanding how and why the industry is changing, it is important to first consider the industry's recent past, one of the greatest periods in its history. Over the last 25 years, pharmaceutical companies have developed and brought to market a series of groundbreaking, high revenue drugs – medications that are now integral to the healthcare of millions of people around the world and that have earned these organizations tens of billions of dollars.

Anti-Depressants, Statins, Beta Blockers, Cox-2 Inhibitors and Sexual Function Disorder treatments are just a handful of the new classes of drugs that have changed healthcare. Today more than 200 million prescriptions for statins are written each year in the U.S. alone. Nearly 227 million prescriptions are written annually for anti-depressants. And more than 19 million Americans each year use medications to treat sexual dysfunction.¹

Exhibit 1.1

Top 10 Therapeutic Classes by U.S. Dispensed Prescriptions

Rank	Therapeutic Class	2006 Dispensed Prescriptions (millions)
1	Anti-Depressants	227
2	Lipid Regulators	203
3	Codeine & Combination	177
4	Ace Inhibitors	154
5	Beta Blockers	130
6	Proton Pump Inhibitors	102
7	Thyroid Hormone, Synthetic	98
8	Seizure Disorders	95
9	Calcium Blockers	87
10	Benzodiazepines	80
	All Therapeutic Classes	3,707

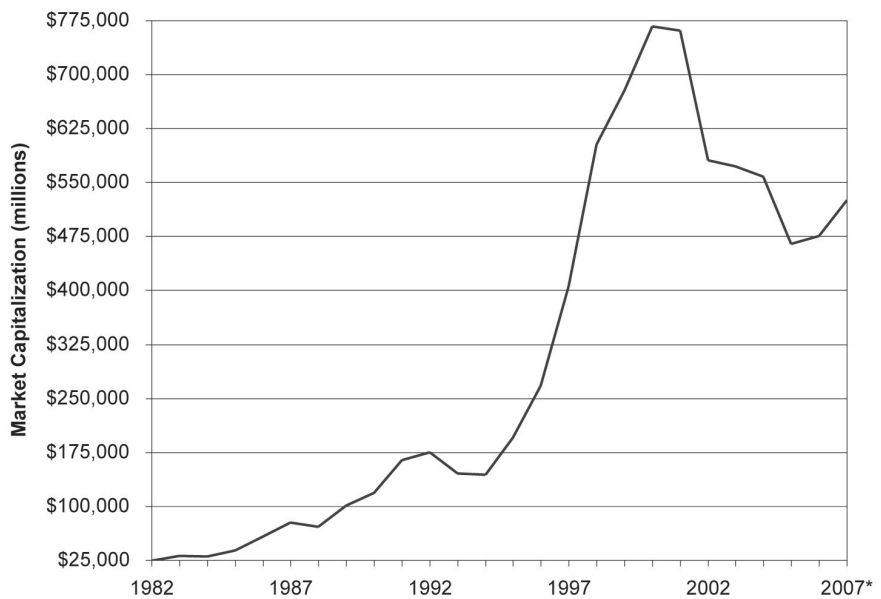
Source: IMS Health

This explosion in new drugs has improved the quality of life for countless people. It has likewise generated revenues for the pharmaceutical industry far greater than anyone might have imagined only a quarter century ago.

Consider six of the largest pharmaceutical companies – Pfizer, Merck, Eli Lilly, Schering-Plough, Bristol-Myers Squibb, and Abbott Laboratories. Last year their combined revenues exceeded \$137 billion and profits were about \$31 billion.² And in just the last 25 years, their market capitalization has grown from less than \$25 billion in 1982 to nearly \$525 billion by 2006.³

Exhibit 1.2

**Market Cap of Pharmaceutical Companies
has Grown Substantially Over 25 Years**



*As of 8/29/07
Aggregate capitalization of Pfizer, Merck, Eli Lilly, Schering-Plough, Bristol-Myers Squibb, and Abbott Laboratories.
Source: Value Line; Yahoo Finance

The Ideal Career

In the 1980s, there was a feeling of endless opportunities in the pharmaceutical industry

For a new college graduate in the early 1980s, there were few better opportunities than working for a pharmaceutical company. It was interesting work that helped improve the lives of others. There was a seemingly endless pipeline of new drugs and job opportunities. And pharmaceutical companies plowed back billions of dollars of their profits into research of new treatment areas, creating even greater prospects for the future.

During this time, pharmaceutical companies and their employees had a paternalistic relationship. Pay was good and employees' retirements were secure with robust pensions. Jobs were stable and benefits unbeatable. It was easy to envision an entire career with one employer.

Many of these companies also shared their great successes with their employees. These organizations showered down large numbers of stock

Several forces are making pharmaceutical companies' business models obsolete

options as an integral component of each person's compensation. They also allowed their employees to acquire company stock at a substantial discount through their company stock purchase programs. And as these companies' stock prices soared, many long-term pharmaceutical company employees became millionaires.

Forces are Changing the Industry and the Careers of its Participants

The industry, however, is on the verge of entering into a new era because a series of forces have made pharmaceutical companies' current business models obsolete. These forces can be grouped into three categories:

1. Revenues are Under Pressure

- *Patents on Numerous High Revenue Drugs are Expiring.* Major pharmaceutical companies find themselves in the unenviable position of having to rely on a small number of drugs for much of their revenue and the preponderance of their profitability. However, the patents on many of these treatments will expire over the next five years and 36 treatments that generated nearly \$59 billion in U.S. revenues in 2006 will have to compete with low-cost generic alternatives.⁴
- *Pipeline for New Drugs Looks Uncertain.* It does not appear that the drugs in the development pipelines of major pharmaceutical companies will generate anywhere near as much in revenue as those with expiring patents.
- *More Powerful Payers.* A series of mergers has created a handful of very powerful payers. Today only 10 firms control nearly 56% of the managed care market.⁵ While in the past, physicians were the key decision-makers as to which drugs were used by patients, these larger payer organizations now influence which treatments their insured will use by manipulating patient co-pays.

Lower cost medications – such as generics and those treatments sold by pharmaceutical companies at a below-market cost so that the payer will include them in its formulary – are provided to patients at a very low out-of-pocket cost. For all other treatments, patients must pay much more, nearly 10 times as much as the generic alternative for some drugs. Consequently, pharmaceutical companies now face the unappealing choice of having to discount even branded medications or effectively be excluded from large segments of the potential patient population.

2. Costs and Risks of Developing New Drugs are Increasing

At the same time that the pharmaceutical industry's revenues are under pressure, the costs and risks associated with the development of new drugs are increasing for a number of reasons.

First, many of the drugs currently under development are aimed at treating conditions that have more complex and difficult targets, thereby increasing the costs of the research process and reducing the likelihood of ultimate success.

Second, unlike in the past when the R&D process was frequently driven by obvious commercial applications, today's R&D is often driven by new scientific

Today's R&D is largely driven by new scientific discoveries – a riskier, less predictable process from a commercialization standpoint

discoveries, a process that is far less predictable from a commercialization perspective.

Third, the regulatory approval process has become significantly more complex and costly. The regulatory agencies are more sophisticated, capable, cautious and conservative in evaluating drugs than in the past. Consequently, their standards for approvals are significantly higher. This, in turn, is forcing pharmaceutical companies to test their new treatments in larger, more comprehensive and more costly clinical trials.

Fourth, the current plaintiff-favorable litigation environment continues to be a drag on pharmaceutical company profitability. Since 2000, 65,000 product liability lawsuits have been filed against prescription drug makers – more than in any other industry.⁶ This should come as no surprise given certain features of the U.S. tort system: plaintiffs do not need to incur any out-of-pocket costs to hire contingency-fee lawyers; prescription drug users represent a convenient group for class action certification; and unsophisticated juries are frequently willing to give exorbitant awards. Further, even if a pharmaceutical company successfully defends a lawsuit, it will incur significant legal costs in the process.

Finally, payers are slowly shifting to an “outcomes-based” analysis of treatment alternatives. Under outcomes-based analysis, payers focus not on a treatment’s ability to address any particular symptom, but rather its long-term effect on overall health. Consequently, predicting the potential revenue from a new treatment has become much more difficult, and it is less certain that companies who spend the hundreds of millions of dollars necessary to develop new treatments will generate a sufficient return on their investments.

3. Globalization

The most powerful force sweeping through the industry, however, is the globalization of this industry. What had historically been a U.S.- and E.U.-focused business is now shifting to developing countries both for the development of new treatments and as potential markets for products.

The role of these countries in the development of drugs has been aided by several factors. These countries’ laboratories are becoming more sophisticated as they become populated with U.S.- and E.U.-trained scientists, and their research costs are a small fraction of their developed country counterparts. These labs also operate under regulatory regimes that encourage development through less adversarial approval processes. And the intellectual property laws of these countries are maturing.

Globalization is the most powerful force sweeping through the industry

The great economic growth experienced by developing countries has also created a much larger demand for health care and prescription medications than in the past. Although much of their near-term demand for drugs will be for generic treatments, the sheer size of the populations in these countries makes them potentially enormous markets for the industry.

Big Changes for the Pharmaceutical Industry

The confluence of these factors is compelling pharmaceutical companies to reengineer their business models, identify their core competencies and

focus on what they do best. Consequently, the following trends in the pharmaceutical industry will continue, and even accelerate, in the future:

1. Corporate Restructuring

- *Job Reductions.* With their revenues under pressure, pharmaceutical companies are reducing costs by shrinking the size of their workforces. From 2003 to 2006, the industry witnessed about 86,000 layoffs.⁷ Several of the largest pharmaceutical companies have also announced plans for significant layoffs in 2007 and 2008.

This trend should continue for the foreseeable future because these companies must find ways to lower their operating costs to offset their coming drop in revenues. No one can precisely predict how many additional people will be displaced. However, two CEOs interviewed believe that “an entire generation” of *upper-middle and senior-level executives* (as many as 50,000 individuals) will be displaced.

- *Further Consolidation Within the Industry.* The industry has already experienced significant consolidation. Between 1985 and the present, 51 large companies in the industry consolidated into only 10 organizations.⁸ Mergers and acquisitions between large pharmaceutical companies will continue because they are an effective method of cutting costs. They allow the combined company to cut staffing redundancies in administrative support functions such as human resources, legal, marketing staff, senior management, and in research staff for similar product lines.
- *Refocusing on Fewer Business Lines.* Another cost-cutting strategy is to spin off non-core business lines. As pharmaceutical companies narrow their focus, they are selling off entire units for treatment areas that are currently unprofitable and using the proceeds to invest in areas with greater promise and near-term potential for making money.
- *Outsourcing.* In addition to identifying their core business lines, pharmaceutical companies will undergo extensive reviews of their operations. They will identify those functions that allow them to most efficiently add the greatest value and try to lower their costs by outsourcing the remainder wherever possible.

A key element of this strategy will be to outsource large portions of the development of new treatments to laboratories based in emerging countries. They currently operate at a fraction of the cost of those based in the U.S. and E.U., and their scientific sophistication is rapidly increasing.

2. Adoption of Risk Reduction Strategies

- *Acquisitions Rather Than Development of New Compounds.* Large pharmaceutical companies are recognizing that their strengths lie in the late stage development, commercialization and marketing of drugs rather than early stage research and development. Consequently, they increasingly are acquiring or licensing compounds developed by biotechnology companies, typically those backed by venture capital investors.

Since 2001, more than \$71 billion in such transactions have been completed.⁹ Today nearly 50% of the drugs marketed by large

**An “entire generation”
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**Between 1985 and
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10 organizations**

Working for a pharmaceutical company in the future will be less predictable

pharmaceutical companies were developed by companies or institutions other than themselves.¹⁰ Over time, we expect this percentage to increase significantly.

- *Use of Joint Ventures and Research Consortiums.* Pharmaceutical companies also are increasingly sharing the risk of developing new drugs through the use of joint ventures and research consortiums. These partnerships involve other companies, universities, government agencies and not-for-profit entities.

3. Evolution of Drug Marketing

- *Increased Focus on U.S. Payers.* As the ability of U.S. payers to influence which drugs are used by patients increases, marketers with access to physicians will have less value than those who are sophisticated in working with payer organizations. Similarly, branding strategies and direct-to-consumer (DTC) marketing campaigns will focus less on a particular brand or drug than on the availability of treatments for selected conditions in general.
- *Drugs Marketed Globally.* As the demand in developing countries for prescription medications grows, pharmaceutical companies will need to recruit international sales and marketing forces. They will have to develop strategies and programs that address the unique pricing and regulatory environments of each individual country.

What Does it all Mean to an Industry Professional?

As the pharmaceutical industry adapts to the forces changing its business model, it will not only survive, but thrive. However, the adaptation process over the next five to 10 years will be very disruptive for many of its longer-term employees, and will create far reaching consequences for any individual working in this field.

Individuals will need to think in terms of a career in the industry and not at just one company

These changes will make working at a pharmaceutical company less predictable, and individuals will increasingly need to think in terms of a career in the industry and not at just one company. And the skills in the highest demand by employers in the future will differ from those in the past.

The reshaping of the industry, however, will also unlock unforeseen opportunities for those individuals who are able to anticipate the changes, prepare for and take advantage of them. Many will start new careers as independent contractors, earning far more than they ever might as an employee of a large company. Others will either start or join a new company with a unique specialty or expertise and potentially earn millions of dollars should the company succeed. Still others will reposition themselves within large pharmaceutical companies to increase their importance to the enterprise and enhance their careers.

Six Future High Growth Areas of the Industry

Of the many potential opportunities, our research identified six segments of the pharmaceutical industry that we believe will offer particularly high growth potential:

Repositioning or repurposing compounds is a high growth opportunity

1. Commercialization of Dormant Compounds

In the freezers of pharmaceutical companies are thousands of compounds that were abandoned prior to FDA approval, or that were approved but not commercialized. These organizations are reluctant to license or sell these compounds to other companies, largely for fear of receiving less than fair value if the drug becomes profitable for the acquiring company.

Finding ways to reposition or repurpose these compounds is a high growth opportunity over the next decade because the marginal cost of doing so is a small fraction of the cost of developing a new treatment from discovery. Additionally, by repurposing a compound, a pharmaceutical company can extend the life of its patent protection.

2. Generic or Biosimilar Versions of Biologics

The development of generic or biosimilar versions of biologics (i.e. versions of the same treatment that are not identical to the branded medication but have enough similarity to produce comparable results in patients) will also be a high growth area. While the development and manufacture of such treatments remains difficult and expensive, the size of the market (today, 25% of the new drugs coming to market are biologics) and the near-term expiration of patents on some of the highest revenue biologics makes it a compelling opportunity.¹¹ Further, recent regulatory initiatives and advances in technology have increased the likelihood that biosimilar versions of these treatments will soon be a reality.

3. Improving the Efficiency of R&D

The rapidly increasing costs and risks of developing drugs have led to the creation of a fast-growing business within the pharmaceutical industry: finding ways to improve the efficiency of the R&D process. In particular, there will be great interest in finding ways of improving the ability to identify early in the research process (and prior to the incurrence of significant costs) those drug targets that are “inherently intractable and undruggable” or are potentially toxic to humans and therefore not viable pursuits. Additionally, because of the finite life of any drug patent, finding ways of reducing the time required from discovery through regulatory approval will be a focus of pharmaceutical companies.

Pharmaceutical companies need to find ways to reduce the time from discovery through approval

4. Oncology and Central Nervous System (CNS) Disorders Research

As the life expectancy for the U.S. population continues to grow, larger portions of the population will be afflicted with conditions such as Alzheimer’s Disease and dementia. In addition, cancer will be an even bigger cause of mortality, since for many cancers the single most important risk factor is age. As the number of those with CNS disorders and cancer increase, so too will the demand for new treatments.

5. Stratified Medicine and Diagnostics

While cost-effective “personalized medicine” likely remains decades away, “stratified medicine” – particularly in the field of diagnostics – represents a high growth opportunity in the near-term. This field will focus on finding ways

to slightly alter the composition of different medications to make them more effective for sub-segments of the patient population.

The demand for new diagnostic tools in this field will grow exceptionally fast because payers view them as effective cost containment mechanisms. They also have a compelling economic model for pharmaceutical companies and venture capitalists because the regulatory approval process often can be shorter and easier than that for many drugs. Additionally, diagnostic tests are often used by much larger segments of the population than the therapeutic treatment they are designed to test for.

6. Fusion of Pharmaceuticals and Consumer Goods

While the regulation of consumer goods is nothing new, consumer goods companies, plagued by recent scares from poisoned dog food and toothpaste among other things, are now under far more scrutiny. They also view the areas of health and wellness products as high growth opportunities, even though such products have traditionally been the domain of pharmaceutical companies. Consequently, consumer goods firms increasingly will seek individuals with experience in the pharmaceutical industry because of their ability to manage highly-regulated businesses and ensure product safety and efficacy.

Seven Highly-Valued Skill Sets

These six areas will offer great growth potential and, therefore, some of the best employment opportunities over the next decade. However, the changes sweeping through the industry will also create demand from companies of all sizes for individuals with certain skills and expertise. While it would be impossible to produce an all-inclusive list of such abilities, the executives we interviewed believe there will be great demand for the following seven skill sets:

Changes to the industry will create great demand for individuals with certain skill sets and expertise

1. Ability to Manage Decentralized Intellectual Capital Resources

As more pharmaceutical companies shift to decentralized business models, they will look outside their walls for much of the intellectual capital needed to develop new drugs. Contract research organizations (CROs), independent contractors, research consortiums, universities and foreign laboratories will play increasingly integral roles in solving complex problems more cost-effectively. Individuals able to simultaneously and effectively manage all of these internal and external intellectual capital resources will be in great demand across the industry.

2. Ability to Work in Joint Ventures and Across Divisions, Cultures and Countries

The pharmaceutical industry is shifting from fully-integrated businesses focused largely on the United States and E.U. markets to more decentralized business models that operate and compete in a global market. This shift will create a demand for individuals who can navigate the demands of working in joint ventures and across divisions within one company, as well as those who have the ability to work with people from different countries and cultures (which requires experience with different languages, regulatory environments and attitudes about life and work).

There will be great demand for people who can combine an understanding of intellectual property law with science and business strategy

3. Ability to Integrate an Understanding of Intellectual Property Laws, Scientific Expertise and Business Strategy

Recent advances resulting from the human genome project have led to a flood of patents by companies on different gene sequences. The existence of these patents complicates the development of new drugs because it is unclear whether many (if not most) of these patents are enforceable. Consequently, there will be great demand for those individuals who can integrate an understanding of intellectual property laws (in particular, case law) with a deep understanding of science and business strategy. Such individuals will enable pharmaceutical and biotechnology companies to accurately project the potential revenue a new treatment might generate, compare it with the cost of development and thus, understand which drug development opportunities make economic sense.

4. Ability to Spur Creativity While Managing Commercially

In the past, pharmaceutical companies largely operated as silos – that is, each unit working on the development of a new drug largely functioned independently of the other units involved in this process. Researchers' jobs were to make scientific discoveries that would lead to new drugs. Commercialization and marketing staff were responsible for turning these discoveries into commercially viable products.

The economic demands on pharmaceutical companies will force them – and all of their employees – to place a much higher emphasis on finding ways to generate revenues faster. And while these companies were able to be extremely patient in the R&D efforts in the past, hoping for a potential scientific breakthrough, they will instead be forced to more quickly terminate those projects that do not demonstrate near-term promise.

This obsession with the commercialization aspects of research and development, however, could potentially have long-term adverse effects on these organizations' ability to innovate. Scientific research is not a neat and orderly process. It requires a great deal of patience and an operating environment that encourages creativity. Absent patience and creativity, pharmaceutical company laboratories would be unable to generate the scientific breakthroughs necessary for creating new drugs.

Thus, these organizations will need managers who can somehow strike a balance between two conflicting forces: instill a sense of commercial urgency in the development of new products, and do it in a way that still allows the natural creativity of the people in these laboratories to blossom.

Scientific research is not a neat and orderly process

5. Knowledge and Insight on the Decision-Making Dynamics of Payers

The significant shift in bargaining power from pharmaceutical companies to payers has created significant demand for individuals who have a comprehensive understanding of these organizations. In particular, those people who understand not only payer business models but also how the decisions of these organizations are affected by outside influencers (employers, regulatory agencies, state and local governments, etc.) will be invaluable in determining the future pricing and positioning of drugs.

Pharmaceutical companies will need to redesign their human resource functions in order to reengineer their business models

6. Expertise in the Functioning and Decision-Making of Regulatory Agencies

One of the industry's most urgent needs is to reduce the time involved in developing and bringing new drugs to market. Regulatory agencies – both in the U.S. and abroad – are often some of the biggest obstacles to rapidly commercialize a new treatment. Consequently, there will be great demand for regulatory specialists – that is, those individuals who have developed an expertise in how these organizations function and relationships with the individuals who work in them – who can help accelerate the approval process for a particular category of drugs.

7. Human Resource Skills to Help Transform Pharmaceutical Companies

Finally, as pharmaceutical companies reengineer their business models, they will need to change the types of people they recruit (and seek to retain) and the programs in which they develop and train them. They also will need to redesign compensation structures and develop methods of encouraging behavior that is very different from how they have historically operated. Additionally, they will need to create new career paths for most significant positions in the organization. Human resources managers who can efficiently administer these changes will play a critical role in the evolution of traditional pharmaceutical companies.

Every Industry Participant will Experience Change

While there will be countless new opportunities resulting from the industry's transition, this new environment also (sadly) means that the relationship between pharmaceutical companies and their employees will change. The paternalistic environment of a quarter century ago that offered the implied promise of a safe, well-paying career at one employer as well as long-term financial well-being is economically unsustainable.

Consequently, individuals who work in this industry must also recognize that they now have two businesses to run. In addition to managing their careers, they must manage their wealth. And the choices they make today will impact their financial well-being for the rest of their lives.

Every individual in the industry now has two businesses to run: managing a career and managing one's wealth

Career planning is also now essential to future success in this industry. As part of such a process, participants should closely study the industry so they can determine in which part they would like to work and the role they would like to play. At the same time, however, they also must recognize that the opportunities they may pursue are often constrained by financial resources and an individual's ability to bear risk. Additionally, each career choice also involves hidden costs and risks. Measuring them is an integral part of making an informed decision.

Further, just as the industry will evolve, so too will the demand for different skills and expertise. Each person should realistically assess their abilities and find ways to upgrade their value-added over time.

Successful career planning will also require personal branding strategies. Until key decision makers are aware of an individual's capabilities, that person will be afforded only limited opportunities. Thus, developing relationships

with executive recruitment firms and industry peers, publishing articles and research, and participating in professional organizations are all activities that will produce great dividends for industry participants over the long term.

Additionally, the industry's coming changes will force participants to make a fundamental decision as to whether to focus their careers so that they will be viewed as "specialists" – people with great expertise in solving particular problems – or as "athletes" – individuals who have a broad set of capabilities and experience that allows them to manage complexity. Those who fail to do so or try to do both will soon find they are in the unenviable position of knowing too little about too much and will be of little value to most employers.

Conclusion

Finally, we expect that those who have worked in this industry for many years, at least initially, might be discouraged by reading this study. Suddenly their careers and lives appear to have become much less predictable.

We believe, however, that a closer examination of our findings should instead inspire great optimism. The inevitable evolution of this industry will create myriad new opportunities for talented people. Our research suggests that, for those individuals who embrace the coming changes and are able to capitalize on them, the next decade will be a fabulous period in their professional careers. They will participate in interesting and important work, earn more money and have better control over their lives and lifestyles. Our hope is that this paper will play a small part in helping them do so.

II. An Industry Forced to Change

Expiring patents, a limited pipeline and more powerful payers are squeezing the industry's revenues

The pharmaceutical industry is nearing the end of a long business cycle that has seen immense growth in its revenues and profitability. This period witnessed the creation of hundreds of new medications that significantly improved the health and lives of millions of people around the world. Consumers have shown an insatiable appetite for these new and innovative treatments. The combination of innovation and consumer demand created a flood of revenue leading to an unprecedented period of prosperity for pharmaceutical companies and their employees.

However, the confluence of a number of forces will drive pharmaceutical companies to make changes to their business models. Expiring patents on “blockbuster” drugs, a limited pipeline for new treatments and the increased power of payers are squeezing the industry's revenues. The costs and risks of pharmaceutical research and development are increasing. At the same time, instead of its historical concentration in the U.S. and E.U., the industry now competes in a global market for developing and selling drugs.

In response to these forces, the industry has begun a vigorous evolution of its business model. It is shifting from an industry dominated by fully-integrated pharmaceutical companies (FIPCOs) to one with many more decentralized ones. Cost containment and risk management are assuming much greater importance. Outsourcing, mergers and acquisitions and layoffs have become commonplace.

As the industry's economics change, companies' relationships with their employees are changing as well. What has long been an extremely generous and paternalistic relationship between employer and employee is now economically unsustainable. It is increasingly becoming a typical arms-length relationship, similar to that of employees and companies in most other industries.

Over the next decade, these trends will accelerate. There will be fewer big companies and many more small ones. Tens of thousands of jobs at large pharmaceutical companies will be eliminated, but many of them will reappear in other forms either at other companies or as consulting opportunities. Globalization will impact both sides of the income statement: Larger portions of the research and development of new drugs will be conducted overseas, while the marketing of drugs to people in developing countries will change.

A. Forces Shaping the Pharmaceutical Industry

1. Industry Revenues are Under Pressure

Among the forces threatening the pharmaceutical industry's revenues and forcing changes in its current business model, the most obvious is the untenable concentration of revenues in a limited number of “blockbuster” drugs – that is, treatments that generate in excess of \$1 billion of annual revenue. For example, nine drugs alone generated nearly 60% of Pfizer's total revenues in 2006. Four treatments constituted 44% of Wyeth's 2006 total revenues. Nine drugs generated 50% of Sanofi-Aventis' 2006 total revenues, four drugs generated nearly 56% of Merck's 2006 total revenues and five drugs produced more than 60% of Eli Lilly's 2006 total revenues.¹²

Exhibit 2.1

A Relatively Small Number of Drugs Losing U.S. Patent Protection Over the Next Five Years Constitutes a Large Portion of Many Companies' Revenues

Company (Total Revenue in 2006, millions)	Drug	Expected U.S. Patent / Exclusivity Expiration Date	U.S. Drug Revenue in 2006 (millions)	Global Drug Revenue in 2006 (millions)	U.S. Drug Revenue as a Percent of Total Company Revenue in 2006
Pfizer (\$48,371)	Norvasc	2007	\$ 2,500	\$ 4,866	5.17%
	Zyrtec/Zyrtec-D	2007	\$ 1,569	\$ 1,569	3.24%
	Lipitor	2010	\$ 7,849	\$ 12,886	16.23%
	Xalatan	2011	\$ 483	\$ 1,453	1.00%
	Viagra	2012	\$ 796	\$ 1,657	1.65%
	Detrol	2012	\$ 769	\$ 1,100	1.59%
	Total		\$ 13,966	\$ 23,531	28.87%
GlaxoSmithKline (\$42,966)	Coreg	2007	\$ 1,430	\$ 1,441	3.33%
	Advair	2008	\$ 3,459	\$ 6,129	8.05%
	Imigran/Imitrex	2009	\$ 1,019	\$ 1,315	2.37%
	Lamictal	2009	\$ 1,415	\$ 1,843	3.29%
	Valtrex	2009	\$ 1,109	\$ 1,563	2.58%
	Flovent Diskus/HFA	2011/2012	\$ 551	\$ 1,219	1.28%
Avandia	2012	\$ 1,976	\$ 2,588	4.60%	
	Total		\$ 10,959	\$ 16,098	25.51%
Sanofi-Aventis (\$37,451)	Ambien/Ambien CR	2007/2009	\$ 2,334	\$ 2,573	6.23%
	Eloxatine	2008	\$ 1,225	\$ 2,150	3.27%
	Copaxone	2008	\$ 930	\$ 1,357	2.48%
	Taxotere	2010	\$ 899	\$ 2,225	2.40%
	Plavix	2011	\$ 198	\$ 2,830	0.53%
	Lovenox	2012	\$ 1,907	\$ 3,092	5.09%
	Total		\$ 7,493	\$ 14,227	20.01%
Novartis (\$36,749)	Lotrel	2007	\$ 1,352	\$ 1,352	3.68%
	Zometa	2012	\$ 696	\$ 1,283	1.89%
	Diovan/Co-Diovan	2012	\$ 1,858	\$ 4,223	5.06%
	Total		\$ 3,906	\$ 6,858	10.63%
AstraZeneca (\$26,475)	Nexium	2007	\$ 3,527	\$ 5,182	13.32%
	Casodex	2008	\$ 295	\$ 1,206	1.11%
	Animidex	2009	\$ 614	\$ 1,508	2.32%
	Atacand	2011	\$ 260	\$ 1,110	0.98%
	Zoladex	2011	\$ 107	\$ 1,008	0.40%
	Seroquel	2011	\$ 2,486	\$ 3,416	9.39%
	Total		\$ 7,289	\$ 13,430	27.53%
Merck (\$22,636)	Fosamax	2008	\$ 1,983	\$ 3,134	8.76%
	Cozaar/Hyzaar	2010	\$ 1,140	\$ 3,163	5.04%
	Singulair	2012	\$ 2,578	\$ 3,579	11.39%
	Total		\$ 5,701	\$ 9,876	25.19%
Wyeth (\$20,350)	Effexor/Effexor XR	2008	\$ 2,419	\$ 3,722	11.89%
	Protonix	2010	\$ 1,795	\$ 1,795	8.82%
	Total		\$ 4,214	\$ 5,517	20.71%
Bristol-Myers Squibb (\$17,914)	Plavix	2011	\$ 2,655	\$ 3,257	14.82%
	Avapro	2012	\$ 647	\$ 1,097	3.61%
	Total		\$ 3,302	\$ 4,354	18.43%
Eli Lilly (\$15,691)	Zyprexa	2011	\$ 2,106	\$ 4,363	13.42%
	Total		\$ 2,106	\$ 4,363	13.42%
Total Revenue			\$ 58,936	\$ 98,254	

Data retrieved from the FDA Orange Book refer to patent/exclusivity dates which are the latter of either the earliest expiring patent or exclusivity date. Certain patent dates are subject to change and may be declared invalid as a result of litigation. Sanofi-Aventis earnings and sales figures adjusted to U.S. dollars using the average exchange rate listed in the company's 2006 annual report .
Source: FDA Orange Book; SEC Filings; U.S. Patent And Trademark Office; Financial information available on company websites.

It remains unclear how pharmaceutical companies will replace lost revenues

As shown in Exhibit 2.1, the patent protection for many of these high revenue medications will expire within the next five years. Following such expirations, the revenues from the branded treatments, facing robust competition from generic alternatives, will quickly decline – potentially by more than 80%.¹³ For example, Pfizer's revenues from Zoloft and Zithromax have plunged more than 70% since the patents on the two drugs expired in 2006 and 2005, respectively.¹⁴

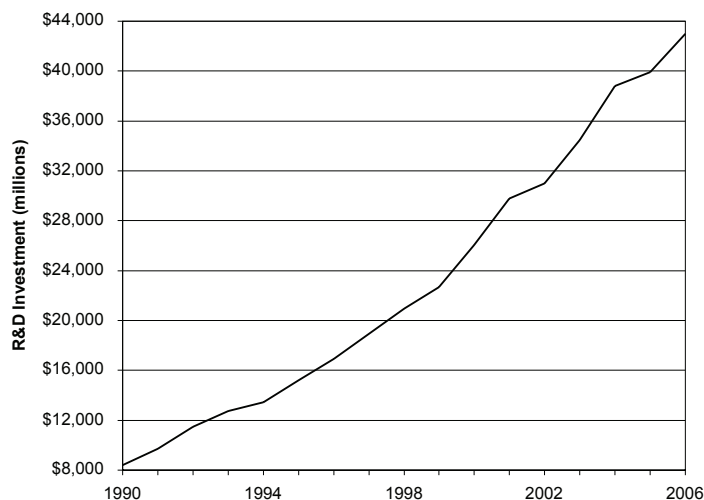
Given that the U.S. patents held by several major pharmaceutical companies for drugs with nearly \$13 billion in U.S. revenues in 2006 will expire in 2007, and an additional \$46 billion in U.S. revenues in 2006 will expire by the end of 2012, the cumulative effect on the industry's revenues will be staggering.¹⁵ Another way of looking at this is to consider what will happen to their profits if pharmaceutical companies are unable to replace these lost revenues or substantially reduce their costs. For example, consider the nine large companies shown in Exhibit 2.1 that generate nearly \$59 billion in annual U.S. revenue from drugs with patents that expire by 2012. Assuming that the revenues from these drugs will fall about 80% once their patents expire, these companies will see their total revenues decline by nearly 18% with no automatic reduction in costs. Consequently, unless they are able to cut their costs or find new products to replace the lost revenues, the operating profits of these organizations will decline by 69%.¹⁶

An Uncertain Pipeline

The expiration of patents on so many high revenue drugs over such a short period is threatening because it is unclear how pharmaceutical companies will be able to replace their lost revenues. To be sure, there are many new drugs under development. Five of the largest pharmaceutical companies have treatments seeking more than 120 indications in Phase III trials.¹⁷ In addition, the industry continues to pour billions of dollars into research and development – in 2006 alone, spending on biopharmaceutical R&D by PhRMA-member companies was almost \$43 billion.¹⁸

Exhibit 2.2

Biopharmaceutical Companies Have Steadily Increased their Investment in R&D



R&D spending by PhRMA member companies. In 2006 PhRMA member companies accounted for 80% of U.S. biopharmaceutical R&D investment.
Source: PhRMA

Revenues from new products are unlikely to be as robust as those from drugs with expiring patents

Additionally, although most of the people interviewed during our research strongly believe there will almost certainly be substantially fewer high revenue drugs in the next decade than previously, it is accepted that a drug's blockbuster potential is unpredictable. Making such forecasts depends not only on the potential efficacy of a new drug, but also on concurrent advances in medical research.

For example, while most pharmaceutical companies believed there was a potential market for statins, one researcher pointed out that everyone originally assumed these statins would be used primarily in treating individuals with extremely high levels (>300 mg/dl) of serum cholesterol. Over time, long-term medical studies showed that statins were quite effective with a much wider group of patients in slowing atherosclerosis and reducing the likelihood of heart attacks and strokes. Consequently, the demand for statins exploded far beyond what anyone had anticipated.

For several reasons, however, the revenues from the many new products in the pipeline are unlikely to be as robust as those from current blockbuster drugs, and will likely fall far short of offsetting the revenues expected to be lost from the expiration of patents.

First, many of the past quarter century's blockbusters addressed some of the most widespread afflictions – hypertension, pain management, sexual dysfunction, depression, etc. Consequently, once they received regulatory approval, they were quickly adopted by millions of patients, generating billions in annual revenues. In contrast, many of the products currently being developed treat conditions affecting far fewer potential patients. By one estimate, nearly 75% of the drugs currently in the pipeline across the industry are such specialty medications.¹⁹ Thus, even if these new treatments eventually receive regulatory approval, the targeted population of users suggests they will generate much less revenue than many of their blockbuster predecessors.

Pharmaceutical companies will struggle in the future to charge premium prices for new drugs

Second, while there are drugs under development for the broader, primary care markets, in most cases these medications will not be the only therapeutic alternative for treating the condition. Instead they will have to compete with several other drugs, including some that have been in use for years and whose patent protection has expired or will expire soon. Thus, once these new drugs receive approval and are brought to market, pharmaceutical companies will have to convince patients, doctors and (most importantly, as we will discuss in greater detail below) payers to use their new medications to treat patients, even though a lower-cost generic alternative may exist. Given the immense pressure to lower health care costs, pharmaceutical companies will struggle to charge premium prices for their new drugs unless they can demonstrate that they are significantly more efficacious than the existing alternatives. It will also slow the adoption rates of these new treatments.

Combined, these factors make it likely that many of these new medications will generate far less revenue than their blockbuster predecessors.

More Powerful Payers

The combination of expiring patents on many blockbuster drugs and a shortage of new drugs in development with similar revenue potential would by itself force changes to many firms' business models. In addition, however, a broader shift

There are now two key decision-makers: physicians and payers

in how drugs are sold is reducing what pharmaceutical companies are paid for their products. Over time, this shift will make even the most innovative future treatments less profitable than they would have been in the past.

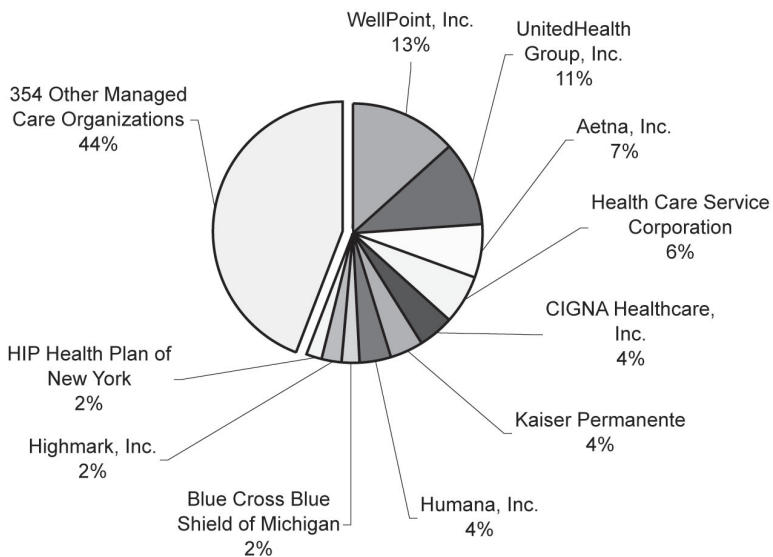
For many years, the key decision-maker in determining which drugs would be used by patients in the United States was the physician. Thus, pharmaceutical company marketing efforts were basically educational campaigns targeted to physicians, designed to encourage them to prescribe a medication for their patients who had a certain condition.

Over the last 15 years, however, a new group of decision-makers – the payers (e.g., insurance companies, HMOs, PPOs, etc) – have acquired the power to influence and, in some cases, determine which treatments patients use for different afflictions. This shift from a “physician-prescriber” to a “stakeholder-payer” model will further pressure industry revenues in the future, and is forcing many pharmaceutical companies to alter their business models.

Payers in the U.S. have become more powerful in part because they have become so much larger as a result of a series of mergers. Over the last 12 years there have been hundreds of mergers, including more than 300 from 1995 through 2001 alone.²⁰ The number of HMOs and PPOs has likewise declined substantially. It is no longer uncommon for a single payer to control access to millions or even tens of millions of patients.

Exhibit 2.3

Nearly 56% of the Managed Care Market is Controlled by 10 Firms



Managed Care Organizations, ranked by total health plan enrollment as of December 2006. Includes enrollment in HMOs, PPOs, POS, Medicare, Medicaid and FFS managed medical plans, for companies that offer fully insured managed care products; does not include specialty benefit enrollment. Percentages do not sum to 100 due to rounding. Source: Atlantic Information Services, Inc. (AIS)

Today, almost 24% of the health insurance market is controlled by just two companies – UnitedHealth Group and WellPoint. Just five companies account

Payers use co-pays to encourage the use of generics over branded drugs

for 80% of California's HMO market and half of all people insured by HMOs nationally are in one of 10 health plans.²¹

Perhaps even more importantly, the concentration of payers in individual markets has substantially increased. According to an American Medical Association study, in 91% of all population markets with more than one million people, at least one insurer had a minimum 30% market share. In 48% of those highly concentrated markets, one insurer had more than 40% market share.²²

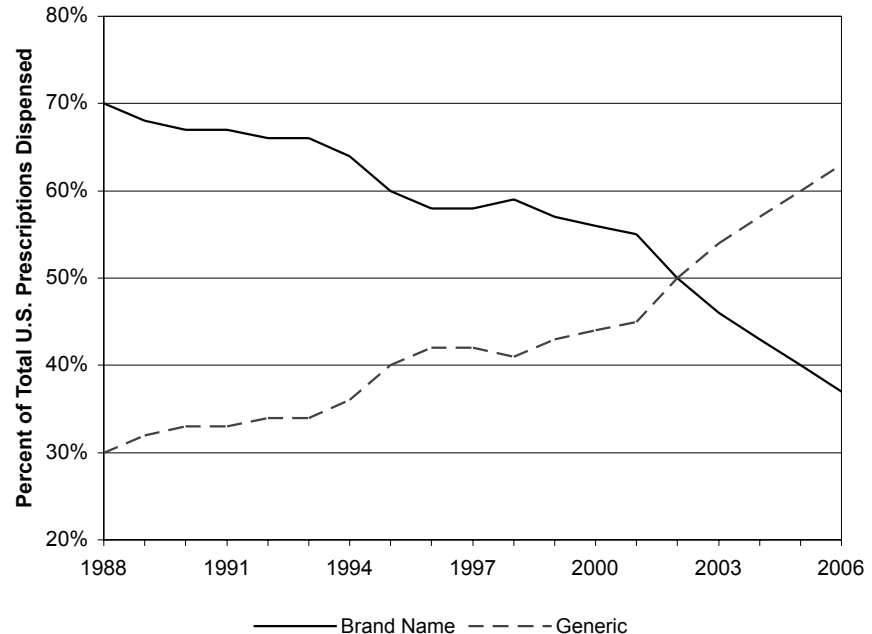
Manipulation of Out-of-Pocket Costs and Pharmacists

As the number of payers has declined, the remaining have increased their market share and, therefore, their bargaining power with pharmaceutical companies. Although they cannot dictate to their insured which medications a patient may or may not use, payers do have the ability to encourage the use of generic alternatives to high-cost branded drugs.

For example, under many insurance plans, a patient's co-pay will vary by drug. The co-pays for drugs that are part of the standard formulary of the patient's payer or are generic are typically de minimis, often as little as \$5 per prescription. For those medications that are neither, however, payers will set the co-pay at a substantially higher price point, often as much as \$50 to \$100 per month. This cost differential is unlikely to go unnoticed by most patients. Although their physician may have prescribed a particular treatment, given the choice of \$60 per year out of pocket versus \$600, the patient will often ask their pharmacist to fill their prescription using the lower cost (in terms of co-pay) alternative.

Exhibit 2.4

Generics Continue to Gain U.S. Market Share



Source: RSM Pharmaceutical Services; Generic Pharmaceutical Association

Pharmacists may receive twice as much to fill a prescription with a generic drug than with a branded one

In addition to manipulating patient behavior through out-of-pocket costs, payers have enlisted a key group of allies – the pharmacists themselves – to further encourage patients to use lower-cost drugs. Since generics cost the payers so much less than branded drugs, the payers often will pay a pharmacist nearly twice as much for filling a prescription with the generic or formulary medication than they will pay for dispensing a branded drug. Given the high volume of prescriptions pharmacies fill and the razor-thin margins under which they operate, such an inducement by payers is very compelling. Consequently, many pharmacies will automatically fill any prescription with a lower-cost generic, if available, unless the physician specifically requests the branded medication.

A Difficult Choice for Pharmaceutical Companies

As the U.S. payer industry has become more concentrated, controlling larger portions of the major population markets, pharmaceutical companies face a difficult decision. If they want to be included in a payer's formulary, they must negotiate a price – typically at a substantial discount to list – even for drugs still under patent protection. A company unwilling to negotiate with a payer runs the risk that the payer will assign a high co-pay to their medication, leading large portions of the patient population to opt for a cheaper (from the patient's perspective) alternative.

Driving down the cost of prescription drugs to their insured is a major priority for virtually every payer because it directly impacts the payer's bottom line. As described to us by one CEO, if a payer can get its insured to shift to either a generic or a negotiated low-cost medication for a single class of treatments, it can increase the payer's profitability by as much as \$200 million per year.

For very large companies whose employees are large consumers of prescription drugs – such as General Motors – shifting employees to generic drugs is likewise a major priority because of its huge effect on the company's health care costs. For example, if all of the employees and retirees of General Motors who used statins had shifted to a generic alternative in 2006, the company would have saved an estimated \$82 million in that year alone.²³

A greater number of drugs in generic form and more powerful payers will limit what drug companies can charge for their products

As the U.S. payer market concentrates further and more drugs become available in generic form, pharmaceutical company revenue will be under greater pressure. Payers will drive more of their patients to use lower cost generic alternatives unless pharmaceutical companies agree to give them substantial discounts on their patented medications. Longer term, payers will use their power to make it more difficult for pharmaceutical companies to charge premium prices for even their new treatments. Increasingly the pricing of most drugs will, to some degree, be commoditized.

To be sure, pharmaceutical companies that are able to develop substantially more efficacious treatments for new or existing conditions – in particular ones that are life threatening or debilitating afflictions – will still be able to charge premium prices for their products. Pressure from a combination of patients, the government and employers will force payers to offer these treatments with reasonable co-pays. However, unless a pharmaceutical company can clearly demonstrate that its new drug is significantly better in treating a condition than existing alternatives, the price it can charge for the medication will be effectively capped.

THE POWER OF PAYERS: Lipitor vs. Generic Versions of Zocor

A good example of the increased bargaining power of payers can be seen in how the market for statins has recently changed. One alternative – Zocor – lost its patent protection in June of 2006. Even though Zocor is not as effective for treating cholesterol in some patients as Lipitor, which is still patent protected, Lipitor's market share fell precipitously earlier this year.

Sales for Lipitor have skyrocketed over the last 10 years. In the first quarter of 2007 alone, they totaled \$3.358 billion.²⁴ However, now that a comparable alternative is available in a generic form, payers have begun to encourage (through higher co-pays and other incentives) their insured to change medications. (For example, WellPoint offered its insured four free months of simvastatin, the generic version of Zocor, as an inducement to switch from name-brand drugs such as Lipitor.)

From the first to second quarters of 2007, Lipitor's sales dropped to \$2.719 billion, or nearly 20% less than the previous quarter. In terms of market share, Lipitor's share of total prescriptions for cholesterol drugs fell during that single quarter by almost 5%.²⁵

While the decline in Lipitor's sales in a single quarter is particularly noticeable given the drug's widespread usage and corresponding immense revenues, it also highlights the broader shift in bargaining power from pharmaceutical companies to payers. Consider what has just happened. Lipitor is patent protected through 2010 and is extremely efficacious for the people who use it. In terms of branding, it is one of the best known medications in the world because Pfizer spends a large sum on marketing and advertising, creating a perception among consumers and doctors that it is “the” treatment for high cholesterol.

For Lipitor's sales to fall more than \$639 million in one quarter, an enormous number of existing patients using the drug had to shift to another alternative.²⁶ Simply by changing their insured's co-pays (at least in the U.S. market), payers helped engineer this shift.

Europe: A Case Study

Pharmaceutical companies are already accustomed to having to negotiate with powerful payers. Many foreign nations have nationalized health care systems and agencies of their governments fill the same roles that private payers do in the U.S. Because these agencies effectively control access to millions or tens of millions of citizens in these countries, they enjoy great bargaining power – power that they have used to reduce amounts that pharmaceutical companies are paid for their products.

For example, for many years Western European nations have created different tools designed to limit what they will pay for certain medications.²⁷ Both Germany and the Netherlands have instituted “reference pricing”, a patient cost-sharing program. Under the program, the administrator groups drugs that are close substitutes for each other within therapeutic classes and then sets a reimbursement ceiling, or “reference price”, for the whole class that is typically equal to either the cost of the lowest-priced drug or the median price for the entire class. Similar to the tactic of varying patient co-pays used by U.S. payers to influence which drugs are used, under a reference pricing program a patient will pay a higher out-of-pocket cost for a relatively higher-priced drug within any particular class.

**The government is now
the largest U.S. payer**

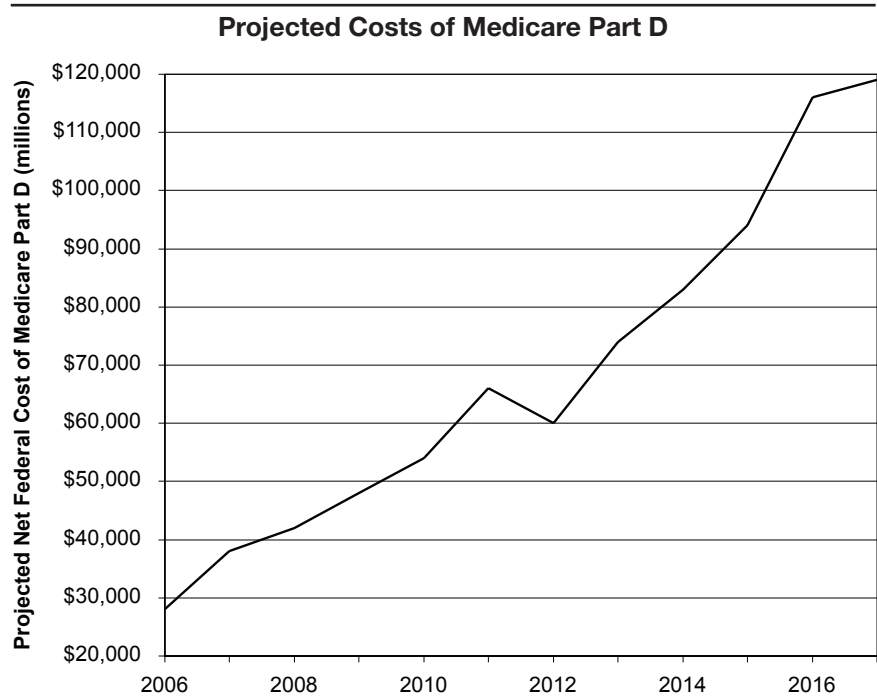
The 800-Pound Gorilla

While the increased power of U.S. payers in general is squeezing the industry's revenues and profitability, one payer in particular – the U.S. government – is a wild card, with the potential to cause overwhelming changes to pharmaceutical company business models.

The government instantly became the biggest U.S. payer when the Medicare Part D prescription benefit went into effect in January 2006. Today, more than 39 million senior Americans receive their prescription drug benefits from the government, 24 million of whom participate in the Part D program.²⁸ The remainder is made up of individuals who participate through the Retiree Drug Subsidy, TRICARE (for military retirees), Federal Employee Benefits Plans and the Veterans Administration.

Although the Medicare prescription drug benefit is delivered through a series of private payer-managed programs, the government pays for it. The total costs in 2006 were projected to be \$28 billion. By 2017, the annual costs of the program are projected to reach almost \$120 billion.²⁹

Exhibit 2.5

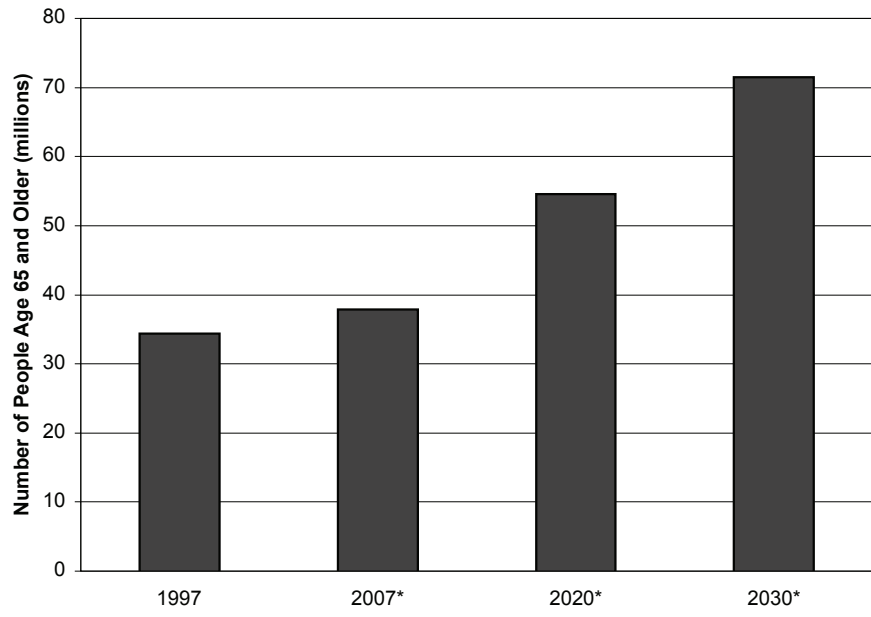


Source: Congressional Budget Office

Additionally, as the U.S. population ages over time, the number of people who will get their prescription drugs through a government-sponsored program will increase. As shown in Exhibit 2.6, by 2020 the number of people over 65 is expected to reach almost 55 million, and by 2030 will exceed 70 million.

Exhibit 2.6

Number of People Over Age 65 in U.S. is Projected to Grow Rapidly



*Projected
Source: U.S. Census Bureau

The government is under tremendous pressure to lower health care costs

By statute, the government currently may not negotiate the prices it pays for prescription drugs under the Medicare program (as it does under other programs such as the one for the Veterans Administration). While there is much debate within the academic community and public policy forums whether such negotiation would allow the government to decrease its overall costs, the sheer magnitude of the costs has created great pressure on the U.S. government to lower drug prices. How and when it will try to achieve this goal is unclear, but the prospect that the effort will be made is a grave threat to the industry's future economics.

Given that the U.S. government has very broad power – through regulation and legislation – that extends even beyond its role as the largest consumer of prescription medications, there is a risk that the pharmaceutical industry's economics could be changed literally overnight. For example, just as it did with gasoline and beef prices in the 1970s, the government could mandate prices for certain drugs, regardless of the cost of developing and bringing them to market. It also could decide to exclude certain medications from the Medicare Part D program, stripping away the largest market for certain treatments. From a most extreme perspective, Congress could even enact legislation which would alter the terms of drug patent protection. This alone would force previously unheard of changes on most companies' business models.

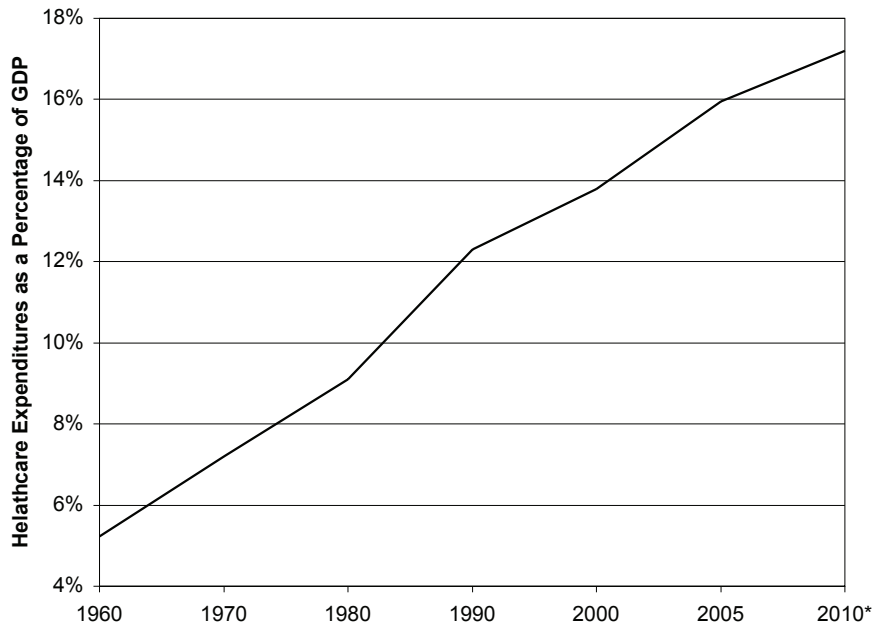
Health Care Costs are 16% of GDP

While it is uncertain how the U.S. government, as payer or lawmaker, will alter the pharmaceutical industry's economics, it is clear that the rising

cost of health care in our country is creating great political pressure and momentum to change the current system. Health care costs today now comprise 16% of GDP, a substantial increase from only a decade ago.³⁰ More troubling is that healthcare expenditures in 2015 are expected to surpass \$4.04 trillion, or as much as 20% of GDP, with prescription drugs accounting for \$446 billion.³¹

Exhibit 2.7

Health Care is Projected to Constitute 17.2% of the Gross Domestic Product in 2010



*Projected
Source: U.S. Department of Health & Human Services

The industry has been portrayed by the media and politicians as greedy and uncaring

Additionally, providing health insurance and medications to the uninsured portion of the population has become a major political issue. For example, a battle between the Bush Administration and the Democratic-controlled Congress has centered on expanding SCHIP (State Children’s Health Insurance Program), a program designed to provide healthcare to uninsured minors. A recent bill passed by Congress – but vetoed by the President – would have expanded this program substantially in order to provide health insurance to many adults without coverage.

Further complicating matters, pharmaceutical companies have become convenient targets for different political groups. Movies such as Michael Moore’s controversial “Sicko” together with many aspiring politicians have demonized the industry, portraying pharmaceutical companies as greedy and uncaring, ignoring the immense benefits its products provide to millions of people.

The combined effect on the federal government of all these factors – the immense costs, the even greater future costs, the expanding

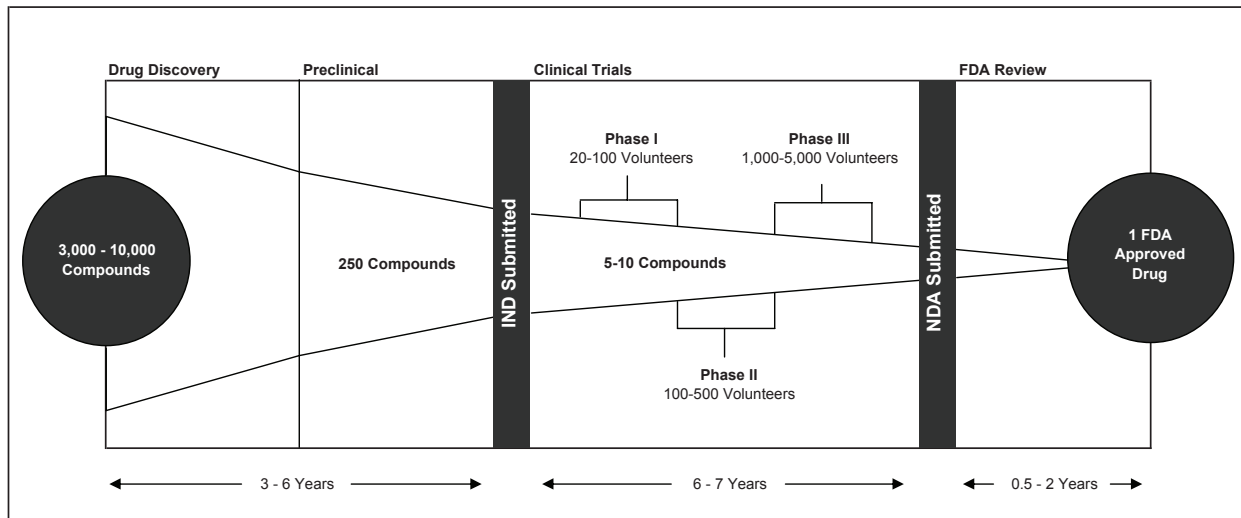
percentage of the population whose health care it insures, budgetary challenges on many fronts and the current political climate – creates constant pressure to find ways to reduce health care and drug costs. Over time, it seems inevitable that the government will use its bargaining power to get lower prices for the drugs for which it pays. Those lower prices will translate into reduced revenues and profitability for the pharmaceutical industry.

2. Costs and Risks are Increasing

It would be difficult enough if the only challenges were to the pharmaceutical industry's pricing power and projected revenues. Its future economics, however, also face challenges of higher costs and greater risks in developing new drugs. Admittedly, developing new medications has meant persevering against long odds. As shown in Exhibit 2.8, production of a new drug typically requires between 3,000 and 10,000 compounds. However, only one out of every 250 new compounds used in preclinical testing and 1 in 5 to 1 in 10 in subsequent human clinical trials ever receives FDA approval.

Exhibit 2.8

Number of Compounds to Produce a New Drug



Source: PhRMA and FN estimates

In addition, R&D has always been very expensive; historically, it has cost between \$800 million and \$900 million to bring a new drug to market.

A recent study by Bain & Company, however, found that the average cost of developing and launching a new drug today is substantially higher. Bain estimates that it now costs about \$1.7 billion (up from about \$1.1 billion in the late 1990s) in total direct and indirect costs to produce a new treatment. More importantly, these increasing costs have made the risk/return profile of investments in pharmaceutical R&D appear largely unattractive. Bain projects that the average expected annual return on investment from a new drug has fallen

to only 5%, and only one in six drugs will generate a return as high as 12%.³²

Pharmaceutical companies are taking greater risk with a lower potential payoff

The costs and risks involved have increased for several reasons. First, many of the industry's new drugs under development will treat conditions that have more complex and difficult targets, making the research process more costly and reducing the likelihood of ultimate success. Many pharmaceutical companies find themselves in the unenviable position of having to take greater risk with a lower potential payoff.

Second, unlike in the past when the R&D process was frequently driven by the obvious commercial applications available (e.g. create a drug to lower cholesterol because there is a large market waiting to use it), today's R&D is often driven by new scientific discoveries, a process that is far less predictable from a commercialization perspective.

Third, the higher costs and risks of developing new drugs are also due to the increased difficulty – as compared to two decades ago – in getting regulatory approval for any new medication. The regulatory agencies have become much more sophisticated and capable as well as cautious and conservative in evaluating drugs than in the past and, consequently, their standards for approvals are significantly higher. To meet these higher standards, pharmaceutical companies have had to conduct larger, more comprehensive and more expensive testing of proposed drugs.

The regulators who must first approve any medications brought to market are likewise under great pressure to prevent drugs from being offered that might not be completely safe. As a result, pharmaceutical companies are forced to spend millions of dollars more in testing, although the total number of people impacted by the side effects is relatively small. A byproduct of their added caution is that a much smaller percentage of new drugs which have successfully completed Phase III clinical trials are receiving approval than in the past. One CEO interviewed estimated that in the past, about 90% of the drugs which had completed this phase of development would receive regulatory approval without additional testing. Today he believes it has fallen to about 75%.

The threat of litigation has cast a pall over the industry

Fourth, in recent years, we have seen a flood of litigation related to unintended side effects from drugs that have received regulatory approval; the threat from trial lawyers and class-action litigation has cast a pall over the economics of the industry. Vioxx, Celebrex, Viagra and Crestor are only a handful of the many medications caught up in this epidemic of litigation.

Since 2000, 65,000 product liability lawsuits have been filed against prescription drugmakers, more than any other industry.³³ The cases for Vioxx, in fact, recently ended in Merck settling 27,000 lawsuits for \$4.85 billion.³⁴

Exhibit 2.9

Liability from Unintended Side Effects

Drug	Vioxx	Prempro and Premarin	Ortho Evra	Seroquel
Maker	Merck	Wyeth	Johnson & Johnson	AstraZeneca
Use	Painkiller	Hormone replacement for menopausal women	Birth-control patch	Anti-psychotic
Allegation	Omitted material information and failed to properly communicate cardiovascular dangers.	Failed to adequately test for and warn of potential risks, including breast cancer.	Failed to properly test for and falsely downplayed the risk of blood clots and other factors.	Overstated benefits of drug and minimized risk of developing diabetes.
Lawsuits	26,950 as of June 30, 2007	More than 5,300 as of June 30, 2007	2,400 as of July 1, 2007	1,848 as of March 13, 2007

Source: USA Today; SEC Filings; Wall Street Journal

The U.S. legal system encourages a “winning lottery ticket” mentality

Many lawsuits involve unintended side effects from a medication that affects only a small fraction of the patients using the medicine – so small a number that it is often impossible to detect these potential side effects until the medication has been in widespread use for many years.

The costs of clinical trials are already astronomical – a Phase III trial for a single medication can cost \$80 million to \$200 million or more – yet they are by no means large enough to detect all potential unintended side effects of medications. At the same time, patients who can convince a jury that their medical problems are more likely than not the result of the treatment can win massive judgments against these companies.

Further, the economic model of tort claims in the U.S. encourages a “winning lottery ticket” mentality for both potential plaintiffs and their lawyers when thinking about product liability and class-action lawsuits. First, individuals taking a prescribed treatment who begin to suffer from medical issues do not need to incur any out-of-pocket costs to initiate a lawsuit claiming that the treatment is the cause. The trial lawyers that represent these litigants will accept the cases on a contingency fee basis, in which they absorb the near-term out-of-pocket costs and receive between 33% and 40% plus expenses of the judgment or settlement.

Additionally, should a lawsuit achieve “class-action status” – i.e. numerous lawsuits are bundled into a single case – the lawyers involved have the potential for a payday measured in tens of millions of dollars while limiting the actual number of cases they have to try and the costs they must bear. Given these incentives, it is easy to see why lawsuits have exploded.

Finally, unlike Great Britain, our country does not have a “loser-pays” litigation system where the losing party must pay the winning party’s legal fees and costs. Thus, even when pharmaceutical companies prevail in litigation, they have still spent millions of dollars in legal fees and related expenses, not to mention the additional public relations and “damage control” costs. As a result, simply defending oneself from

product liability litigation has become an enormous operating cost of most pharmaceutical companies.

Challenges of Outcomes-Based Pricing

Outcomes-based pricing will become more prevalent

A gradual shift by payers to an “outcomes-based” analysis when evaluating different treatment alternatives and what they will pay for them is further complicating the cost/benefit analysis of R&D investments. This shift will increase pharmaceutical company risk because it will make it much harder for them to accurately forecast the likely revenues (and thus, their potential return on investment) generated from their drugs under development.

With an outcomes-based analysis, payers take a more holistic approach in deciding which treatment regimens they will encourage their insured to follow. Their goal is to find the most cost-effective way of taking care of the long-term health of their clients. They measure this by comparing the actual outcomes achieved by large numbers of patients using different treatment regimens.

Payers do not yet have sufficient data to conduct such analyses on a wide-scale basis. However, as more physicians shift to electronic medical records, payers will be able to collect the required data.

An example of how an outcomes-based analysis is different from an efficacy-based analysis involves cholesterol-lowering drugs. There are numerous medications available to treat cholesterol, and some are more effective for different patients than others. But the goal of these treatments is not just to lower cholesterol. Rather, it is to increase the heart health and longevity of the patients who use these medicines. Consequently, using an outcomes-based analysis, the payer will review all available treatment regimens – for example, dietary changes, exercise, food supplements as well as cholesterol-lowering medications – and then determine which approach produces the best outcome over the largest number of patients.

Predicting future revenues from new drugs will be much more difficult with outcomes-based pricing

Under such an analysis, a particular drug may be exceptionally effective at lowering cholesterol. However, the fact that the drug is more effective at lowering cholesterol than several competing alternatives may not make that much of a difference in improving the long-term heart health and longevity of the patients who use it as part of a broader treatment regimen. The key point is that payers will be reluctant to pay a premium price for any medication, notwithstanding its efficacy as to any particular individual measurement or endpoint (i.e. high cholesterol) if it does not materially improve long-term patient outcomes.

Any shift to a holistic, outcomes-based analysis significantly complicates the economics of developing new drugs because it makes estimating their potential new revenues far more difficult. In earlier years, pharmaceutical companies focused on finding new ways to treat specific conditions, ideally ones with a huge number of potential users. This calculus combined the likelihood of success with the potential market for the drug and the marketing forces’ ability to persuade physicians to prescribe it.

More importantly, although the Medicare Part D program is currently prohibited from negotiating the price of prescription drugs, the Medicare prescription drug legislation included authority to consider “outcomes-

**Several countries
are shifting toward
outcomes-based pricing**

based research data” in the development of the formulary for the program. As several people we interviewed pointed out, the inclusion of this language creates an economic incentive for the government to shift at some point to a “cost-effectiveness” analysis of the drugs it provides to retirees.

In fact, several countries, including the U.S., have developed agencies, such as the U.S. Agency for Healthcare Research and Quality and the U.K. Centre for Health Technology Evaluation (a division of the National Institute for Clinical Health and Effectiveness), for the specific purpose of comparing the safety and efficacy of different treatment regimens – all part of an effort to promote the use of an outcomes-based approach.

With an outcomes-based analysis, pharmaceutical companies will have to consider many factors (rather than simply efficacy with respect to a particular individual measurement or endpoint) when deciding whether to fund the many millions of dollars of R&D required to produce a new treatment. They must evaluate and consider the other alternatives available today and try to estimate their costs many years from now when the new potential drug is brought to market. Even more difficult, they must also try to predict what other treatments will be available in the future and what the likely cost and efficacy of these alternatives will be. They also have to forecast the potential marginal benefit of their new medication to patient outcomes versus all of the other options, and then try to estimate what price they will be able to charge for their new treatment. Combined these factors have made investing in R&D an even riskier activity with more uncertain return.

3. Globalization

**Globalization is
the greatest force
reshaping the
industry**

As important as all of the forces discussed above are and will be in reshaping the pharmaceutical industry, they pale in comparison to the long-term effects of globalization. The great recent economic success of many emerging countries such as China, India and South Korea are changing both the potential markets for drugs and how they will be researched and developed in the future.

Drug markets will change profoundly as such developing countries become major consumers of prescription medications. For example, until recently the E7 countries (China, India, Brazil, Russia, Indonesia, Mexico and Turkey) on average spent less than 1% of GDP on prescription medicines and accounted for only 8% of the global market.³⁵

As the wealth of these countries increases, so too will their demands for better healthcare. Consequently, they will offer an even bigger potential market for prescription medications. By one forecast, the real GDP of these countries is expected to triple by 2020, by which time they could account for as much as 20% of global pharmaceutical sales.³⁶

For example, there are more than 639 million people living in developing countries who suffer from hypertension. By 2025, that number is forecast to reach at least 1 billion. Likewise, the number of people with diabetes in developing countries is expected to rise to 228 million in 2025.³⁷

It is often easier to find patients for clinical trials in developing countries

It is important to note that a significant part of this market will be for generic drugs. Even with substantial economic expansion, the very poor in these countries will still vastly outnumber the middle class or the wealthy. But the sheer size of the populations in these countries – there are more than 100 million people who constitute the top 10% of wealth holders in China alone – will also create new markets for branded medications.

Many Aspects of Drug Development are Shifting to Developing Countries

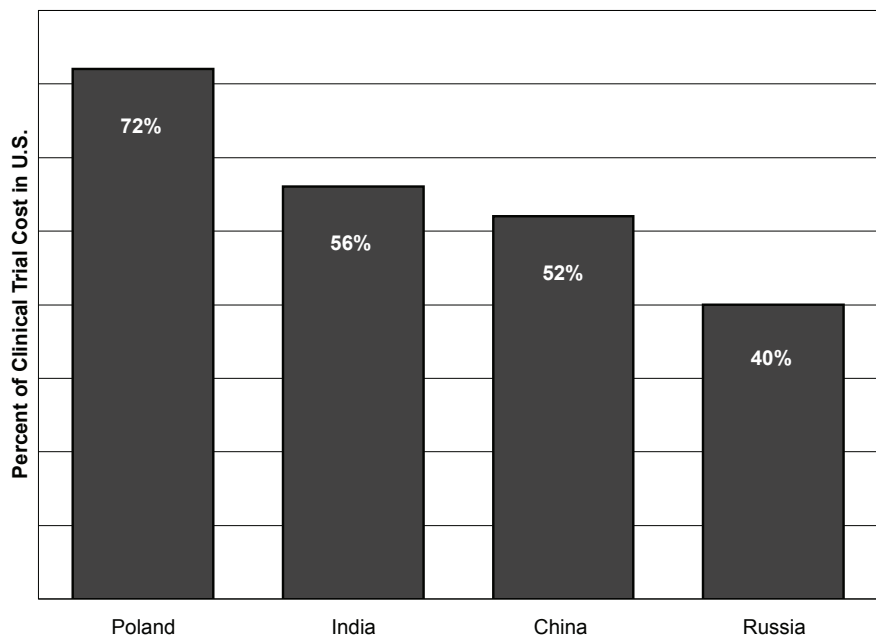
A more important aspect of globalization, however, will involve the role of laboratories in developing countries in future pharmaceutical R&D. Many aspects of such R&D have been outsourced to these countries for some time.

For example, portions of many clinical trials are already conducted in these countries because it is much less costly than doing so in the U.S. or E.U. By one estimate, the direct cost savings can range from 30% to 65% compared to sites in the U.S. or Western Europe.³⁸

Additionally, it is often easier to find a larger number of patients in these countries suffering from a particular affliction who are not already receiving some other treatment. Greater availability of patients concentrated in one region helps clinical trials achieve faster and more accurate results.³⁹ This in turn shortens drug development time – Phase III trials can be completed up to six or seven months sooner than in domestic markets – further accelerating the point at which drugs can be brought to market and begin generating revenue.⁴⁰

Exhibit 2.10

Clinical Trials are Less Expensive in Emerging Markets



Source: PRA International

**At least 10
of the largest
pharmaceutical
companies outsource
aspects of medicinal
chemistry to
developing countries**

Additionally, substantial portions of the medicinal chemistry aspects of drug R&D that were once done exclusively in U.S. and E.U. labs are now conducted in China and India. By one estimate, as much as 90% of all biotechnology companies and at least 10 of the largest pharmaceutical companies now outsource portions of their medicinal chemistry research work to developing countries.

In the future, this shift of the research and development of new drugs to laboratories in these countries will increase significantly for several reasons. First, their laboratories are becoming more capable. To be sure, at present they are by no means as able to conduct all aspects of R&D as the laboratories of most pharmaceutical companies, and most of the fundamental and creative work – such as the design of a molecule for a certain target – is still produced in the U.S. However, the sophistication of these foreign laboratories is growing by leaps and bounds each year, largely because they are stocked with people who have trained at universities and worked for companies in the U.S. and E.U.

Second, the R&D costs in laboratories in countries such as China and India are a fraction of that in the U.S. or E.U. By one estimate, much of the work now outsourced to these countries costs about 10% as much as doing the work in-house. Because of this immense cost differential, as these foreign laboratories become more sophisticated, they will garner ever-growing portions of the research and development process of new drugs.

Third, there is a more favorable regulatory environment for developing new drugs in these countries than in the U.S. or E.U. It is a national priority for these countries to develop their own pharmaceutical industry. Consequently, although their regulators are concerned with efficacy and safety, they often pursue a more cooperative rather than adversarial relationship with pharmaceutical companies.

Finally, because these countries want to build their own pharmaceutical industries and potentially export their drugs to other markets, they have begun the first stages of abiding by and respecting the intellectual property rights of foreign drug manufacturers. For example, to comply with the Trade Related Aspects of Intellectual Property Rights (TRIPs) Agreement of the World Trade Organization (WTO), India introduced product patent protection for pharmaceuticals in January 2005. China also has begun to make progress by implementing new drug administration laws designed to streamline product registration and protect intellectual property rights.

**It is a national
priority for developing
countries to build
a pharmaceutical
industry**

It is important to note that these countries' efforts and willingness to enforce pre-existing patents are still in their nascent stages. At the same time, they also recognize that their ability to build a large domestic pharmaceutical industry – and the thousands of high-paying jobs that would accompany it – is dependent upon reciprocity between countries regarding the respect of intellectual property rights.

B. Big Changes for the Pharmaceutical Industry

We've discussed the major forces facing the industry:

- Revenues and profits are being squeezed,
- The costs and risks of developing new drugs are climbing, and
- The industry is rapidly transforming from a U.S./E.U.-focused business to a global market for both developing and selling drugs.

Now consider the predicament of senior management teams of U.S. pharmaceutical companies. As the managers of public companies with (increasingly impatient) shareholders, they are under great pressure to boost their profitability and the price of their stock. At the same time, they can see that a substantial drop in their revenues is looming just over the horizon when the patents of many of their highest revenue products expire. If they are unable to replace these revenues and/or substantially reduce their costs, the profitability of their companies will fall precipitously.

While ideally they would like to replace products with expiring patents with new ones developed from their labs, it is unlikely that the new medications nearing approval will generate anywhere close to as much revenue as their existing products. Further, pharmaceutical companies are unlikely to recognize substantial returns on new investments until at least 10 years after such investments are made – an uncomfortably long investment horizon for a public company management team. Besides, given the coming shift to outcomes-based analysis of treatment alternatives, it is next to impossible to forecast what revenues might be generated from whatever new drugs may survive the R&D and regulatory hurdles.

Limited and Unattractive Choices

Executives at pharmaceutical companies face many challenges and have few attractive choices

When one looks at all of these challenges, it is easy to understand why many of the current and former senior executives whom we interviewed believe that pharmaceutical companies will make many big changes in order to adapt, survive and thrive in this new environment. The available choices, however, are limited and unattractive.

They need to substantially cut costs. They also need to find ways to replace the soon-to-be-lost revenues from their best products. And at the same time, they need to take better advantage of overseas opportunities.

To do these things, these managers must also make some difficult strategic decisions. Near-term return on capital and the measurement and reduction of risk will be more important than long-term potential. And many management teams will be forced by their boards of directors and/or shareholders to consider whether it makes sense for their companies to remain independent or become part of other, larger organizations.

Additionally, each company will have to choose which business lines to continue to pursue based on their likely near-term contribution to the company's profitability. Many will be forced to spin off or sell off

Pharmaceutical companies will have to consider outsourcing as many functions as possible

many lines of business that offer great long-term potential but likely will be unprofitable in the near term.

Pharmaceutical companies also will need to find a way to shorten the amount of time required to bring new treatments to market. While the management of every company would love to develop the next multi-billion dollar treatment from scratch, the current imperative for these organizations is to find new products that they can quickly commercialize into profitable ones.

In other words, these management teams will have to further shift their companies away from fully-integrated businesses – that is, companies that conduct all aspects of R&D, commercialization, manufacturing and marketing – to more decentralized ones. As part of this shift, their labs will create fewer new compounds and instead be increasingly used to complete the development of later-stage compounds that already have shown commercial potential.

Pharmaceutical company management also will have to consider outsourcing as many functions as possible to other organizations that can perform them at a lower cost. Many functions currently handled in-house that cannot be completely outsourced will be divided into parts so that at least some portions may be done at a lower cost by other firms.

The paternalistic relationship between companies and their employees is no longer economically feasible

Further, these companies will have no choice but to change their relationships with their employees because their paternalistic relationship with their employees will no longer be economically feasible. Consequently, as they re-focus their enterprises, they will have to eliminate the jobs of many of their long-term employees and cut benefits to those employees they retain.

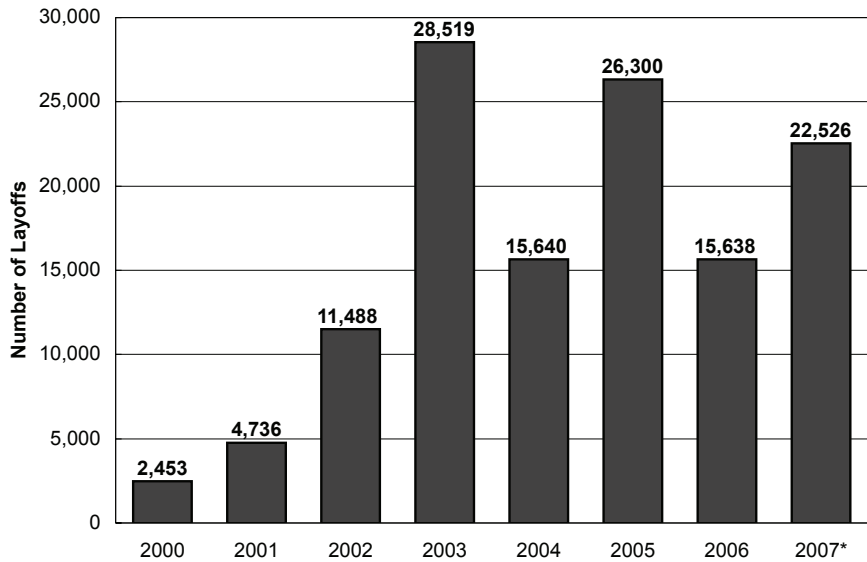
Finally, pharmaceutical company management teams will have to reengineer how their organizations market their products. The simple model of pharmaceutical companies persuading physicians to prescribe their medications is now insufficient and will have to include a separate, more sophisticated effort that targets payers, including perhaps the U.S. government as the largest payer. They also need to build marketing forces that can sell their products in developing countries.

Changes Have Already Begun

Several of the more obvious aspects of the reengineering of the industry's business model are already well underway. Most of the major pharmaceutical companies have begun large-scale cost reduction efforts by trimming their staffs. For example, in 2003 there were 28,500 layoffs industry-wide, followed by 15,600 in 2004, 26,300 in 2005 and 15,600 in 2006.⁴¹ In late 2006 and 2007, Pfizer alone cut 10,000 jobs – including more than 2,200 people from its U.S. sales force and 10% of its global workforce – and closed several manufacturing and research sites.⁴²

Exhibit 2.11

Restructuring and Mergers Have Led to More Than 120,000 Layoffs in the Biopharmaceutical Industry



*Through 9/07
Source: Challenger, Gray & Christmas, Inc., FN estimates

Individuals with 20 or more years in the industry are most at-risk

The pace of layoffs continues unabated. This year AstraZeneca announced that it would reduce its workforce by 7,600, or 11% of its total jobs up from its initial plan of cutting only 3,000 positions. Merck announced plans to lay off about 7,000 employees, or 11% of its workforce, by 2008. Johnson & Johnson recently announced 4,800 job cuts in its pharmaceutical and stent businesses, about 3% to 4% of their global workforce, hoping to generate \$1.3 billion to \$1.6 billion in annual cost savings.⁴³

Going forward, as the patents of many high revenue drugs expire, the numbers of layoffs will continue to increase. By one high-ranking executive's estimate, about 90% of all positions at major pharmaceutical companies are tied to single treatment area produced by their employer. As the patent protection expires on many of the higher revenue medications, these companies will need far fewer people to continue to develop, commercialize and market such products.

Dislocation of a Generation of Upper-Middle and Senior-Level Executives

Like any other industry that is restructuring, the jobs at greatest risk are the highest paying ones, typically held by individuals who have worked in the industry for two or more decades. As companies reshape their product lines, merge and outsource, a key element of their strategy will be to lower their costs by replacing senior positions with lower-paying ones wherever possible.

How many such jobs will be eliminated is unclear. However, one former CEO of a major pharmaceutical company suggested that an "entire generation" of upper-middle to senior-level executives totaling 50,000

Mergers offer the potential to lower costs without decreasing revenues

jobs could be displaced as the industry tries to cope with the many forces reshaping its economics.

To be sure, many of these jobs will reappear but in different forms: at smaller companies, outside service providers, spin-offs or as independent contractor positions. But another senior executive interviewed estimated that as many as 20,000 senior positions could disappear completely over the next decade.

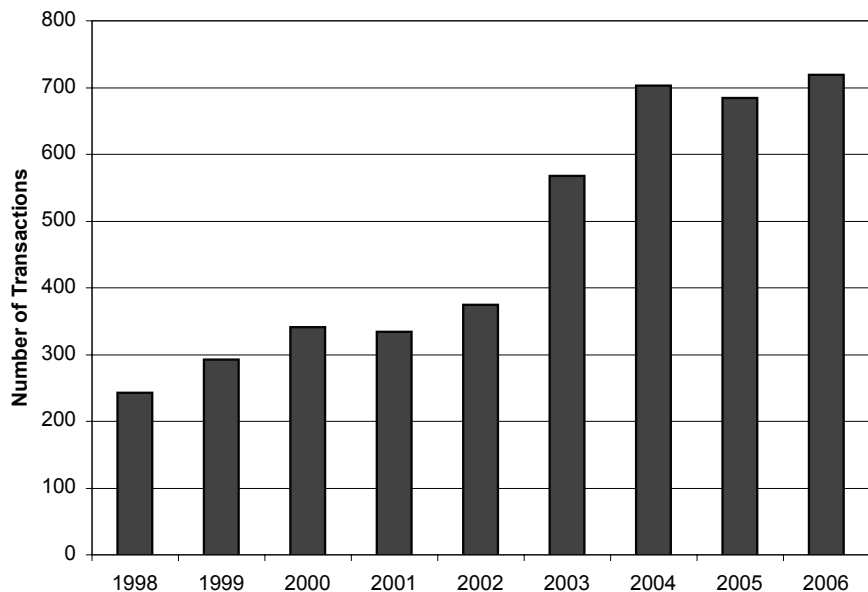
Mergers and Acquisitions as a Cost-Cutting Strategy

Many of the job losses will be the result of another cost-cutting approach that pharmaceutical companies have long embraced: mergers and acquisitions between larger companies within the industry. Between 1985 and today, what were once 51 large companies in the industry have consolidated into only 10 organizations, as shown in Exhibit 2.13.

Such transactions can be compelling because they create the ability to lower costs without any corresponding decrease in revenues. Most of these cost cuts occur through the elimination of positions that will be redundant in the post-merger organization. Obvious examples of potential redundancies are administrative support functions such as human resources, legal, marketing staff, senior management, and research staff for similar product lines.

Exhibit 2.12

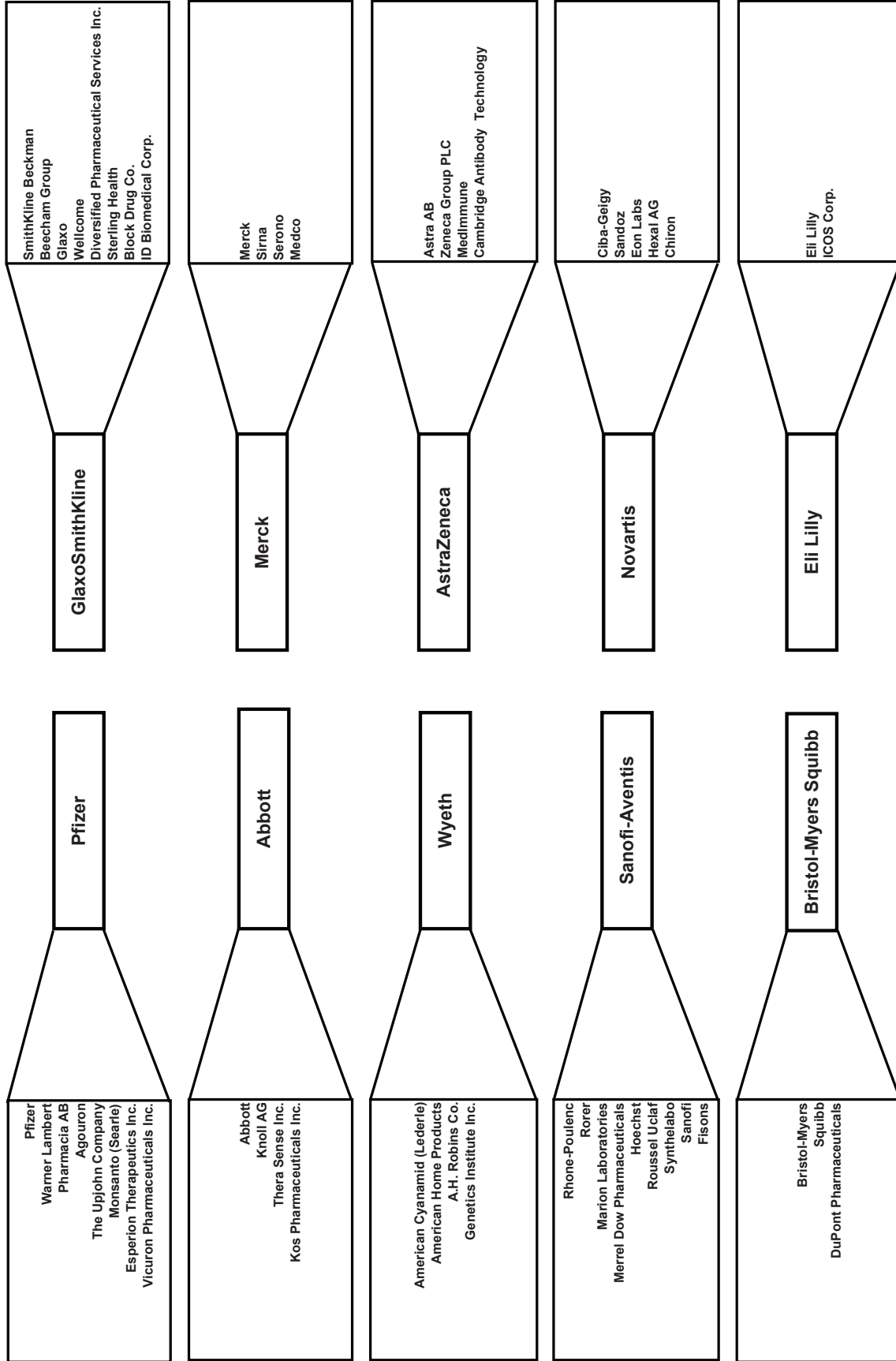
M&A Activity has Been Increasing in the Pharmaceutical Industry



Number of global M&A transactions.
Source: PriceWaterhouseCoopers

Exhibit 2.13

Industry Consolidation has Turned 51 Companies Into 10



Note: Includes transactions exceeding \$1 billion. Some data on mergers and acquisitions of companies pre-1998 may be inconclusive. Source: Thomson ONE Banker; Yahoo Finance; Company websites and various articles

Many companies will be forced to spin off or sell certain business lines

A key measure of success for such mergers is usually the amount of costs that are stripped out (mostly from layoffs) from the combined entity. For example, when Pfizer merged with Warner-Lambert in 2000, its goal (in addition to acquiring the rights to Lipitor) was to save \$2 billion annually by eliminating 10,000 jobs. When Glaxo Wellcome merged with Smithkline Beecham in 2000 to become GlaxoSmithKline, it eliminated 15,000 positions as part of reaching its goal of \$1.6 billion in annual cost savings. More recently, the objective of the Sanofi-Synthelabo's merger with Aventis was to generate \$2 billion in annual cost savings, the first part of which was achieved by eliminating 2,700 jobs.

It is important to note, however, that the number of jobs eliminated in each of these transactions is less important than the amount of money saved. Consequently, since senior professionals are paid more than junior ones, merger plans typically try to eliminate as many senior positions as possible.

Exhibit 2.14

Projected Cost Savings and Jobs Eliminated from Selected Mergers

Pre-Merger Entities	Post-Merger Entity	Merger Date	Cost Savings (millions)	Jobs Eliminated
Sanofi-Synthelabo; Aventis	Sanofi-Aventis	2004	\$ 1,000	10,000
Monsanto; Pharmacia & Upjohn	Pharmacia	2000	\$ 600	6,000
Astra AB; Zeneca Group PLC	AstraZeneca	1999	\$ 1,900	6,000
Glaxo Wellcome; SmithKline Beecham	GlaxoSmithKline	2000	\$ 1,100	12,000
Rhone-Poulenc S.A.; Hoechst AG	Aventis	1999	\$ 1,200	11,000
Ciba-Geigy; Sandoz	Novartis	1996	\$ 1,400	8,000
Pfizer; Warner-Lambert	Pfizer	2000	\$ 1,600	12,000
Pfizer; Pharmacia	Pfizer	2003	\$ 2,500	15,000
	Total		\$ 11,300	80,000

3-year projected cumulative cost savings post merger date.
Source: Wood Mackenzie

Refocused Strategies with Fewer Treatment Lines

A similar, though not identical trend to mergers that pharmaceutical companies have already embraced (and will continue to embrace in the future) is the spin-off or sale of certain treatment business lines. At a time when their revenues are under extreme pressure, these organizations are re-evaluating which lines of business offer the highest return on investment and have the greatest potential for growth. Under the current operating structures of most big pharmaceutical companies, products that do not generate at least \$500 million in annual sales are generally unprofitable, simply because the current operating and cost structures of most pharmaceutical companies are designed to support the development and marketing of high volume drugs. As companies narrow their focus, they are selling off entire units for treatment areas that are no longer a strategic priority and using the proceeds to invest in areas with greater promise.

The most logical buyers of such units are other companies that already work in these treatment areas and have decided to emphasize them even more in the future. However, with this type of spin-off, a large percentage of jobs at the spun-off entity are usually eliminated. After AstraZeneca recently announced a \$150 million deal to acquire Arrow Therapeutics,

In the future, large pharmaceutical companies' focus will be on later-stage development and commercialization of new treatments

a specialist in anti-viral therapies with a therapy for Respiratory Syncytial Virus (RSV) in mid-stage trials, the company said it would lay off 3,000 employees. The acquisition was done to enhance AstraZeneca's anti-bacterial research capabilities and early-stage compounds.⁴⁴

Acquiring Instead of Developing Compounds

In addition to cutting costs through layoffs, mergers and acquisitions, and spin-offs of non-core business lines, large pharmaceutical companies have begun shifting their business models to more decentralized ones by acquiring (or licensing their compounds from) smaller companies. As part of this strategy, large pharmaceutical companies increasingly focus on later-stage development and commercialization of new treatments.

The idea of acquiring new compounds from smaller companies is not new. For example, the extremely successful drug for treating osteoporosis, Fosamax, was developed by a European company and subsequently acquired by Merck. Similarly, the compound that led to Pepcid was developed by a Japanese company and only later acquired and further developed by Merck. Although both medications still required significant additional research and development before they could receive FDA approval and be brought to market, much of the basic research that led to their development was completed before Merck bought them.

The trend of acquiring compounds which have demonstrated commercial potential from smaller firms through licensing agreements – or in some cases by buying the entire company—likely will accelerate in the future for two reasons. First, doing so shortens the time it takes a pharmaceutical company to bring new products to market while at the same time reducing exposure to the riskiest aspects of research and development.

As described earlier, the idea of developing new products more quickly is compelling to many pharmaceutical companies because of the long time involved in creating a new drug from scratch. Investors focus on near-term profits rather than projections for 10 years in the future. By effectively eliminating the early stages of the development process and increasingly focusing on those compounds that have already cleared the early stages of the regulatory approval process, the entire development cycle is significantly compressed.

Measuring and managing risk is the core competency of venture capitalists

Second, as the drug development process becomes more tied to the vagaries of scientific breakthroughs – and not, as in the past, obvious commercial opportunities – many pharmaceutical companies have decided that their core competencies do not include predicting which scientific breakthroughs offer the greatest commercial potential.

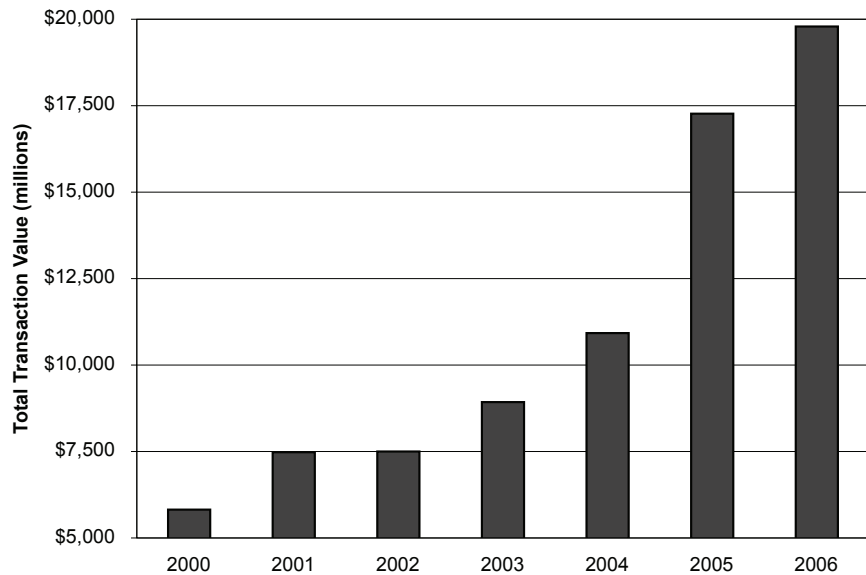
In contrast, measuring and managing such risks is the core competency of venture capitalists. A venture capitalist's business model assumes a very high rate of failure; by one estimate, only one in five biotechnology startups ever makes its investors any money. However, those investments that are successful typically generate astounding returns for their backers, more than offsetting their other losses.

Pharmaceutical companies are increasingly looking to venture capital firms to bear the risks of early-stage drug development

As part of many pharmaceutical companies' new business models, their management teams are increasingly looking to venture capital firms to bear the risk of early stage research and development in exchange for high payoffs for their successes. While this approach requires that pharmaceutical companies share the profits of successful products, it also allows them to focus on their strengths – such as massive capital bases and marketing forces – that allow them to acquire newly developed drugs with proven potential, and then further develop and commercially exploit them.

Exhibit 2.15

The Value of Licensing and Joint Venture Transactions has Grown Rapidly



Annual U.S. biotech industry financing funded through licensing and joint ventures (partnering) between biopharmaceutical companies.
Source: Burrill and Co.

As shown in Exhibit 2.15, the size of licensing and joint venture deals that transpired between pharmaceutical companies and biotechnology firms (and between different biotechnology companies) has grown immensely over the last five years. In 2006 alone, nearly \$20 billion in such transactions was consummated, and since 2001, more than \$71 billion were completed. Today nearly 50% of the drugs marketed by large pharmaceutical companies were developed by companies or institutions other than themselves.⁴⁵ Over time, we expect this percentage to increase significantly.

To be sure, pharmaceutical companies will continue to develop original, new drugs in the future. However, doing so will be less common than in the past.

Research Consortiums Share Risk

Another approach to reducing research and development risk that pharmaceutical companies are embracing is developing new drugs through

research consortiums. Instead of one company bearing all of the risks and costs of developing a new treatment, several companies pool their R&D resources in a joint venture. When and if they have a product that can be commercialized, the consortium participant with the best sales and marketing force for this type of treatment will distribute the medication, and the other participants share in licensing revenues.

For example, the Center for Biomedical Innovation is a research consortium between MIT & Harvard and several of the largest pharmaceutical companies in the world. It researches a broad range of topics including methods for improving the effectiveness of clinical trials, post-launch surveillance of selected medications to detect and measure side effects and improving the planning for large scale manufacturing for a Phase III clinical trial. The center also works closely with government agencies to identify ways of designing clinical trials, collecting and presenting data in order to reduce the time to regulatory approval.

Outsourcing of R&D to Foreign Laboratories

As part of their shift to lower-cost, decentralized business models, pharmaceutical companies are also turning to outsourcing for more of the functions that they historically have performed in-house. For example, AstraZeneca recently outsourced large portions of the company's IT functions to IBM.⁴⁶

Increasingly sophisticated laboratories in developing countries are leading pharmaceutical companies to outsource greater portions of drug R&D

A larger (and from the perspective of people working in the industry today, more ominous) shift in the industry's business model will be the outsourcing of large portions of the development of new drugs to laboratories in developing countries. As previously described, foreign laboratories are increasing rapidly in their sophistication. At the same time, they operate at a fraction of the cost of those in the U.S. and E.U. This combination of increasing sophistication and immensely lower costs will lead pharmaceutical companies in the future to consider every opportunity to outsource as much R&D as possible.

The combination of a higher reliance on smaller companies to produce the compounds that ultimately will be commercialized; the sharing of research through consortiums; and the increased use of foreign laboratories for more of the R&D activities will put great pressure on every research unit at every pharmaceutical company. Research groups will be required to demonstrate that they can produce a sufficient return on capital investment to justify both the dollars and the risk involved in producing new products. The managers of these units will be forced to consider every possible way of developing new treatments at the lowest possible cost, even if it means eliminating many jobs within the unit by outsourcing the work to another entity.

Evolution of Marketing

Just as the R&D areas of pharmaceutical companies must undergo significant changes, so too will marketing and commercialization. In the U.S., the shift from the "physician-prescriber" to a "stakeholder-payer" model will make the ability to influence payers of paramount importance to pharmaceutical companies. It also will cause these companies to lessen, though not eliminate, their marketing efforts to physicians.

Consequently, these companies will need fewer people whose primary added value is being able to access physicians. Instead, their marketing staffs will seek individuals who are very sophisticated in working with payers to position and price their products.

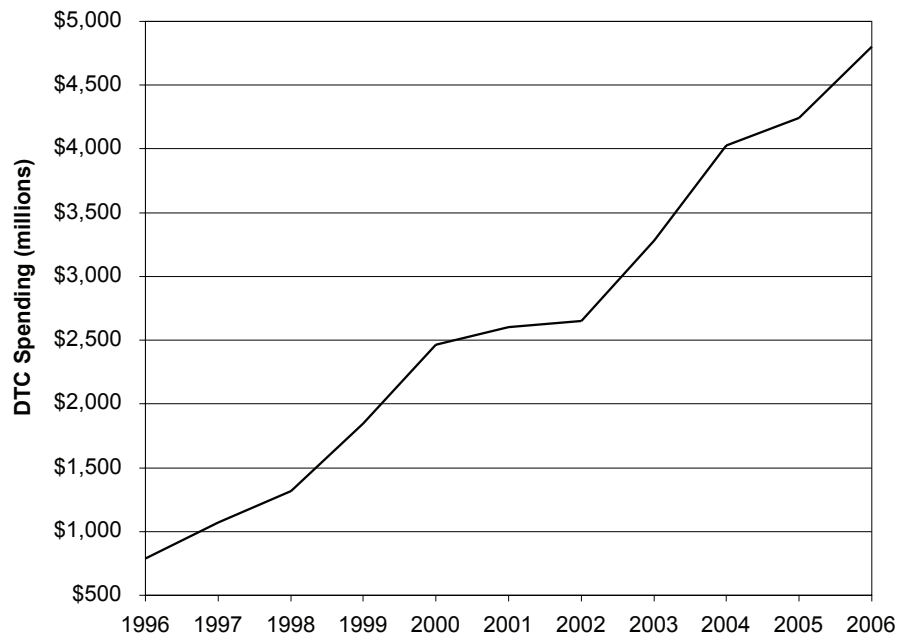
Declining Importance of Drug Brands

Branding strategies for drugs have become less effective because of the payers' ability to influence patients' choices

The increased power of payers will continue to reduce the effectiveness of many companies' branding strategies for their products. Billions of dollars have been spent over the past decade on direct-to-consumer (DTC) marketing, such as advertising on television and in magazines. In 2006 the industry spent nearly \$4.8 billion on DTC advertising, a 13% increase over 2005 and the second year of double-digit growth.⁴⁷ These efforts have been in addition to the extensive marketing campaigns aimed at physicians. The objective of both kinds of programs is to establish a preferred position for a particular medication in the minds of consumers and physicians.

Exhibit 2.16

Biopharmaceutical Direct-to-Consumer Advertising Continues to Increase



DTC promotion represents the expenditures for direct-to-consumer pharmaceutical advertising for prescription products on television, radio, magazines and newspapers, as well as outdoor advertising. Source: IMS Health

Because payers can make the out-of-pocket cost to the patient so much higher for a branded drug than one that is included in their formularies, the effectiveness of many of these marketing programs has been (and will be further) diminished. Consumers, who often have little ability to understand the relative benefits of different treatments, now instead must choose between the drug recommended by their physician with a name they know well and an alternative that takes much less out of their pockets.

Over time, we expect that DTC marketing programs will focus on informing patients about the availability of treatments in general – instead of a specific brand name – for disorders that traditionally have been viewed by consumers as natural and untreatable aspects of aging. The goal of such programs will be to encourage individuals who might not otherwise seek treatment to make an inquiry with their physician, thus increasing the overall demand for a treatment area.

Global Marketing of Drugs

The marketing units of the pharmaceutical companies also will become much more global in their approach to commercializing medications. In particular, as the economies of developing countries grow, so too will their demand for prescription medications. Each of these new markets will force companies to design, staff and manage marketing and sales strategies designed to address the unique pricing and regulatory environments of each country.

There will be fewer large and many more small pharmaceutical companies in the future

C. A Very Different Industry

Given all of these changes, what will the industry look like a decade from now? There are so many issues facing the industry, plus so many variables within those issues that could affect outcomes, that it is impossible to predict the industry's future structure and which of its current firms will best adapt and succeed. However, we believe there are at least a few macro-changes that seem inevitable.

There will be far fewer large and mid-sized companies and many more small ones. There also will be many new companies – including contract research organizations, laboratory safety consulting firms, etc. – providing services to pharmaceutical companies that were formerly handled internally. The large companies that survive will be much leaner and more focused than they are today.

Every pharmaceutical company of every size will need to have a global view as each, to at least some extent, will be competing in a global market for products and services. Joint ventures and partnerships between companies will be common, while single company, integrated development processes responsible for creating and bringing new medications to market entirely on their own will be rare.

Individuals working in the industry should expect to change jobs regularly

Individuals working in this industry should expect to change jobs regularly. While many will remain at the same employer, their roles and responsibilities will change with greater frequency than in the past. As part of this new environment, individuals may be expected to relocate to different states and often different countries more often than in the past. Others will move between companies, with many working for a half dozen or more across their careers.

Just as it will no longer be economically feasible for companies to have a paternalistic relationship with their employees, individuals working in this industry will have to be far more pragmatic about managing their careers than in the past. Instead of thinking in terms of working at a company for an entire career, industry participants' relationships with an employer will be measured in much shorter time frames, such as over the life of the development of a new product or the patent life of a group of drugs in a treatment area. While

there still will be great long-term careers in the industry, there will be far fewer people who spend their entire career at one company.

Whether or not people remain with their current employer, everyone who works in this industry should expect their lives and careers to change significantly. Just as the employers' business models are going to evolve, so too will the skill sets required for employees to succeed.

In fact, many people who would be able to remain at their current employer may find that their best long-term opportunities lie elsewhere. The changes in this industry will better allow employees to unlock their potential in ways not possible during a career at a single company. Consequently, while the idea of working for multiple companies across a career may have been almost heretical in many segments of the industry 20 years ago, it will soon become commonplace.

III. Opportunities for the Next Decade

Pharmaceutical companies are hardly going out of business

For anyone working for a pharmaceutical company, the industry's tremendous changes could prove frightening. Tens of thousands will find their current positions eliminated. Some jobs will be outsourced to another company or even another country; others will be labeled redundant and subject to cost-cutting in connection with a merger; still others will vanish when the companies exit unprofitable treatment areas.

Life will also change for those individuals who remain with their current employers. Some employees will be asked to change jobs and/or take on new responsibilities. Others will find that they must relocate to another city, state or even another country.

But large pharmaceutical companies are hardly going out of business. On the contrary, the changes they are implementing will allow them to remain competitive in a new business environment. They will still need thousands of talented people – people who will be well compensated – to help them develop and bring drugs to market.

A New Golden Era

More importantly, the evolution of the pharmaceutical industry, as unsettling as it may be, will unlock countless new opportunities and create tens of thousands of new jobs at companies of all sizes. With the right planning, industry professionals will be able to better manage their careers and lives. Those people who add the greatest value in their areas of expertise will be in immense demand and will be paid much more than in the past.

For those individuals able to anticipate, adapt and position themselves to take advantage of the coming changes, the next decade will be a new golden era. They will participate in some of the industry's most important developments and will be able to determine where they live and work.

For those individuals who can prepare for and take advantage of the coming changes, the next decade will be a golden era

The biggest change for many will be in their job structure and working environment. Instead of the cozy, comfortable environment of a big company, they may become independent contractors or join smaller organizations. Their compensation structure is also likely to change: Many will find that they will be paid much more money for their expertise over shorter periods of time, or will receive a disproportionate amount of their compensation in employer equity.

One way to take advantage of the coming changes is to identify those segments of the industry likely to offer the greatest opportunity, and those skills likely to be in the highest demand. Because of the industry's massive size, compiling an exhaustive list of either would be next to impossible. During our research, however, we were able to identify six areas of the industry that offer very high growth opportunities over the next decade, together with seven skill sets that will be in great demand across all segments of the industry.

Six High-Growth Areas

Six High-Growth Areas in the Pharmaceutical Industry
1) Commercialization of Dormant Compounds
2) Generic or Biosimilar Versions of Biologics
3) Improving the Efficiency of R&D
4) Oncology and Central Nervous System (CNS) Disorders Research
5) Stratified Medicine and Diagnostics
6) Fusion of Pharmaceuticals and Consumer Goods

1. Commercialization of Dormant Compounds

A major opportunity at large pharmaceutical companies will involve finding ways to commercialize compounds that were abandoned either prior to FDA approval or after approval but before commercialization. There are an estimated 2,000 to 5,000 such compounds currently in the freezers of pharmaceutical companies, with another 150 to 200 being added each year.

As described in Chapter II, pharmaceutical companies are desperate to replace the revenues they will lose as the patents on many high revenue drugs expire over the next five years. Developing new drugs from discovery is not an option because it is unlikely to produce a revenue-generating treatment in less than 10 to 15 years.

Pharmaceutical companies have already poured hundreds of millions of dollars into developing currently dormant compounds without any return on their investments. Some of these compounds simply did not work, others suffered from undesirable side effects, and still others lacked sufficient commercial potential to justify further investment.

In the past, pharmaceutical companies may have considered either selling or licensing such dormant compounds to other firms in an attempt to recover some of their R&D costs. However, most are now reluctant to do so, because they fear the embarrassment of having handed another firm a profitable drug for less than fair value. Consequently, to ensure that they are not making a mistake, companies face spending millions of additional dollars to re-evaluate an abandoned compound before selling or licensing it.

These re-evaluation costs, combined with the relatively modest fees a company can expect to receive from the acquiring firm, typically render the licensing or selling of dormant compounds economically unattractive. Consequently, a major growth opportunity will be helping companies reposition or repurpose dormant compounds.

Economics of Repositioning or Repurposing are Compelling

The economics of successfully “repositioning” or “repurposing” a dormant compound are particularly compelling to pharmaceutical companies for

Thousands of commercially-dormant compounds sit in the freezers of pharmaceutical companies

Many successful products have come from repositioning/repurposing compounds

several reasons. As already noted, they have sunk a great deal of money into developing such compounds without generating any revenue in return. While commercializing a dormant compound may require further R&D investment, the marginal cost is a small fraction of the costs of developing a new treatment from scratch.

Second, by repurposing a compound, a pharmaceutical company can extend the life of its patent protection. A pharmaceutical company typically receives 20 years of patent protection for a molecule when it is first developed. By repurposing the drug, it can receive an additional 20 years of patent protection for the new indication.

Many Well-Known Drugs Came from Repositioned/Repurposed Compounds

Several of the industry's most recent successful products have come from repositioned or repurposed compounds. For example, Eli Lilly's cancer drug Gemzar was initially designed to be an antiviral medication. And Thalidomide, a sleep aid and anti-nausea drug that became infamous in the 1960's when linked to birth defects, is now used to treat leprosy.

Typically, the repositioning or repurposing of a compound involves finding ways to slightly alter current formulations of a medication so that it can be used to treat a different affliction, or to treat other indications with the current formulation. In some instances, the potential for repositioning a compound is identified from some of the unintended side effects that occur in clinical trials.

Viagra and Rogaine initially were developed as anti-hypertensive drugs. Given some of their pronounced side effects on patients participating in the clinical trials, their makers decided to pursue alternative uses for these medications and developed two extremely successful and well-known medications.

Biosimilar biologics will be a high growth area over the next decade

Several smaller companies have created units designed to work with large pharmaceutical companies to identify and take advantage of repositioning/repurposing opportunities. For example, Gene Logic identifies discontinued drugs at major pharmaceutical companies and funds further research to identify other potential indications of selected medications. As a result, Gene Logic is entitled to both research and licensing payments if the pharmaceutical company elects to move forward with development.

2. Generic or Biosimilar Versions of Biologics

One nascent segment of the pharmaceutical industry likely to provide a multitude of opportunities for many years to come is that of creating generic or biosimilar versions of biologics, that is, versions of the same treatment that are not identical to the branded medication but have enough similarity to produce comparable results in patients. It is a high growth opportunity for several reasons. First, most of the pharmaceutical industry's growth in sales over the last decade has come from biologics and small molecule generics. Currently, 25% of the new drugs coming to market are biologics.⁴⁸ Second, the biotechnology industry began about 30 years ago, and as shown in Exhibit 3.1, many of the U.S. patents of its highest revenue treatments are about to expire (many of the European patents are also about to expire – or have already expired).

There are several different groups (generic manufacturers, payers, patient advocacy groups, etc.) that are advocating the development of biosimilar versions of biologics. One group has argued that biosimilars have the potential to reduce Medicare costs by \$14 billion.⁴⁹ A European study estimated that E.U. governments would save nearly \$3 billion annually just from the introduction of the first six biosimilar versions of biologics.⁵⁰

Exhibit 3.1

Top-Selling Biologics Face Patent Expirations

Product	Company	Indication	Patent Expiration Date		2006 Revenue (millions)
			U.S.	Europe	
Enbrel	Amgen, Wyeth	Rheumatoid arthritis and other inflammatory disorders	2012	2010	\$ 4,379
Aranesp	Amgen	Renal and cancer anemia	2016	2014	\$ 4,121
Rituxan / MabThera	Genentech, Roche, Biogen Idec	Non-Hodgkin's lymphoma and rheumatoid arthritis	2015	2013	\$ 3,912
Procrit / Eprex	Johnson & Johnson	Renal and cancer anemia	2013	2004	\$ 3,180
Neulasta	Amgen	Neutropenia (hematological disorder)	2015	2015	\$ 2,710
Epogen	Amgen	Renal and cancer anemia	2013	2004	\$ 2,511
Lantus	Sanofi-Aventis	Diabetes	2014	2014	\$ 2,115
Betaferon / Betaseron	Bayer Schering Pharma	Multiple sclerosis	2007	2008	\$ 1,273
Neupogen	Amgen	Neutropenia (hematological disorder)	2013	2006	\$ 1,213

Rituxan/MabThera includes revenue from co-marketers Zenyaku Kogyo and Chugai. Lantus revenue converted into U.S. dollars using the average exchange rate in the company's 2006 annual report.

Source: La Merie; SEC 10-K Filings; Express Scripts; AARP Public Policy Institute; Information provided by Amgen and Johnson & Johnson

Proving bioequivalency with biosimilars is much more difficult than with small molecule generics

Proving Bioequivalency More Complicated

The source of this dilemma involves the amount of testing – and therefore, cost – that should be required to prove that a biosimilar biologic is as safe and effective as its branded counterpart. With traditional small molecule compounds, a generic provider must only establish that two batches of active pharmaceutical ingredients are chemically identical and have substantially similar impurities. Provided it can do this, the provider is required to do only limited clinical trials in order to obtain regulatory approval.

In contrast, proving bioequivalency with large molecule treatments, such as biologics, is much more difficult. In one sense, the challenge is analogous to shifting from a two-dimensional problem to that of a three-dimensional one. Not only must the generic version have the same molecules as the branded biologic, but the structure and location of the molecules must also be similarly situated relative to one another for the treatments to function the

same way in patients. Even slight deviations in the design, purity or potency of a biologic can substantially change its efficacy and safety for patients.

**Only minor alterations
in the formulation of
biologics can cause
near-fatal side effects in
patients**

In one incident, a seemingly minor alteration to the packaging of a widely used biologic caused almost fatal reactions in patients using the medication. This treatment is used to help patients undergoing kidney dialysis and has for many years been manufactured by the same global pharmaceutical company. Within a matter of days, many patients using the medication produced at one of their manufacturing plants began to suffer severe autoimmune reactions. The manufacturer immediately suspended production of the drug at that plant and spent millions of dollars trying to determine what was causing the reactions. While to this day the cause has yet to be identified with certainty, it is believed that a slight change in the packaging used at this plant – a supplier had begun using different stoppers for the vials – was the likely culprit.

The importance and difficulty of creating biosimilar versions of biologics that are bioequivalent to branded treatments has also created controversy as to whether their development ultimately will lower costs for these drugs. A recently completed study at Duke University (sponsored by a major biotechnology firm) argues that it will not do so. The study asserts that, to prove bioequivalence, generic manufacturers will have to conduct such widespread and costly clinical trials that their biosimilar medications will not be substantially cheaper than their branded counterparts.

**Legislators and Regulators Trying to Encourage the
Development of Biologics**

Despite this controversy, a series of regulatory and legislative changes have been implemented that are helping launch this segment of the pharmaceutical industry. The first of these changes was the EMEA's (the European Medicines Agency) establishment of a legal framework for biosimilars in 2004, followed last year by guidelines for their final approval.

**Europe has already put
regulations in place
for the approval of
biosimilars**

In April 2006, the EMEA gave approval to Novartis for Omnitrope, a biosimilar version of a growth hormone designed to compete with Genotropin, a biologic manufactured by Pfizer.⁵¹ The FDA subsequently approved the drug for use in the U.S., describing it as a "follow-on protein product."

Further regulatory and legislative changes in the United States have been underway that are designed to help accelerate the development of these types of treatments. In particular, new legislation was working its way through Congress that would have authorized the FDA to approve biosimilar versions of brand-name biologics. This legislation has, however, been stalled as of September 2007, and won't reappear until 2008 at the earliest.

Additionally, despite the challenges of proving bioequivalence, venture capital firms have made many investments in companies hoping to develop biosimilars, suggesting that they believe bioequivalency can be proven and that there will be a large market for these products. For example, Israel's Protalix Biotherapeutics Inc. has a biosimilar product undergoing Phase III clinical trials, and is financed in large part by venture capital.⁵² Bioceuticals Arzneimittel AG is also a venture-capital funded operation that was set up by German generics group Stada Arzneimittel to develop Stada's biosimilar programs. The company recently received a positive approval recommendation from the EMEA's Committee for

Pharmaceutical companies lose \$2 million for each additional day before a new drug reaches the market

Medicinal Products for Human Use (CHMP) for Silapo, a biosimilar version of Johnson & Johnson's anemia medication Eprex/Erypo.⁵³

Large pharmaceutical companies are also making substantial investments in the development of biosimilars. Both Novartis and Shire have biosimilar products on the market and last year Merck acquired GlycoFi, a company which specializes in optimizing the production of biotech molecules.⁵⁴

One force encouraging such investments are the recent advances in analytical technology that help companies to better design generic versions of biologics and more easily demonstrate to regulators the required bioequivalency. New companies – such as Momenta, Procognia and ExSar – have created such technologies and are developing new, more sophisticated ones. Over time, a global market for generic versions of biologics will follow.

3. Improving the Efficiency of R&D

As discussed earlier in Chapter II, one of the most urgent priorities for pharmaceutical companies is finding ways to improve the efficiency of R&D – that is, lower the cost and risk of developing new drugs. Of equal importance to these companies is finding ways to shorten the time between the discovery of new compounds or molecules and their coming to market. Given any medication's finite patent life, pharmaceutical companies on average lose \$2 million of revenue for each additional day before a new drug reaches the market.⁵⁵

Consequently, these factors are leading to the development of a new, high-growth area within the pharmaceutical industry. Instead of simply trying to find ways to create new and more efficacious drugs, this effort seeks to improve the likelihood of success in creating the industry's next generation of treatments. It also focuses on finding ways to reduce the time required to get from discovery through regulatory approval.

To improve the efficiency of their R&D, pharmaceutical companies are reviewing every aspect of the drug development process. For example, many companies are increasing their investments in translational medicine; that is, developing a better understanding of the mechanism of action of drugs in human populations. They also are trying to redesign clinical trials to increase the likelihood of early identification of those medications most likely to fail in subsequent, expanded testing.

Improvements in early-stage R&D efficiency have the greatest economic impact

A particular focus of this growth area will be developing technologies and methodologies for improving the rates of success during the earlier stages of research.

Once a compound has successfully completed Phase I trials, the odds of ultimately producing a marketable product significantly improve. The impact of finding ways to improve the likelihood of success during earlier stages of research will be greatly beneficial to R&D efficiency.

Pharmaceutical companies are also trying to find means of predicting which drug targets are “inherently intractable and undruggable” in order to determine earlier in the research process which potential targets are viable pursuits. Other companies are working on reengineering the design of clinical trials that more quickly can demonstrate to regulators the efficacy and safety of a compound. Still others are developing tests that better screen for toxicity

or efficacy in patients or are able to identify potential unintended side effects from a new compound.

4. Oncology and Central Nervous System (CNS) Disorders Research

Oncology and CNS research offer great long-term career opportunities

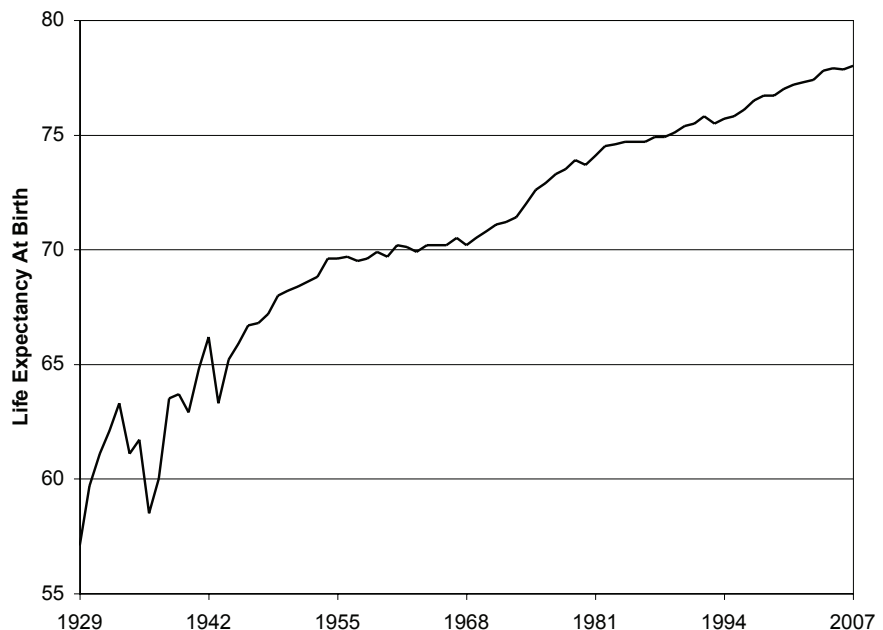
The areas of oncology and CNS can offer great long-term career opportunities. Recent breakthroughs in genomics as well as significant advances in the understanding of cancer and the biochemistry of the brain have created the potential for many new treatments. At the same time (and somewhat ironically), the success that the industry has had over the last two decades in treating other afflictions has made CNS and oncology high growth commercial opportunities for pharmaceutical companies.

Most medically-related deaths from the 1960's to the 1990's were from infections, heart disease, AIDS and certain forms of cancer. Many of the great scientific breakthroughs at pharmaceutical companies since then have made these afflictions increasingly chronic instead of fatal.

Consequently, the average life expectancy of the U.S. population has grown significantly. In 2007, the average life expectancy at birth for the total population reached a record high of 78 years – up from 75.4 years in 1990. The percentage of people over the age of 85 also is rising dramatically. In 2000, they numbered four million, or about 1% of the total population. By 2050, this number is expected to increase to 19 million – or 5% of the U.S. population and 24% of those over the age of 65.⁵⁶

Exhibit 3.2

Life Expectancy for People in the U.S. has Increased by More than 20 Years

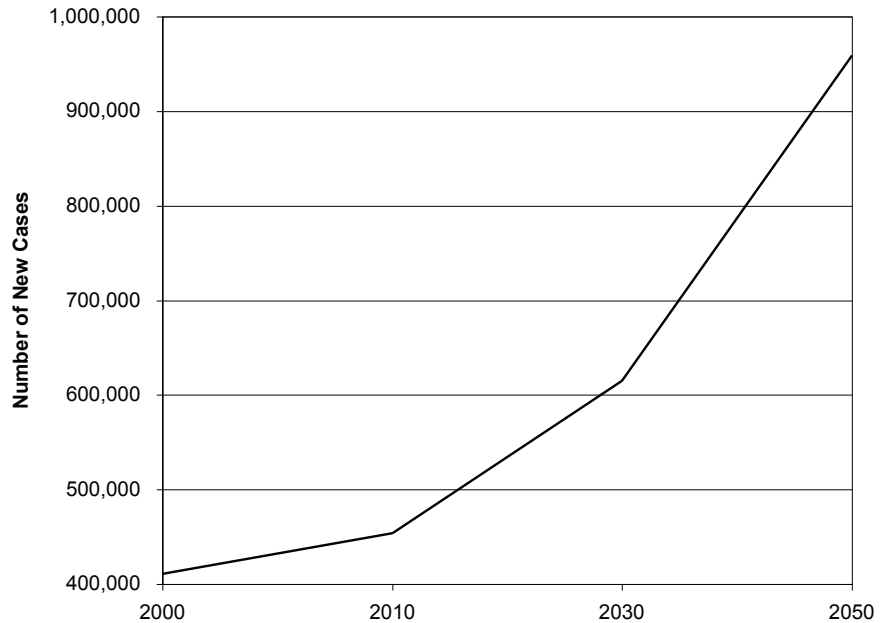


Source: CDC/NCHS; National Vital Statistics Reports; CIA World Fact Book

As more people live longer, larger portions of the population will be afflicted with conditions such as Alzheimer's Disease and dementia.

Exhibit 3.3

Projected New Cases of Alzheimer's Disease in the U.S.



Source: Alzheimer's Association

Cancer will be an even bigger cause of mortality, since for many cancers the single most important risk factor is age. A recent government study predicted that if cancer rates follow current patterns, there will be 2.6 million Americans diagnosed with cancer in 2050 – double the number in 2000. The number of cancer patients over age 85 is expected to increase four-fold over this same time period.⁵⁷

Exhibit 3.4

Percent Change in Selected Causes of U.S. Deaths

Cause of Death	Total Number of Deaths		% change
	1979	2004*	
Heart Disease	733,235	652,486	-11%
Prostate Cancer	22,240	29,004	30%
Brain Cancer	8,691	12,606	45%
Skin Cancer	6,156	10,301	67%
Parkinson's Disease	3,510	17,989	412%
Alzheimer's Disease	857	65,965	7,597%

Source: CDC Wonder; National Vital Statistics Reports
 *Latest year for which data was available

These higher rates of CNS disorders and cancer will create an immense demand for new treatments. Additionally, unlike areas such as heart disease and infections, current treatment alternatives for a large number of CNS disorders and cancers are relatively limited and not particularly effective. Pharmaceutical companies will likely be able to charge premium prices for new effective treatments. Combined, these factors will create an immense economic opportunity on which many pharmaceutical companies will focus for decades to come.

5. Stratified Medicine and Diagnostics

**It will be many years
before personalized
medicine can be delivered
to patients in a cost-
effective way**

When self-described futurists talk about the future of health care, they almost inevitably focus on the topic of “personalized medicine”. Several forecast a time when a patient will go to a doctor’s office and, based on a DNA analysis of a blood sample, will walk out with a customized prescription of treatments best suited to treat the patient.

While this may occur someday, our research suggests that the field of personalized medicine is still in its nascent stages; it will be many years before there will be a cost-effective way to deliver it to patients. In retrospect, many believed that, when DNA was discovered in 1956, it would lead to myriad new treatments that would change the world. Although DNA-related science has advanced steadily over the last five decades, it is only now that widely used commercial applications are coming to market.

Thus, while the field of personalized medicine likely will grow substantially over the next decade, we expect that “stratified medicine” – particularly in the field of diagnostics – will be a higher growth opportunity over that time frame. Stratified medicine can be best described as a mid-point in the evolution of health care from its current structure to that of personalized medicine. Rather than develop a custom regimen for individual patients based on their unique genetic make-up, stratified medicine will see pharmaceutical companies linking clinical biomarkers to patient subpopulations.

Diagnostics is the Largest Opportunity in Stratified Medicine

One aspect of the field of stratified medicine – diagnostics – offers the greatest growth opportunity. Stratified medicine diagnostics will determine the effectiveness or toxicity of a treatment based on a patient’s particular gene sequence and can help identify which patients will most benefit from a particular variant of a treatment.

The molecular diagnostic market, which generated more than \$2.5 billion in sales in 2006, is growing 15% annually.⁵⁸ Most growth thus far has been in infectious diseases and blood screening, which together account for 70% of the market. Genetic testing makes up the rest of the market, and although this segment is small today, it is projected to be an extremely fast-growing component of the market in the future.⁵⁹

Helping to drive a great deal of the demand for new diagnostics – in particular for severe or life-threatening afflictions that require some of the newer and more expensive therapeutics – are payer organizations. The identification of the treatment regimen with the highest likelihood of success is an essential part of their ability to control costs. Thus, they have embraced the use

of diagnostic tests when treating certain types of cancer and other life-threatening diseases.

The economic model for developing and commercializing diagnostics is compelling

The field of diagnostics is also likely to be a high growth area because it has an economic model with a number of features that are attractive to providers of capital, such as pharmaceutical companies and venture capitalists. First, because diagnostic tests are not therapeutics, the regulatory approval process often can be shorter and easier than the process for many drugs. Second, diagnostic tests are often used by much larger segments of the population than the therapeutic treatment they are designed to test for. In other words, certain medications or variants of a medication work for only a small percentage of the population with a specific affliction. However, most potential patients with the affliction will use the diagnostic test to determine whether a particular treatment would be appropriate for them. Consequently, the economic model of diagnostics involves less economic risk than developing a therapeutic and, while a patient may only use the test once (as opposed to the repeated use of a medication for a chronic condition), significantly more patients will use the test than will use any individual treatment.

6. Fusion of Pharmaceuticals and Consumer Goods

There has always been something of a grey area between the pharmaceutical industry and consumer goods companies. While most pharmaceutical companies produce controlled medications that require a prescription, they also produce many over-the-counter (OTC) medications that are sold directly to consumers. In contrast, consumer goods companies traditionally have offered almost exclusively OTC products directly to consumers.

This is changing as consumer goods companies now view health and wellness products as some of their highest potential growth areas. An aging and more health-conscious population has created tremendous demand for virtually anything that will make one look and/or feel younger. Dietary supplements, aesthetic equipment and technology, and cosmeceuticals are just a few examples of consumer goods areas that are growing rapidly.

Consumer goods companies view health and wellness products as some of their highest potential growth areas

As these organizations begin to offer greater numbers of products in this historical grey area, consumer goods companies should expect to find that they must operate under the same regulatory environment as pharmaceutical companies. To be clear, regulation of consumer goods is not new. Dating back to Upton Sinclair's epic "The Jungle", the U.S. government has regulated different aspects of food safety and consumer goods for many years. The Federal Trade Commission (FTC) was formed in 1916. The Consumer Product Safety Commission was created by Congress in 1972 and is responsible for ensuring that the 15,000 types of consumer products under its jurisdiction will not harm or injure consumers. And the same Food and Drug Administration (FDA) that regulates and approves prescription medications also has responsibility for ensuring the safety of the U.S. food supply.

Today, however, there is rising scrutiny of the impact of virtually all consumer products on societal health and wellbeing as well as the environment. Movies such as Morgan Spurlock's "Super Size Me" and recent scares from poisoned dog food and toothpaste have contributed

to higher demand for better controls and more social responsibility by consumer goods companies.

Consequently, consumer goods firms increasingly are going to seek individuals with extensive experience in managing highly-regulated businesses, and with an expertise in ensuring product safety and efficacy. The ranks of the pharmaceutical industry are packed with such individuals. Many will be recruited by consumer goods firms to help them better control their existing product lines, while others will be brought in to oversee the development of new ones.

Seven Skill Sets with Great Future Value

Seven Skill Sets Necessary to Operate in the Pharmaceutical Industry of the Future	
1)	Ability to Manage Decentralized Intellectual Capital Resources
2)	Ability to Work in Joint Ventures and Across Divisions, Cultures and Countries
3)	Ability to Integrate an Understanding of Intellectual Property Laws, Scientific Expertise and Business Strategy
4)	Ability to Spur Creativity While Managing Commercially
5)	Knowledge and Insight on the Decision-Making Dynamics of Payers
6)	Expertise in the Functioning and Decision-Making of Regulatory Agencies
7)	Human Resource Skills to Help Transform Pharmaceutical Companies

The foregoing discussed six areas of the pharmaceutical industry that will offer particularly good opportunities for careers in general. The following discussion identifies seven skill sets/attributes that will be of particular value to multiple employers across the industry.

1. Ability to Manage Decentralized Intellectual Capital Resources

As more pharmaceutical companies shift to decentralized business models, they will look outside their walls for much of the intellectual capital needed to develop new drugs. While companies will maintain large research staffs, contract research organizations (CROs), independent contractors, research consortiums, universities and foreign laboratories will be integral parts of solving complex problems more cost effectively. They also will be essential to solving these problems more quickly, enabling pharmaceutical companies to develop and bring drugs to market faster.

Individuals able to simultaneously and effectively manage all of these internal and external intellectual capital resources will be in great demand by pharmaceutical companies of all sizes. People who can quickly decide which problems should be solved internally and which should be outsourced will bring both cost-savings and competitive advantages to their employers.

Understanding which individual researcher in a foreign lab has the necessary expertise will be essential to outsourcing portions of R&D

The best managers will know which specific external resources are best qualified to address individual aspects of difficult problems. This may sound self-evident, but cultural barriers often make execution difficult. Some of the most innovative R&D work in chemistry is happening in laboratories in China and India. Among the hundreds of researchers in any lab, however, there are often only one or two with the expertise that is needed. The culture of these countries dictates that the most senior researcher in the lab receives most of the credit for the lab's production, regardless of whose intellectual capital played the key role. The best managers of intellectual capital resources have to know not only which labs to contract with, but also which employees of these labs are essential to have involved.

The best managers of intellectual capital resources must also have a broad awareness and understanding of the work being conducted at universities and CROs around the world. This knowledge will help them to avoid paying to attack problems that have already been solved, and to identify where to go should their organization encounter a similar but not identical problem. It also will be essential in helping them evaluate the feasibility of new ideas.

InnoCentive, Inc.

A new, innovative company initially developed by Eli Lilly in 2001 provides a glimpse of how pharmaceutical companies will look for ways to more cost-effectively solve problems they encounter in the research and development process. InnoCentive is a web based business that taps into the expertise of a global base of scientists and researchers.

Also known as a "crowd-sourcing" business, this company offers pharmaceutical companies, academic institutions and non-profit organizations a means of anonymously accessing a universe of more than 125,000 experts. These organizations will post a reward ranging from \$10,000 to \$1 million for whomever can deliver a solution to a particular R&D challenge. Since the reward is only paid if the problem is solved, the organizations only pay for productive work.

About 20% to 25% of the individuals registered with InnoCentive as solvers are retired, while the balance is made up of freelancers, faculty and other professionals. These people initiate work on their chosen problem within a given set of guidelines. When a solution is selected as "best" by the seeker, the solver transfers intellectual property rights to the solution to the organization paying the reward. To date, almost 200 awards have been paid.

2. Ability to Work in Joint Ventures and Across Divisions, Cultures and Countries

As described earlier, the pharmaceutical industry is shifting from fully integrated businesses focused largely on the United States and the E.U. to more decentralized business models that operate and compete in a global market. This shift – which is accelerating – will make an individual's ability to work in joint ventures and across divisions (within one company), as well as to work with people from different countries and cultures, one of the most sought-after skills in the industry.

Few people possess the ability to work effectively in joint ventures and across a company's divisions

Although the demand for this skill may seem obvious, few people actually possess it for several reasons. First, the corporate cultures and resulting ways in which large companies and small ones operate are very different. Individuals who are effective at working in one environment typically struggle in the other.

Second, as difficult as domestic joint ventures may be, managing international joint ventures involves complexities of a different order of magnitude. Cross-border joint ventures require managers to deal with different languages, regulatory environments and attitudes about life and work.

Third, even work done at a single pharmaceutical company will be very different in the future than it has been in the past. Many of these organizations have historically operated as groups of separate "silos" (e.g., animal research vs. human testing vs. marketing, etc.). In the future, the lines between these groups will blur. Companies will demand that all of their employees work more closely together, be they researchers, marketers or managers. Each person's success will depend on how effective he or she can be in working with other units within the company.

The importance of being able to function effectively in joint ventures, across business units or across borders will make the limited number of people able to do so invaluable to their (and other) employers. The competition for individuals with such skills will lead pharmaceutical companies to pay fancy premiums for their services.

3. Ability to Integrate an Understanding of Intellectual Property Laws, Scientific Expertise and Business Strategy

Since its inception, an essential part of the pharmaceutical business has been its ability to patent-protect intellectual property. The first patent for a chemical compound was granted in 1907 for adrenaline. Insulin was the second in 1923.⁶⁰ With patent protection, companies could risk investing the enormous sums required to develop new drugs, knowing they would enjoy an exclusive right to market them for a period of time and recoup a return on their investment.

Progress in decoding the human genome has led to an intellectual property land-grab

This aspect of the industry, however, has become much more complicated over the last 15 years due to the success of the Human Genome Project (HGP) and the genetic research conducted by Celera Genomics. These organizations provided a quantum leap in the understanding of a human's genetic make-up by identifying most of the genes in the human genome and mapping most of the sequencing of individual genes. This work is the foundation for the fields of stratified and (eventually) personalized medicine.

Their work also made the field of pharmaceutical and biotechnology intellectual property much more complicated, because it led several companies to apply for patents for a series of gene sequences that might be used for developing new treatments. Celera alone applied for more than 6,500 patents on whole or partial genes.

According to a recently published study, nearly 20% of all human genes have now been patented. One company, Incyte, has been granted patents for more than 2,000 genes.⁶¹ Further, some gene sequences have as many as 20 patents on them asserting rights as to how the genes may be used.

It is unclear how many patents on gene sequences will be enforceable

These patents complicate the development of new drugs and treatments because no one knows what rights the patent holders actually have. This uncertainty arises because the idea of patenting forms of human life (as opposed to compounds found in human beings) is a relatively new aspect of intellectual property law. There is little case law – that is, rulings in actual litigation as opposed to statutory language written by legislators – indicating how the courts will view such claims.

Although the patent holders assert that they have the right to licensing revenues from any diagnostic tests or therapeutic treatments based on the gene sequences, or if knowledge of the sequences is used to test the efficacy of a new drug, it is yet to be determined how enforceable their claims will be over time. One expert we interviewed believes that fewer than 100 of these patents will ultimately be upheld by the courts.

It is important to emphasize that the pharmaceutical industry has always needed experts in intellectual property rights. In most instances, they have hired attorneys specializing in this field. Some companies have even funded the legal training of their former chemists in order to have more knowledgeable attorneys.

Going forward, however, there will be a particularly high demand for those individuals who can integrate a combination of expertise in intellectual property rights with a deep understanding of the underlying science of a product area and their company's business strategy. Only with all three attributes will one be able to fully understand the practical economic effect of these patent rights on the research and development of new products. More specifically, it will allow someone to accurately predict how much revenue from a potential new drug or diagnostic tool will have to be paid to these patent holders. It also will enable them to understand how these potential payments must be balanced against the cost of developing the product, the likelihood of succeeding and the potential revenue the product might ultimately generate.

Such skills are already in high demand by smaller firms such as biotechnology companies. As pharmaceutical companies begin their long-term shift to stratified medicine, the entire industry will be looking for individuals with these skill sets.

Absent an understanding of intellectual property rights, it will be hard to predict the potential revenues from any new products

4. Ability to Spur Creativity While Managing Commercially

As we discussed in Chapter II, executives at pharmaceutical companies face a series of challenges and conflicts. They are under immense pressure to boost profits and stock prices at a time when a large percentage of their companies' revenues are about to decline or vanish because of expiring patents. Although making massive investments to produce future generations of drugs will strengthen their companies in the long run, management's greater imperative is to address their firms' short-term challenges.

Further complicating matters, the process of researching and developing new drugs has become significantly more complex. The R&D process is now one driven largely by scientific discovery – as opposed to the identification of commercial applications and the subsequent development of medications to treat widespread afflictions – and is focused on more difficult targets.

Scientific discoveries are irrelevant to investors unless they are accompanied by robust returns on their dollars used to fund the research

At the same time, any new drug is far less likely to get regulatory approval than 20 years ago. Even if a drug does win regulatory approval, the coming shift by payers to outcomes-based pricing over the next decade makes it extremely difficult to accurately predict what future revenue the new treatment will generate. Consequently, pharmaceutical companies are in the difficult position of having to spend much more and take much greater risk to develop new drugs.

In a perfect world, the R&D efforts of pharmaceutical companies could be designed to ensure that significant investments would always result in successful commercial products. However, the scientific discovery process is rarely neat and orderly. Only a tiny fraction of new compounds actually make it to market as products. Many times researchers will work for years on developing a compound to treat a condition, only to learn it does not work, but then later discovering it is extremely effective in treating other afflictions, generating immense revenues for the company.

To be successful in researching and developing new products, pharmaceutical companies will still need to be able to foster the type of environment necessary to spur creativity. Such an environment has to allow the researchers great freedom to explore new ideas and pursue different approaches, although many of these will fail and never produce any commercially-viable products.

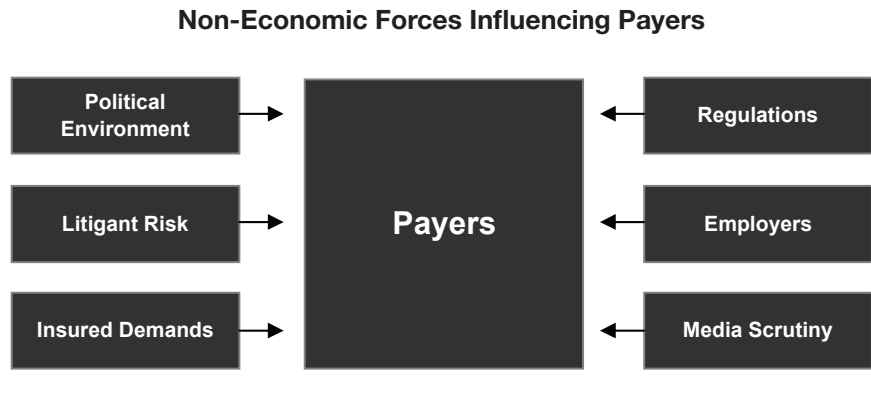
Clearly, such an environment is in many ways in direct conflict with the near-term interests of shareholders – whose sole focus is on boosting their investment returns. So although a company's research efforts may be creating great scientific advances and discoveries, such success is irrelevant to investors unless they are accompanied by robust returns on the dollars used to fund the research.

Balancing the conflicting interest of commercialization and creativity will be one of the industry's greatest challenges

This conflict between scientific discovery and commercial potential will create an immense demand for those individuals who are able to balance both the interests of shareholders and the need to allow the inherently disorderly scientific discovery process to work. As a result, some of the most sought-after managers in the future will be a bit schizophrenic – they will encourage broad innovation and scientific discovery while at the same time gently nudging their teams to remain focused on the commercial aspects of their work. They also will need to foster within such a creative environment an additional ethos: everyone involved in developing and bringing to market new drugs has a duty to the shareholders of the company to generate a fair return on the staggering sums invested in R&D.

5. Knowledge and Insight on the Decision-Making Dynamics of Payers

Exhibit 3.5



Payer decisions are influenced by a series of non-economic forces

In earlier years, successfully marketing a new drug largely rested on the ability to educate physicians and potential patients about it and to persuade doctors to prescribe it. However, a new factor – payers’ ability to influence their insured’s behavior – has introduced a new variable that in many ways now dominates the decisions about which treatments patients actually use.

As discussed earlier, over the last 25 years there has been a significant shift in bargaining power from pharmaceutical companies to payers. Because the payer industry has consolidated significantly through mergers and acquisitions, a relatively small number of very large payers now can influence the behavior of large segments of the population through the application of varying co-pays for different treatments for the same affliction.

This shift in power has made payers’ decisions about which drugs to include in their formularies a critical factor in determining the sales of a particular treatment. It also has increased the importance to each pharmaceutical company of understanding the decision-making processes of the payers, and made it imperative that each pharmaceutical company be able to communicate the relative cost/benefits of its treatments versus alternatives offered by other companies.

But the factors that drive payer organization decisions are much more complex than just simple economics. Instead they are impacted by a wide variety of influences. For example, insurance companies are highly regulated businesses and cannot risk running afoul of local, state and federal governments.

They also must be responsive to their clients – employers of all sizes. Often the same person who is deciding which payer organization to use for a company’s benefits is also a recipient of those very benefits. Thus, the decisions made by payers regarding what it will cost an insured individual to receive different medications are closely scrutinized by their employer clients.

Further, as payer organizations have consolidated and grown in size and market share, they also have come under far greater scrutiny by the media

and regulators. Similar to the pharmaceutical industry, payers are now a target of choice of class-action litigators. Consequently, payers' future successes are dependent upon not only their economics but also whether they are perceived to be indifferent to the outcomes of their insured.

As the power of payers continues to increase over time, pharmaceutical companies understandably will increase their marketing efforts to these organizations. To do this, they will need employees who have a deep understanding of how these influencers, and many other factors, shape different payer organizations' decision-making processes. Without such insights, it will be impossible for pharmaceutical companies to most effectively price and position their products within payer programs. Those individuals able to develop such insight into how individual payers operate and make decisions will be in high demand.

6. Expertise in the Functioning and Decision-Making of Regulatory Agencies

Just as pharmaceutical companies will need more individuals who understand payer organizations, those with detailed expertise and insights into how regulatory agencies work – and who can use such knowledge to help companies accelerate the approval of new treatments – likewise will be in great demand.

The drug approval process is like baseball. Although a pitcher may throw many pitches, they are neither balls nor strikes until the umpire decides how to call them

In one sense, the drug approval process is a lot like baseball. Although a pitcher may throw many pitches, they are neither balls nor strikes until the umpire decides how to call them. Similarly, while pharmaceutical companies may spend hundreds of millions of dollars developing new and innovative drugs, until they receive the regulatory approval these products remain unmarketable compounds. Thus, getting regulatory approval for a new treatment is an essential precondition to success.

The time involved in obtaining approval for new medications, however, is by no means uniform. Regulators have broad authority in reviewing treatments and they gain no benefit by accelerating the process.

At the same time, however, pharmaceutical companies have an overwhelming interest in getting their medications approved as soon as possible. These companies have made enormous investments in new treatments that cannot generate any return until the regulatory agencies allow them to begin marketing their products.

Consequently, pharmaceutical companies will seek individuals who have developed a robust expertise in the functioning of regulatory organizations and who have relationships with key decision makers within them for a particular treatment area. This expertise and these relationships will be most valuable if they can be used to help an organization design their clinical trials and communications with the regulatory agency such that the approval process is shortened.

In addition, the demand for these regulatory experts will not be limited to the U.S. or the E.U. As pharmaceutical companies increasingly shift to global enterprises, they will be forced to navigate the regulatory approval process in each country in which they operate. Further, as they shift more of their R&D work to foreign laboratories, they may first seek approval for

products in those countries prior to bringing them onshore. All of these changes will make an ability to work effectively with foreign regulators a highly sought after skill.

7. Human Resource Skills to Help Transform Pharmaceutical Companies

To reengineer their economic models, pharmaceutical companies will have to redesign their human resource programs

As pharmaceutical companies reengineer their business models, they will need to change the types of people they recruit (and seek to retain) and the programs in which they develop and train them. They also will need to redesign compensation structures and develop methods of encouraging behavior that is very different from how they have historically operated. Additionally, they will need to create new career paths for most significant positions in the organization.

Implementing these changes will be difficult. These firms have operating cultures developed over decades and sub-cultures within different operating units. The coming changes are going to compel them to break down barriers between different groups while creating new groups.

The companies also will need to eliminate many positions now occupied by long-time employees. This inevitable bloodletting will, in turn, fundamentally alter the employer-employee relationship between the firm and those who remain part of the organization. Each company will run the risk of adverse selection: many of its best people will elect to leave for other opportunities.

The ability to manage all of this change from a human resources perspective will be one of the most valuable skill sets in the pharmaceutical industry over the next decade. These companies are, in effect, reengineering both their business models and their workforces. And it all must be done on the fly: they do not have the luxury of suspending current operations while they carefully implement these changes.

Consequently, they will need individuals who can help transform their organizations in ways that do not disrupt their ongoing businesses. At the same time, they will need people who can help them find and develop individuals (from both within and outside the organization) who will serve as the next generation of leadership for companies that will be operating in a very different economic environment from the past.

IV. Planning Your Future

Changes coming to the pharmaceutical industry discussed in Chapters II and III are potentially unnerving, particularly to industry veterans who have enjoyed an extensive period of prosperous stability.

Unfortunately, the lack of job security has become increasingly evident. Previously well-defined career paths are now less predictable. Past successes are no longer a guarantee of future employment. As management teams at every company aim to cut expenditures and produce a higher rate of return on their investors' capital, employees will be judged more stringently by their ability to contribute to the enterprises' future success.

Put simply, industry professionals no longer have the luxury of assuming that a job well done, regardless of its contribution to company profitability, will necessarily lead to advancement up the company ladder. Instead, people who work in the pharmaceutical industry must be more realistic about the "bottom line" approach employers will use in evaluating jobs and must take a more active role in planning their careers.

Career planning and retirement planning are similar: Successful outcomes only occur when employees take charge of their own career planning

Step 1: Taking Responsibility for Your Career Planning

In at least one way career planning in the pharmaceutical industry is now similar to retirement planning. In both cases, successful outcomes can only occur if one takes personal responsibility.

For many years, large U.S. companies provided their employees with generous pensions when they retired, allowing employees to rely on their employers for their long-term financial well-being.

Today most companies offer 401(k) plans in lieu of pensions. While companies regularly match employee contributions, it is up to the employee to decide both how much of his or her salary to contribute (up to certain caps) and how to invest his or her portion of the plan's money. It is important to note that the amount of money the employee will ultimately get from the plan at retirement depends on the performance of his or her investment choices.

Just as a 401(k) plan forces individuals to be responsible for their own retirement planning, the changes sweeping through the pharmaceutical industry require that employees take charge of their own career planning. Employers are facing so many challenges that it is simply unrealistic to expect that they will be able, much less willing, to ensure that all of their employees have the security of well-paying, long-term careers. Consequently, industry professionals should develop their own strategies for taking advantage of their individual human capital.

This type of career planning is a very personal activity that involves many variables and can be quite complex. Each individual has a unique set of goals, abilities and preferred working environments. Each person must also decide where they want to live, how they want to raise their children and what type of balance they want to strike in their lives between work and play. Working through all of these issues requires many – often difficult – decisions, each of which will have a long-term impact on the careers and lives of the people involved.

Consequently, there is no “one-size-fits-all” career planning strategy. Instead, there are several issues to consider in the career planning process. A non-inclusive list of these questions would include:

- In which part of the industry and in what kind of role do I want to work?
- What opportunities are realistic for me to pursue given my current financial resources?
- What are the potential costs and risks involved in remaining in my current job and/or moving to a new one?
- What skills and expertise do I need? How do I brand myself so that I can be in a position to take advantage of different opportunities?

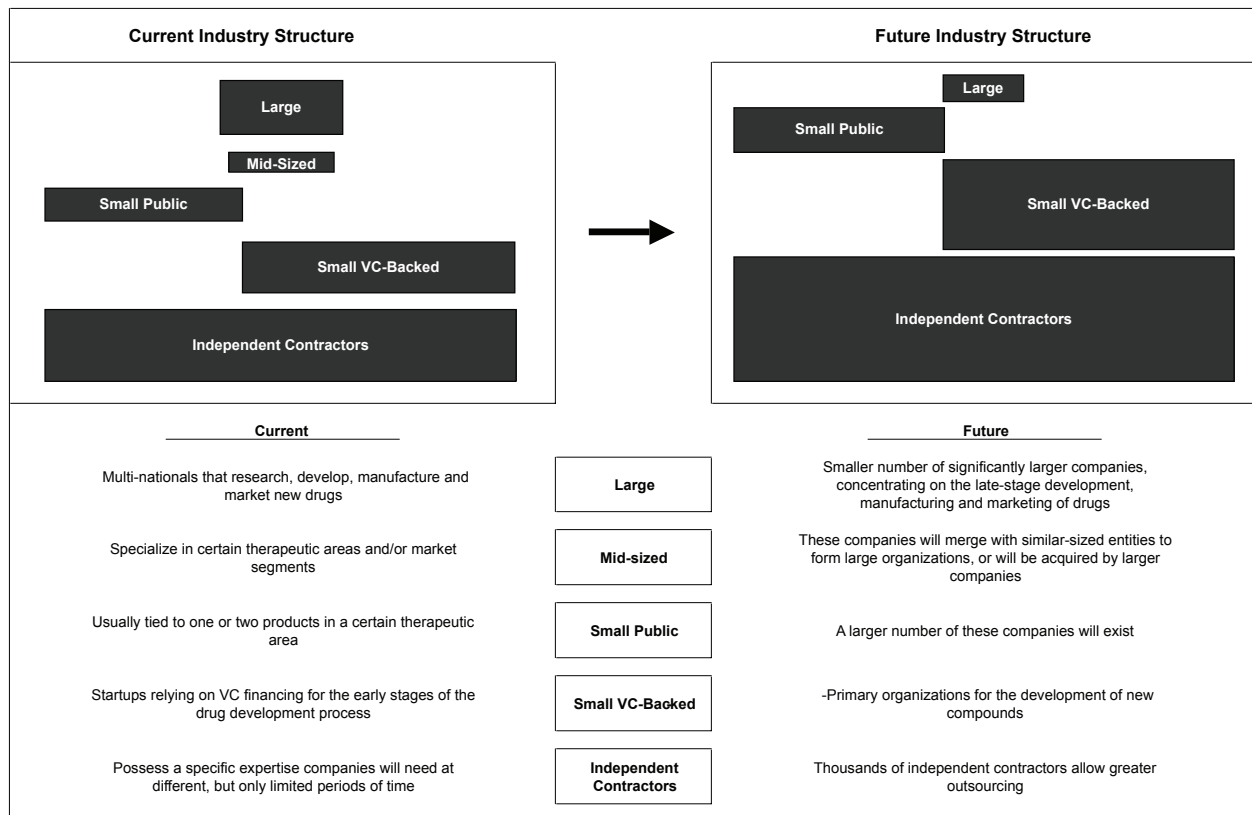
Step 2: Assessing the Industry's Future Structure and Your Tolerance for Risk

1. The Shifting Structure of the Pharmaceutical Industry

From a top-down perspective, the pharmaceutical industry today is similar to the structure shown on the left side of Exhibit 4.1. It is a relatively concentrated industry with a small number of very large corporations, several mid-sized companies, and thousands of small enterprises. The small enterprises generally can be divided into two groups: small/public and venture capital-backed/private. Additionally, there are also thousands of independent contractors throughout the industry.

Exhibit 4.1

Current Industry Structure and Future Industry Structure



Any function that can be done more cost-efficiently outside of the organization will be outsourced

We believe that over time this structure will evolve into one more like the right side of Exhibit 4.1. There will be fewer large companies and the mid-sized ones will either become much bigger or will be acquired by the larger ones. There will also be thousands of new enterprises and independent contractors. In fact, many of the industry's new jobs – in particular, those positions that will replace those lost as larger companies rationalize themselves – will be with smaller companies and as independent contractors.

Much of the growth in the numbers of small companies and independent contractors in the future will result from pharmaceutical companies embracing outsourcing on a much grander scale. As we discussed earlier in Chapter II, any function – human resources, marketing, manufacturing, etc. – that can be done more cost-efficiently outside of the organization will be outsourced.

As pharmaceutical companies rationalize their operations, they will narrow the functions that they do in-house to those that they do well and with which they are able to add the most value and rely on third parties to perform the remainder.

2. Cultures Vary by Size of Enterprise

An important step in any individual's career planning process is determining which type of corporate culture offers the best personality fit for the employee. As a general rule, professionals in the pharmaceutical industry can expect corporate cultures of the various industry players to vary according to the size of the enterprise.

An Evolving Culture at Large Companies

Notwithstanding the changes discussed in this paper, large companies will continue to offer excellent long-term careers in the pharmaceutical industry. After reengineering their business models, they will be much stronger and more profitable companies. They will also provide opportunities to live and work abroad and their best people will continue to be paid very well.

At the same time, however, the cultures of large pharmaceutical companies will change as their business models evolve. These organizations will have to be more Machiavellian in the future in determining who to retain as employees and who to let go. As different patents expire on the products that a company has in a particular treatment area, many of the individuals who helped develop and bring these drugs to market will no longer be needed by the organization.

Big pharmaceutical companies will have different working environments and cultures in the future

As the ranks of the large pharmaceutical companies further consolidate, the importance and power of their marketing and distribution systems will increase. Although many new treatments will be developed by smaller companies, these organizations will have to partner with large pharmaceutical companies if they want to get their drugs into the hands of consumers around the world. Thus, the cultures of these organizations will also change, deemphasizing the creation of new treatments and instead focusing on their roles as marketing and sales enterprises.

Additionally, because these organizations need products to offset the revenues they will lose from the expiration of patents on many of their highest revenue medications, their priority will be finding ways to more quickly commercialize new treatments. Thus, instead of taking a long-term, patient approach to

the research and development process, the cultures of large pharmaceutical companies will instead become obsessed with near-term results, trying to maximize shareholder return by developing and commercializing new products as quickly and efficiently as possible.

Survival is the Focus of Small Companies

Moving from a large company to a small one is often a culture shock

As much as the cultures and working environments of large companies are changing, this shift is minimal compared to the culture shock that awaits many individuals who have spent their entire careers as part of a large organization when they move to a smaller company or go out on their own as an independent contractor.

People who work at large companies with billions of dollars in annual revenues have little need to worry on a day-to-day basis about whether their company will exist tomorrow. In contrast, the operating culture of most small companies centers on the concept of survival. They typically have a limited range of products, sometimes just one or two that are still in some early stage of development, and if these products do not become commercially viable treatments or diagnostics, the business could implode.

Smaller companies also have extremely limited resources. Consequently, they carefully fill each position with individuals who have a depth of capability and experience in an area of expertise. These smaller organizations might also require that these people handle virtually all of the functions associated with a particular post.

These firms are also usually less hierarchical than their larger counterparts. This informality is the result of a dependence on every person's ability in the organization to execute his or her responsibilities and makes the loss of a single researcher or manager intolerably disruptive. Thus, their cultures often have little time or patience for formality.

Working at a smaller company is often professionally and emotionally all-consuming

It is important to emphasize, however, that this informality should not be confused with a lack of intensity. Rather, working at a smaller biotechnology or pharmaceutical company is often professionally and emotionally all-consuming. The workday never ends and everyone in the company is under constant pressure to perform.

Additionally, smaller, venture-capital funded companies must regularly (and in some cases, constantly) raise capital to fund future operations. Their backers intentionally limit exposure to risk by providing only enough funding for the next phase of research and development. When small companies stumble, they find that it is next to impossible to raise the additional capital necessary to survive.

Further, small companies typically seek out employees with different skill sets than those recruited by large companies. Small firms are focused primarily on successfully completing the next phase of developing a product so that they can raise the additional capital necessary to survive. With such a narrow focus, small firms seek experts who are adept at solving particular problems rather than hiring individuals with broad experiences and general skills.

It is likewise important to understand the perspective of the venture capitalists whose funding is the lifeblood of these organizations. These firms invest in

Pharmaceutical company managers have little credibility with venture capitalists unless they have “personally made them millions of dollars”

multiple companies with the expectation that a majority will fail. Their few successes, however, are expected to generate astronomical returns that more than offset their losses. Consequently, a key element in their strategy is quickly determining which investments are most likely to fail and then cutting their losses as quickly as possible. It came as no surprise, then, that one executive recruiter indicated to us that working with venture capitalists requires the “skin of a rhinoceros.”

In terms of selecting management for the companies in which they invest, venture capitalists often have a jaded view of individuals who have been successful managers at large pharmaceutical companies. From the venture capitalists’ perspective, much of the experience of working at a large pharmaceutical company is not transferable to a smaller organization because the roles of management at each are so different.

Large company managers spend their time overseeing multiple, complex projects involving large numbers of people and resources. Small company managers, conversely, typically spend their time trying to get a single product far enough through the development process so that either a large corporation will want to license it or possibly even buy the company or so that the company will have sufficient credibility with institutional investors so that it can complete a successful public offering. Additionally, the senior managers of small companies spend the preponderance of their time raising capital so that the company can survive past its current phase of development. Consequently (and, as described to us by several biotech company executives) managers moving from big pharmaceutical companies to smaller entities have little credibility with venture capitalists until “they have personally made them millions of dollars.”

Finally, in considering a shift to a small company, employees of large pharmaceutical companies should not expect to spend the remainder of their careers with a single small company. While it is somewhat unusual for an individual to have worked for many different large organizations, frequent job changes are somewhat customary for those individuals who work for small companies. They typically change companies when their employer is sold, its product is licensed to a larger organization, or, more commonly, once their value-added function is no longer essential to the enterprise’s near-term goals.

Working as an Independent Contractor is Another World

With independent contractors, the individual is the business

As different as the cultures of large and small companies may be, independent contractors, by comparison, function in an almost parallel universe. Independent contractors are self-employed individuals who have a particular expertise that companies may need from time to time – but primarily for limited engagements. Successful independent contractors with high-demand expertise typically contract with several different organizations over time and have the potential to make far more money than if they had worked for only one employer.

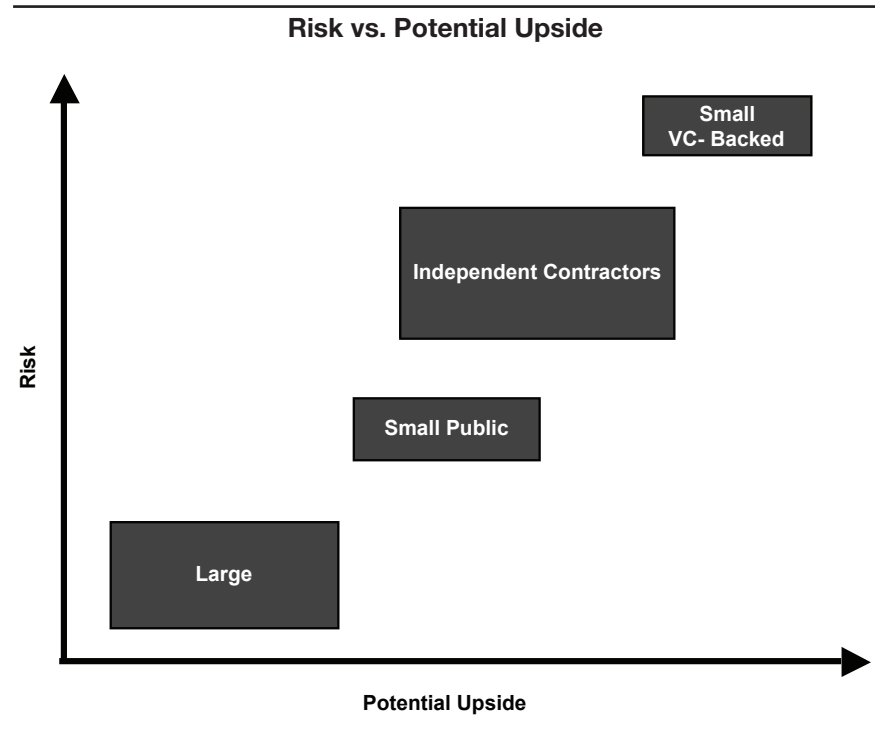
The challenge of being an independent contractor is that the individual is the business. Instead of working as part of a large group with a broad staff for support, independent contractors, for the most part, must function on their own. They move from project to project, continually foraging for future consulting opportunities as they are engaged by any particular company only for so long as they are needed.

In one sense, the culture of working as an independent contractor is liberating. There are no office politics. They can set their own hours. They can live where they choose. At the same time, however, there is no other expertise in the organization to lean on and independent contractors do not have the social benefits of being part of a larger organization trying to accomplish something.

3. The Risk vs. Reward Calculus

While the corporate culture and working environment of potential employers are important factors to consider in career planning, understanding the risk involved in each employment opportunity as well as one's ability to bear risk is paramount. All career choices involve some degree of risk, whether remaining at a current employer, joining a new company, or going it alone as an independent contractor.

Exhibit 4.2



One way of thinking about this issue is to compare the risk versus the potential reward of different career choices. As shown in Exhibit 4.2, the greatest potential to make large amounts of money typically resides in smaller companies. A large portion of the compensation paid to employees of these organizations is in stock and stock options. Should the company succeed, the stock is often extremely valuable.

Everyone in the industry knows of someone who joined a start-up and made millions of dollars. What is often not discussed, however, is the risk that the individual took in pursuing this type of career opportunity.

As described earlier, about only one in five venture-backed biopharmaceutical start-ups succeed. This means that, for every success story, there are

Large company risk is going up while potential upside is declining

four failures. And when small companies fail their employees typically find themselves holding worthless equity while faced with the prospect of needing to find a new job.

To be sure, there are varying degrees of risk among smaller companies and far less risk at mid-sized firms. Small organizations that have been able to go public typically are larger than venture-backed enterprises and are much further along in their development. Working at mid-sized firms involves even less risk as they are fairly big companies.

The potential upside to new employees at publicly-traded, smaller companies, however, is substantially less than for those who joined the ventures in their more volatile, privately-held, venture-backed stages.

Risk/Reward Ratio at Big Companies Has Changed

Notably, over the last decade, the risk of working at larger pharmaceutical companies has gone up while the potential remuneration has gone down. When the industry was producing blockbuster drug after blockbuster drug, job security at these companies was almost a certainty. Thus, those individuals who joined these companies in the 1980s received stock options and stock grants that, in many cases, are worth millions of dollars today.

Hence, working for a big pharmaceutical company was for many years, the best of both worlds: one took very little risk and still had the potential to make large amounts of money.

The forces sweeping through the pharmaceutical industry have changed this model dramatically. While large pharmaceutical companies still include stock (and sometimes stock options) in the compensation packages that they pay many of their key people, the value that these individuals will likely realize is far less than in the past. At the same time, job security at large pharmaceutical companies has dropped significantly and will likely continue to decline in the future.

An ability to bear risk is the dominating factor in determining most career choices

To be sure, this change in the risk/reward ratio for working at a large pharmaceutical company is not abnormal. Most jobs in most industries are compensated based on the level of risk involved. Working at a large pharmaceutical company still involves far less risk than working for a smaller company or a start-up.

Conversely, what was unusual about working for a large pharmaceutical company 20 years ago was that an employee could receive the benefits and security of working for a large company while still building substantial wealth. Thus, what is happening now to the risk/reward ratio of working for a large pharmaceutical company is more of a migration to the mean than an aberration.

Ability to Bear Risk Limits Range of Potential Career Options

This issue of risk – and one’s ability to bear it – often becomes a dominating factor when making career choices. The appeal of working for a start-up is obvious: leave a big corporate job, join a start-up, and then make millions

Everyone in the industry must manage both their careers and their wealth

of dollars from appreciated stock options. The flexibility and the be-your-own-boss aspects of the independent contractor route have a similarly strong appeal. In reality, however, neither choice is realistic for many people because they simply lack the financial resources necessary to maintain an acceptable lifestyle should their career bet not succeed.

The issue of risk is also an important issue for even those people who remain at large companies because the pharmaceutical industry is shifting from one marked by a very paternalistic employer – employee relationship to one in which each individual is responsible for his or her own financial well-being. Consequently, everyone in the industry now has two jobs: they must manage their careers and they must manage their wealth. How well they manage their wealth will be a major determinant in the range of career choices they can pursue.

The ability to bear risk, however, is not a linear function for many people in the pharmaceutical industry. Rather, it is somewhat binary, tied to the ability to indefinitely fund an acceptable lifestyle.

In other words, most individuals are reluctant to make significant career changes that involve more risk until they are first sure that they will still be able to pay all of their bills, send their children to college, pay for their retirement, etc., should the career move prove to be a mistake. At the same time, once they are confident that their resources are sufficient to support their lifestyle through retirement, these same individuals will often seek out much riskier opportunities with far greater upside potential.

Step 3: Evaluating Your Financial Resources and the Economic Impact of a Career Change

Because people who work in the pharmaceutical industry typically have a wide variety of investment assets, it can be difficult to gauge the exact value of what they own in addition to what level of lifestyle those assets will support. For example, a senior manager who has worked for a pharmaceutical company for many years will often have many different financial assets. These might include: numerous sets of stock options with different strike prices and vesting dates, company stock acquired from different restricted stock grants and/or purchased through the company's employee stock purchase plans, a defined benefit pension plan benefit (i.e., traditional pension), and non-qualified deferred compensation.

Determining one's resources is an extremely complicated exercise

Additionally, senior managers will often own mutual funds, as well as individual stocks and bonds purchased through their company's 401(k) plan or with savings using after-tax dollars. These high-level executives typically also have material real estate investments in the form of a primary residence and, oftentimes, a vacation home too.

With so many different types of assets, determining one's resources is a complicated exercise. It is an even more complex exercise, however, when one must include the effect of taxes in this analysis. Each of the assets listed above may be subject to different tax treatments. Further complicating matters, each of these assets will likely differ in how they may appreciate over time, making it even more difficult to predict one's future asset levels.

As if all of this were not enough, these projections of future asset values must also be considered in relationship to the individual's future obligations and

expenses to determine what level of lifestyle they will sustain. And because of the material, long-term effect of inflation, the amount of money needed in the future to maintain a certain lifestyle will not remain constant over time.

Exhibit 4.3

Example of Pharmaceutical Executive's Portfolio

Assets		
Taxable Savings Account		
Employer Stock	\$	300,000
Other Pharmaceutical Company Stock	\$	50,000
Large Cap Mutual Funds	\$	50,000
Cash	\$	50,000
401K		
Employer Stock	\$	450,000
Large Cap Mutual Funds	\$	100,000
Small Cap Mutual Funds	\$	50,000
Deferred Compensation		
Employer Stock	\$	150,000
Large Cap Mutual Funds	\$	150,000
IRA		
Large Cap Mutual Funds	\$	50,000
Small Cap Mutual Funds	\$	50,000
Stock Options		
Employer Stock (Current Value)	\$	550,000
Total	\$	2,000,000

Determining Your Financial Situation

Shown in Exhibit 4.3 is a portfolio that is typical of many pharmaceutical executives. This individual has spent his or her entire career with a single employer and most of this person's net worth is invested in one form or another in that company's stock. Determining the executive's financial situation – and thus, the career options he or she can potentially consider – requires an understanding of what the portfolio is worth today and its likely future value. The objective is to compare those amounts with the level of funding necessary to support this person's future lifestyle and determine whether there will be sufficient assets to meet those long-term cash flow needs.

For purposes of this example, assume that the individual is 55 years old and holds investments worth \$2 million. Over time, if the portfolio appreciates at a rate similar to that of the expected returns from a typical diversified portfolio – that is, one with 30% invested in U.S. large company stocks, 5% in U.S. small company stocks, 20% in international and emerging markets stocks, 25% in bonds and 20% in alternative investments – this portfolio would be worth almost \$5 million in 20 years.

The next step in determining one's financial situation is to determine how much - in terms of after-tax dollars – this individual will need every year to support an acceptable lifestyle. Assume that he or she plans to work for 10 more years and currently spends about \$150,000 per year after taxes. When considering the effect of inflation, in 20 years this person will need more than \$270,000 plus taxes per year to maintain a similar lifestyle and this amount will continue to increase with inflation each year thereafter.

The good news is that with a \$5 million portfolio in 20 years, it is highly likely that this individual could maintain his or her lifestyle to age 95. Although doing so would involve initially consuming 5.4% of his or her assets after taxes each year, these remaining assets would be invested and even with modest returns would appreciate sufficiently so that the individual could maintain his or her lifestyle.

Managing tax risk is essential to how much value one retains

It is important to note, however, that this example is overly simplistic and a bit misleading because determining the value of one's assets and the funds necessary to sustain a certain lifestyle is a much more complex exercise. For example:

- The tax treatment for each of the assets is different, and is tied to how and when the funds are used or the assets are sold.
- Investments such as stock options have finite lives and the timing of their exercise likewise significantly affects the value achieved.
- The tax-deferred assets (401(k), IRA, deferred compensation, etc.) must be withdrawn no later than certain points in time or the holder incurs substantial tax penalties. The strategies for withdrawing them – and the timing involved – can significantly affect the value one retains.
- This individual must pay taxes on all gains recognized each year on his or her after-tax investments. However, certain types of investments (such as index funds) typically realize very few gains each year. Consequently, an investor can boost his or her after-tax returns by locating certain assets in after-tax savings accounts and others in tax-deferred accounts.
- The actual calculus for determining how much one will need to support a particular lifestyle involves many variables, including:
 - how long someone will work and what they will be paid;
 - any likely large expenditures (e.g., vacation home purchase, children's weddings or college) that would force this person to consume more assets in a particular year;
 - the out-of-pocket amounts the individual will have to pay for health care as he or she ages and any potential unexpected costs such as those related to a nursing home for one's parents, spouse or siblings;
 - the timing of investment returns. For example, should a portfolio perform poorly in the early years of one's retirement it might not be able to maintain a desired lifestyle throughout retirement.

Many industry participants have the preponderance of their personal assets invested in the industry

Most importantly (and as we will discuss later in greater detail), nearly three quarters of this individual's portfolio is invested in the stock or stock options of his or her employer. For purposes of this example we assumed that it would generate the same return over time as a much more diversified portfolio which is an optimistic assumption at best.

1. Evaluating Your Asset Allocation and the Concentration Risk Borne by Many in the Pharmaceutical Industry

An essential element of determining the amount of resources necessary to maintain a particular lifestyle also involves an understanding of how the risks in a pharmaceutical employee's investment portfolio may correlate with those in his or her career. Many industry veterans have the preponderance of their investments concentrated in pharmaceutical and biotech firms or in other assets effectively tied to the performance of such companies. Additionally, their most valuable asset – their ability to earn a living – is also tied to the success of the industry.

A high concentration of risk creates an exposure to a single, sudden event that could wipe out much of one's wealth

From any rational investment perspective, such an asset allocation is extremely risky because only one or two events – e.g., a company is hit with a massive liability lawsuit because of unintended effects from one of its blockbuster drugs, the government changes the prices it is willing to pay for certain drugs, etc. – could simultaneously and dramatically lower the share prices of many companies within the industry.

Vioxx is an example of this type of fallout. In 2004, Merck withdrew Vioxx from the market because of an increased risk of heart attack and stroke to patients using the drug. Almost immediately, the company's stock price began to collapse, falling more than 42% in the 29 trading days following the announcement.

As discouraging as any such loss must have been for a holder of large amounts of Merck stock, it was far worse for Merck employees who had not diversified their assets. Diversification is critical to reducing risk, as shown in Exhibit 4.4.

Exhibit 4.4

Although Merck Stock has Recovered, Investors Holding it Have Foregone Substantial Returns

Effect of Vioxx			
	MRK (cumulative return)	Broad Market (S&P 500 Index) (cumulative return)	Percent Difference
29 Trading Days Following Event (9/29/2004 to 11/09/2004)	-42.31%	4.63%	47%
One Year Following Event (9/29/2004 to 09/29/2005)	-36.23%	12.13%	48%
Two Years Following Event (9/29/2004 to 09/29/2006)	2.24%	24.34%	22%
Three Years Following Event (9/29/2004 to 09/29/2007)	30.25%	44.78%	15%

Vioxx was removed from the market on 9/29/2004.
Source: Bloomberg

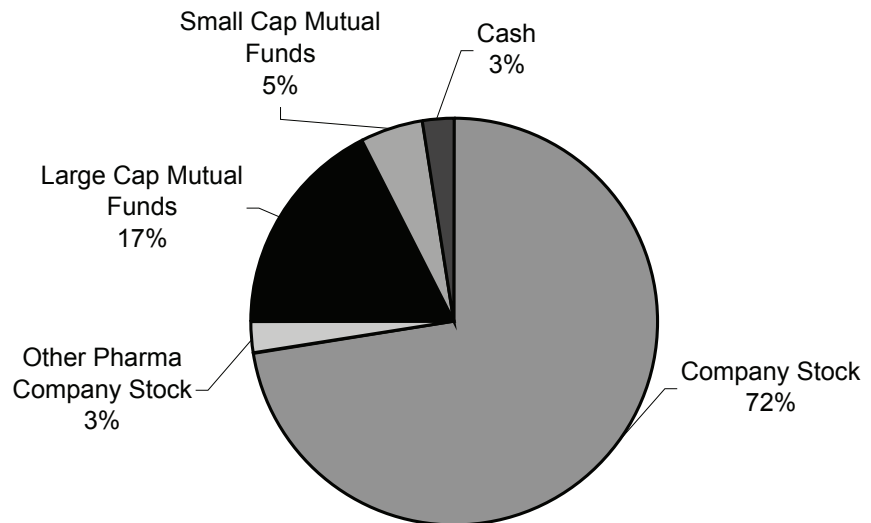
More importantly, for many of these individuals, there was a much greater, albeit, hidden, cost: the career options that they could now consider pursuing were much narrower than in the past. They no longer had the resources necessary to indefinitely sustain their current lifestyles and thus their ability to bear risk was much less than before the Vioxx incident.

Further, while it may be obvious to industry participants that their personal wealth is often fairly concentrated in one company, the risk of over-concentration is often even greater than they realize. Many people who work in the pharmaceutical industry are married to other industry participants. They also have a substantial share of their assets invested in a home in a part of the country (such as New Jersey) whose real estate values can be significantly affected by changes in the industry. In a sense, these individuals have unintentionally “doubled down” and “tripled down” their bets on one

industry. A single adverse event could wipe out a large part of their wealth, not to mention their ability to take risk.

Exhibit 4.5

Asset Allocation of Typical Pharmaceutical Executive



The Benefits of a Diversified vs. Concentrated Portfolio

One of the largest risks faced by many people who work in the pharmaceutical industry is that the price of their employer's stock suddenly drops. Although they are affluent, the preponderance of their assets is concentrated in their company's stock. Thus, a single event that causes their employer's stock to fall precipitously could wipe out much of their wealth.

Consider the example of the industry participant discussed earlier. As shown in Exhibit 4.5, 72% of the individual's assets are invested in his or her employer's stock. For purposes of this example, assume that his or her employer had been Merck and it was just prior to the company withdrawing Vioxx from the market.

During the 29 trading days that followed its withdrawal, Merck's stock price dove more than 42%. In this example, the individual's value in company stock would have lost nearly \$380,000. More problematic, depending upon their strike price, the options in this portfolio could have lost most, if not all of their value.

In this instance, if the options lost about 75% of their value or \$400,000, the executive's net worth will have fallen \$780,000. Further, the money this person lost on company stock and options could have been invested in something else. Consequently, at the same point in the future when this person's assets finally again equal \$2 million, the value of his or her portfolio could have otherwise been much greater.

It was not until two years after Vioxx was withdrawn that Merck's stock regained lost ground, reaching its pre-event price on Oct. 20, 2006. As shown in Exhibit 4.4, had this individual not been so concentrated in company stock and had instead invested in the Standard & Poors 500 index, the value of his or her assets would have instead increased by more than 24%.

It is important to emphasize, however, that diversifying a portfolio does not require that one sell all of his or her company stock. Rather, simply reducing one's exposure to a company's stock by 30% to 40% can often mitigate much of this risk. Additionally, any diversification strategy must consider numerous factors, including the weighting of the stock in the portfolio, tax treatment and the correlation of its returns with other assets owned by the individual.

Departing an employer (whether voluntarily or involuntarily) can be costly because unvested options and stock are typically forfeited

Forced exercise of options prevents an individual from benefiting from future appreciation in the stock and the deferral of taxes

2. Leaving an Employer Will Often Involve Hidden Costs

While it is essential to understand and measure one's resources and what they imply in terms of an ability to bear risk, there is another less obvious issue that also affects which choices a pharmaceutical professional may consider: the potential hidden costs of switching employers.

a) Costs Related to Stock Options

The stock options or restricted stock grants that employees receive as part of their compensation typically have vesting requirements. Any unvested options and stock are typically forfeited should the employee leave the company.

In addition, when individuals separate from their employer, most option plans provide that any vested options not exercised generally within 90 days following termination of employment are automatically forfeited.

There are two potential costs arising from this use-or-lose requirement. First, the employee may own options that are vested but the company's stock price at the time of departure is below that of the options' exercise price. Consequently, unlike if the employee had remained at the company and its stock appreciated in the future, the holder would receive no value for securities.

Second, for those options with current value, their forced exercise prevents the employee from realizing any benefits from the stock price appreciating over the remaining term of the grant and deferring the payment of taxes on their gains. A primary benefit of being granted options is that they allow one to participate in the future appreciation of a company's stock without having to invest capital prior to exercise. Because departing employees must exercise or forfeit their options, they now must invest their capital in the company's stock (and thus, place it at risk) if they want to continue to participate in its appreciation. Additionally, they must immediately pay taxes – at their highest marginal income tax rate – on the difference between the strike price of the option and the current price of the company's stock.

The forced exercise of options also creates additional risk for individuals switching jobs who elect not to sell the underlying stock. For example, the capital required to purchase the stock could instead have been used for other investment opportunities. These individuals might also now own a large amount of stock in one company and, as described above, such a concentration exposes them to a great deal of risk. It also creates a tax risk tied to the difference between how the government treats income and capital gains.

Exhibit 4.6

Stock Option Exercise and Taxes

Assumptions		
Number of Shares	1,000	
Grant Price	\$40	
Exercise Price	\$80	
Ordinary Tax Rate	40%	
At Exercise		
Market Value of Stock (1,000 x \$80)	\$80,000	} Ordinary Income Tax on Spread (((\$80,000 - \$40,000) x 40% = \$16,000)
Grant Price (1,000 x \$40)	\$40,000	
Amount Required to Purchase Stock = \$40,000		
Amount of Tax due at Exercise = \$16,000		
If Stock Drops to \$40.00 and Sold After Exercise		
Initial Market Value of Stock (1,000 x \$80)	\$80,000	} Capital Loss (\$80,000 - \$40,000 = \$40,000)
Market Value of Stock @ Sale (1,000 x \$40)	\$40,000	
Value of Investment at Sale = \$40,000		

Maximum capital loss that can be used per year \$3,000.

Tax Risks Associated with Exercising Stock Options

Assume an individual owns stock options with a strike price of \$40 per share and decides to exercise them when the company's stock is at \$80 per share. He or she also decides keep the stock as an investment.

As shown above, this person would have to pay income taxes at ordinary rates on the spread between the strike price and the share price or \$40 for each option exercised. Assuming a marginal tax rate of 40%, the taxes would total \$16 per option.

Now assume that the company subsequently runs into difficulties and its stock price falls later that year to \$40. This person now would own stock at the same price at which it was purchased through the exercise of options and thus, would not have made any money. However, taxes would still be due even if this person decided to sell the stock.

As shown above, selling the stock would generate a capital loss of \$40. But because capital gains are taxed at lower marginal rates than ordinary income, and the fact that capital losses can only be used to offset capital gains, the capital loss that the individual would generate from selling the stock would not fully offset the taxes owed on the initial exercise of the options. Assuming a marginal capital gains rate of 20%, the sale of the stock could generate a tax benefit of only \$8 at best, and that's assuming the individual actually generated capital gains in that same tax year.

So consider the unenviable circumstances that this person is now caught in. The stock option exercise made no money. At the same, this individual owes the government a minimum of \$8 in taxes for each option exercised.

Many people who worked for technology companies in the late 1990s found themselves caught in this tax trap when the NASDAQ collapsed in 2000. Much of their compensation had been in stock options but because the market had consistently gone up for so long, most elected to hold onto the stock after exercising the options. When the bubble burst, several of them wound up in bankruptcy.

Deferred compensation plans allow one to quickly build up wealth

b) Costs Related to Non-Qualified Deferred Compensation Plans

Another less obvious cost to switching jobs involves non-qualified deferred compensation plans. There are two types of deferred compensation plans: qualified and non-qualified. Qualified plans include 401(k) plans, profit sharing, and other retirement plans. At least one of these plans is offered by most employers. An employee is always fully vested in his or her 401(k) deferrals and an individual generally has to be employed for five years to fully accrue the company’s matching contributions. Also, if an employee decides to leave his or her employer and take a distribution from the retirement plan, it can be rolled over into an IRA to maintain its tax-deferred status. However, if the employee is unvested in any of the employer-matching contributions, those contributions will be forfeited if and when the employee leaves.

Non-qualified deferred compensation plans, on the other hand, are usually utilized to attract and retain higher paid executives, individuals who are already making the maximum contribution allowed to a qualified retirement plan. Participating in a deferred compensation program is a great way to build wealth because of the tax deferral participants receive. The compensation received through the program is not taxed until it is withdrawn from the plan. In the interim, its value compounds tax-free, making the tax deferral benefit extremely valuable.

Typically, a non-qualified deferred compensation plan participant will make elections for the following year’s salary and/or bonus in October or November of each year, deciding on the amount to defer and how to receive the income. The income must be paid out within 15 years of retirement or termination.

Exhibit 4.7

Deferring Large Amounts of Compensation Can Quickly Build Wealth

	With Deferred Compensation Plan
Salary & Bonus	\$250,000
Taxes @ 40%	-
After-Tax Amount Invested	\$250,000
Value of 10 Years of Investments	\$3,621,641

Assumes an 8% Pre-Tax Annual Growth Rate on Investments

Deferred Compensation Can Greatly Affect Wealth Accumulation

A wealth building strategy that some pharmaceutical executives can utilize when changing jobs involves being paid entirely in deferred compensation. Such an approach would allow the executive to defer paying taxes on all of the compensation he or she would be paid. These amounts would instead be invested in the new employer's non-qualified deferred compensation plan and would compound on a tax-deferred basis until withdrawn.

Clearly such a strategy would only be appropriate for those individuals who already have sufficient resources to indefinitely fund an acceptable lifestyle and who have adequate liquidity to cover their living expenses for many years. This approach should also only be considered if the new employer is a financially strong enterprise. However, the combined benefits of deferring payment of taxes initially on compensation received and the ability to compound these investments on a tax-deferred basis can quickly build great wealth.

For example, consider a 55-year-old pharmaceutical executive who plans to work for 10 additional years and earns \$250,000 per year. One savings strategy this individual might use to build wealth is to invest 100% of his or her after-tax earnings each year. Assuming this individual has a marginal income tax rate of 40%, he or she would invest \$150,000 per year into an after-tax savings account.

Additionally, each year taxes would be owed on any income and/or capital gains generated in the account. In contrast, the amounts in a deferred compensation plan compound tax-free until withdrawn.

Assume that the executive's investments compound annually at 6% after-tax (roughly 8% pre-tax) per year. If the executive invested 100% of the after-tax earnings for each of the next 10 years, he or she would have accumulated \$1,977,119.

If the executive had instead invested the same funds into the new employer's non-qualified deferred compensation plan, the entire compensation would be invested each year and would compound at pre-tax levels. Thus, with the deferred compensation plan, the executive would have accumulated \$3,621,641 or \$1,644,522 more, as shown in Exhibit 4.7.

It is important to note, however, the amounts in both accounts are subject to additional taxes. The after-tax amounts that the executive will ultimately retain are tied to the timing of withdrawals from the deferred compensation plan and the sale of assets in the after-tax savings account.

Leaving an employer could require one to forfeit post-retirement health benefits

What is potentially problematic in switching jobs is that each year, an individual must pre-determine the schedule according to which they will draw money out of the plan. As long as they remain employees of the company and participants in the plan, they can change this schedule. Once they depart, however, they are unable to alter their withdrawal plan, regardless of how their circumstances might change in the future. The loss of this right to alter their distribution schedule is an extremely important part of tax planning and having to forego it by leaving the company can potentially be very costly at a later date.

c) Costs Related to Value of Post-Retirement Health Care Benefits

A third potential hidden cost of switching jobs is that many large pharmaceutical companies provide their retirees with post-retirement health benefits. For many retirees now participating in such programs, this benefit is worth as much as \$1,500 per month. Under such programs, they typically receive full health insurance coverage until they are 65. After turning 65, these individuals receive insurance that supplements Medicare so that their out-of-pocket costs for health care are minimal.

Taking a lump-sum distribution from a traditional pension plan can be potentially beneficial, albeit a little riskier

Quantifying the potential value of such insurance in the future is difficult for several reasons. It only is provided after the employee retires and the closer that is to age 65, the less value a recipient gets from it. Additionally, while many companies offer this benefit, they often reserve the right to change the terms involved. Thus, it is unclear as to how much of the costs each participant will have to bear over time. Finally, many pharmaceutical companies reserve the right to cancel the entire program. As health costs skyrocket and pharmaceutical companies come under increasing pressure to boost profitability, many of these post-retirement health care benefit programs will be significantly scaled back if not completely eliminated.

d) Costs Related to Defined Benefit Pension Programs

A fourth and often complicated aspect of determining the cost of switching jobs involves how the benefits employees receive from their employers defined benefit pension program may change. Long time employees at many large pharmaceutical companies are entitled to a traditional pension that will pay them retirement benefits for the rest of their lives. When employees terminate their employment, companies typically discount these benefits based on factors including age and length of employment.

Leaving one's current employer and being cashed out of its defined benefit pension plan can be financially beneficial. If the pension plan allows a terminating employee to take a lump sum distribution equal to the present value of his or her accrued benefit, that option should usually be exercised. Whether the pension plan is a traditional plan that accrues an annuity benefit payable for life, or the newer type known as a cash balance plan that accrues a form of account balance, the present value or account balance available upon early termination will usually grow at no more than 5% or 6% per year if left in the plan until retirement age. If the employee instead rolls a lump sum distribution into an IRA and invests it in a well-diversified portfolio with equity exposure appropriate for a long-term investment horizon, he or she could hope to earn perhaps 8% per year.

Exhibit 4.8

A Slightly Higher Return Makes a Big Difference

	Pension Plan	Diversified Portfolio
Current Value of Pension Plan	\$1,000,000	\$1,000,000
Average Annual Return	5.00%	8.00%
Value in 10 Years	\$1,628,895	\$2,158,925
Difference	\$530,030	

Different Rates of Return Between Defined Benefit Plan and Diversified Portfolio

The lump sum value of one's accrued benefit under a traditional pension plan or a cash balance pension plan will typically increase at about 5% per year if it isn't cashed out upon early termination. If a terminating employee can do a lump sum rollover into an IRA and adopt a long-term investment horizon, i.e., invest predominantly in equities, the employee should be able to realize a much higher return. Although rates of return vary over time, and the employee will bear the risk of lower returns if he or she rolls over a lump sum, such an approach has historically produced about an 8% annual return.

Although 3% per year may not appear to be a great difference, over a decade or longer, it can be material. For example, if the present value of one's accrued benefit or account balance was \$1 million, that benefit would grow over 10 years to about \$1.63 million assuming a 5% annual rate of return. At an annual return of 8% per year in a rollover IRA, the same benefit would become \$2.16 million.

3) Understanding Risks Involved in Taking a New Job

In addition to understanding the costs that one might incur when leaving a previous employer, it is equally important to identify and understand the risks assumed in taking a new job.

a) Equity vs. Cash Compensation

Working for pharmaceutical or biotech companies effectively involves investing in an employer's stock

The compensation of most senior management in the industry includes an equity component. Whatever value one actually receives from that equity can be more than half of the total potential remuneration paid to employees of large companies and as much as 90% at small ones.

For example, at a large company, a senior manager might receive \$200,000 in salary, a \$50,000 bonus, \$100,000 of restricted stock in the company, and 10,000 stock options. While at first glance it appears that about 28% of this individual's total compensation is in equity in the company, it can be much larger if the company's stock performs well in the future.

More specifically, should the stock appreciate at about 10% annually, the restricted stock would be worth \$133,000 in three years when it would typically vest. If the stock price had been \$50/share, it would now be worth \$66.55/share and the stock options could be exercised for a gain of \$165,500. In only three years time, the percentage of total compensation received in equity would become 54% rather than the originally estimated 28%.

Thus, anybody who elects to take a job at a large pharmaceutical company should analyze the equity compensation component in the same way that a Wall Street stock analyst would. It is important to consider factors such as:

- What do the company's current revenues and product pipeline look like?
- How fast are its earnings likely to grow in the future?
- How has the stock performed in the past and what factors might affect how well it does in the future?
- Is the company a potential takeover target?
- Does it have any major liabilities (e.g., class action lawsuits) that could obliterate its future earnings?

Understanding Small Company Economics is Paramount

Compensation at smaller companies typically includes a much larger stock component, often in the form of options

As essential as it is to understand the strength and prospects of a large employer, it is of even greater importance for someone joining a small company. Compensation for employees of small companies typically includes a relatively small cash component and a relatively large equity component, usually in the form of stock options. Thus, the performance of the equity component of compensation is often the dominating factor in the total remuneration received by an employee at a small company.

The equity performance of the company is particularly important because the value of options – unlike restricted stock – is entirely tied to the level of appreciation above the strike price of the option. Hence, options are great if the company is a success because the holder receives dollar for dollar value tied to appreciation in the firm's share price. However, the options are worthless should a company's stock price decline below the exercise price of the options.

Another way of thinking about this is that, with a small company, an employee is effectively investing a large portion of his or her compensation in a single product. If the product succeeds, it is a great bet. If it does not, it can be expensive.

Analyzing the potential performance of a small company, however, is a much more complex exercise than that for a large pharmaceutical company. Many small companies are privately held and even basic financial information is not in the public domain. Additionally, when evaluating a large company, the objective is to try to forecast the likely profitability of the company in the future. With smaller companies, the goal is instead to try to predict the likelihood that the enterprise will survive. As discussed earlier, most small companies must constantly raise additional capital to fund the next phase of their development. Should they fail to do so, they will likely go out of business.

Analyzing small companies' prospects is much more difficult than with a large one

Thus, as part of the analysis of a job opportunity at a small company, the potential employee must carefully consider how much cash the organization has on hand, how long it can fund its ongoing operations, and the company's prospects for raising additional capital. Since all of these factors are closely tied to the level of progress the company achieves in developing its product, it is likewise essential to closely analyze the treatment or diagnostic test: how far along it is in its development and the likelihood – and potential timing – of the company commercializing it.

Further, some due diligence should be performed on a small company's investors. What does their track record look like? Have they invested in similar companies before? How much control do they have?

While there are hundreds of venture capital firms, their expertise and quality vary greatly. Representatives of organizations that are backing the enterprise will serve on its board. Given the large investment that an employee will effectively make in the company, it is essential to first know whether those individuals setting the strategic direction and selecting the management of the company know what they are doing.

More importantly, the reputation of venture capital firms among their peers likewise varies greatly. Since small companies are regularly raising additional

Wealth creation is not tied to how much one gets paid, but rather how much one gets to keep

capital, it is important that the organization's backers be held in high regard by their peers. In many cases, the perceived quality of the other investors in the enterprise can be the difference between a company completing an additional round of financing or instead filing for bankruptcy.

b) Deferred Compensation and Counterparty Risk

As discussed earlier, participation in a deferred compensation plan is a very tax-effective way to build wealth. All of the money invested into the plan is made in pre-tax dollars and these dollars compound tax-free until a withdrawal is made from the plan.

A less well-known risk of deferred compensation plans, however, is that the money in these plans is technically not the property of the individual plan participant, but is instead only a promise to pay by the company. Thus, if and when an employer winds up in bankruptcy, each of the plan participants becomes a general creditor of the company.

Consequently, for those job opportunities that include deferred compensation, it is also important to evaluate the credit risk of the company. Another way of thinking about this issue is to view it as analogous to lending the company money on an unsecured basis. In the event it fails, the employee is just another creditor trying to recover some of the money he or she loaned the company.

c) Tax Risk

Managing tax risk is essential to managing one's wealth and should be considered when evaluating a new job opportunity. Wealth creation is not tied to how much one gets paid but rather how much one gets to keep. For some taxpayers, the aggregate amount paid to federal, state, and local governments can approach 50% of total income.

There are numerous tax strategies that can be employed as part of taking on a new job. For example, if the new employer possesses robust credit and the employee's long-term financial resources and near-term liquidity are adequate to indefinitely maintain an acceptable lifestyle, an option to consider would be to negotiate with a new employer so that the preponderance of cash compensation is deferred to a later date.

Estate planning is also an important element of tax risk management when taking a new position, in particular for those opportunities that involve significant potential upside. Under current rules, the federal estate tax would disappear in 2010 and then return again in 2011. It is unclear whether Congress will allow that to happen. However, absent new legislation, estates will be taxed using the same \$1 million exemption and 55% marginal rate that applied in 2001.

Several states also have their own death tax on top of the federal rates. For example, in New Jersey, estates may be taxed as much as an additional 15%. Thus, as much as 70% of the portion of an estate in excess of the standard \$1 million exemption might be consumed by taxes.

Family Limited Partnerships and GRATs for Estate Planning

Wealthy families, venture capitalists and private equity managers regularly use vehicles such as family limited partnerships to avoid estate taxes

The key to avoiding these taxes is to plan for them before one has built the wealth that one wants to transfer to heirs. For example, those individuals who are either starting or joining new companies will typically receive a substantial stock option grant. At the time these options are given, their market value is typically quite small. Only if the company succeeds do they become extremely valuable.

One way to avoid estate taxes on the appreciation in the value of stock options is to exercise the options and gift the stock to a family limited partnership. Because the stock was gifted to the partnership when it held little value and because the ownership of the partnership was simultaneously gifted to one's heirs, the value is excluded from the individual's estate and is therefore not subject to estate tax.

Such estate planning structures are commonplace among wealthy families. They are also regularly used by venture capitalists and private equity managers.

Another way to avoid massive estate taxes on the appreciation of stock is a Grantor Retained Annuity Trust. Although the rules governing this type of trust are somewhat complicated, a "GRAT" allows an individual to exclude any appreciation of assets above a pre-defined IRS hurdle rate (which changes over time) from his or her estate, thus avoiding taxation. For example, if the IRS hurdle rate is 5%, any appreciation of the stock above the 5% annual rate over the term of the trust will be removed from the grantor's taxable estate.

Tax Management Critical to Independent Contractors

For those individuals who elect to become independent contractors, taxes play a material role in compensation matters. Independent contractors are small business owners who do not receive any of the benefits typically provided to employees of large companies. However, as owners of their own businesses, independent contractors can take advantage of many of the same tax breaks that big companies receive from providing benefits to their employees.

For example, independent contractors can potentially write-off any and all of the things that they use in their business including a home office, car, travel, etc. They also are able to deduct their health insurance premiums.

Independent contractors can take advantage of many of the same tax breaks available to big companies

More importantly, although they are self-employed, independent contractors are entitled to the same tax benefits from saving for their own retirement as big companies get from providing retirement benefits to their employees. For example, in many cases an independent contractor can create his or her own defined benefit pension plan (a traditional pension that pays benefits from retirement until one dies). With such plans, one can potentially defer paying taxes on more than \$100,000 of income per year, and the amounts in the plan compound tax-free until they are withdrawn. Additionally, one does not have to start withdrawing funds from the plan (and thus can defer paying taxes) until he or she is 70½ years old.

Exhibit 4.9**Retirement Planning: Individual 401(k) and Personal Defined Benefit Plans**

	Individual 401(k)	Individual 401(k) Plus Personal Defined Benefit Plan
Annual Income	\$225,000	\$225,000
Individual 401(k) Plan	\$20,500	\$20,500
Individual Defined Benefit Plan	-	\$100,000
Net Taxable Income	\$229,500	\$129,500
Total Annual Retirement Investment	\$20,500	\$120,500
Value of Retirement Investments after 10 Years	\$296,975	\$1,745,631
Difference	\$1,448,656	

Assumes 8% annual growth rate

Hidden Tax Benefits in Independent Contractor Opportunities

One of the hidden benefits of becoming an independent contractor is that it allows a pharmaceutical professional to save large amounts of money for retirement on a tax-deferred basis. For example, consider a 55-year-old former executive who makes \$225,000 in annual income and would like to work for 10 more years. If this individual worked for another company, he or she would likely be eligible to participate in that organization's 401(k) plan and invest up to \$20,500 per year in pre-tax compensation into retirement savings.

Assume instead that this person becomes an independent contractor. The former executive could still invest \$20,500 per year on a tax-deferred basis into an individual 401(k) plan. In addition, he or she could also establish and fund a personal defined benefit plan. With such a plan, the individual could invest an additional \$100,000 per year on a tax-deferred basis. By doing so, this individual would additionally reduce his or her taxes annually by about \$40,000 per year.

Further, as shown above, assuming the money invested in both the 401(k) and the defined benefit plan compound at 8% per year, the independent contractor could accumulate an additional \$1.45 million for retirement over the next 10 years. These assets could later be rolled over into an IRA where they would continue to grow tax-deferred without interruption until age 70^{1/2}.

d) Departure Risk

With any new job there is always the risk that the new position will not work out. Because the costs in such circumstances can be significant

A “prenuptial agreement” with a new employer is essential to protecting oneself from departure risk

(lost wages, forfeiture of unvested stock or options, limited eligibility to participate in the company’s benefit plans, etc.), it is important to try to mitigate this risk by pre-negotiating a severance package before taking a job.

As part of such a “prenuptial agreement,” companies will often agree to both salary and benefits beyond their normal severance packages for those individuals with skills that are in high demand. Companies may also be willing to accelerate vesting or extend expirations of equity and option grants depending upon the nature of the departure from the organization. Additionally, new employers – in particular if they strongly want an individual to join them – will often agree to structure severance packages in ways that make them more tax-efficient.

Step 4: Figuring Out Who You Are and How to Brand Yourself

1. Athletes vs. Specialists

After determining what career choices are practically feasible given one’s current and long-term financial resources, the costs of leaving a current job, and the risks that come with taking a new job, another essential element of career planning involves determining whether one wants to be a “specialist” - an individual with very narrow, but extremely sophisticated expertise – or an “athlete” – someone who has the ability to play many different roles and to manage and work with many different specialists.

Specialists (i.e., people with invaluable skills, contacts or experience) are essential to companies from time to time but not on a permanent basis. Examples of such expertise include the knowledge and contacts required to get a certain type of compound through different stages of the regulatory approval process, a skill at deciphering certain aspects of the findings from an early phase of a clinical trial, or knowledge about how different payers approach the pricing of a class of drugs.

Individuals who become successful “specialists” will be extraordinarily well-compensated

In the future, most people working in the pharmaceutical industry will be specialists. From a purely economic standpoint, they are a form of contract labor, albeit, in certain instances they may work for only one company for an extended period of time. While specialists are desperately needed at times, once the crisis of the moment has been addressed, their utility to their employer diminishes quickly. In fact, several of the experts that we interviewed argued that anyone that decides to pursue a career as a specialist should design and package their expertise so that if they elected to leave their current employer, their company (and others) would want to hire them back as contract labor.

Individuals who become successful specialists will also be extraordinarily well-compensated over their careers because the demand for them is growing among smaller pharmaceutical companies. These organizations cannot afford to hire on a permanent basis all of the expertise needed to move a new compound through the different stages of development. Instead, they will overpay individuals who will let them “rent” their expertise for only as long as the company needs it.

Two Challenges to Succeeding as a Specialist

In the pharmaceutical industry, there are two major challenges to building a successful career as a specialist. First, while one's expertise must be very unique and specialized, it also must at the same time be broad enough that multiple organizations (or multiple divisions within one big organization) will require it for some period of time.

Second, there is a relatively short lifespan to the uniqueness of any particular expertise. Over time, more people develop the same knowledge or skill, effectively making what was once an extremely high added value into a commodity. Thus, specialists must continually improve and expand their expertise so that it will remain unique and in demand.

Athletes Have Many Roles Over a Career

The alternative to focusing on a narrow specialty is to become an athlete with a broad set of skills that will allow one to fill multiple roles within a company. Successful athletes are those individuals who will fill the senior management positions of pharmaceutical companies.

**Successful “athletes”
will fill the roles of
senior management
positions**

In the pharmaceutical industry, the chief role of athletes is to manage complexity, finding a way to balance all of the parts that must work together (e.g., research and development, marketing and finance) and still produce a sufficient return on shareholders' capital. However, succeeding as an athlete in this industry in the future will be particularly challenging (as compared to other industries) because it will also require a deep technical knowledge of a company's products and research and development processes.

This kind of expertise underlies all of the risks and opportunities of the pharmaceutical business. Without such insight it will be difficult for someone to add value to an organization. Additionally, any athlete who does not have such knowledge will lack credibility with the people he or she must manage.

The Dead Zone

Regardless of whether a pharmaceutical professional decides to pursue a career as an athlete or as a specialist, it is essential to avoid being caught in the middle of these two approaches to career planning. The days of being able to function as a partial expert who can also manage some aspects of the research and development or marketing processes are numbered. Individuals who are neither specialists nor great athletes will quickly become expendable. They will lack the sufficient expertise to add significant value to their employer and, at the same time, will be unqualified to assume greater, more complex responsibilities.

**One can be either
a specialist or an
athlete – but not both**

Because of the forces reshaping its economics, the industry over the next decade simply will no longer have the luxury of employing professional dilettantes. The need to increase productivity will lead companies to pay more for those individuals who have detailed, essential expertise as well as those persons who are capable of managing the extremely complex aspects of their businesses. Most of the remaining positions will be outsourced over time.

What to do if You Get Caught Up in a Wave of Layoffs

As we discussed in earlier, the pharmaceutical industry's process for adapting to its new economic environment will lead many thousands of layoffs including as many as 50,000 upper-middle to senior level executives over the next decade. While such an outcome is less than ideal, the labor and employment attorneys and outplacement specialists whom we interviewed recommended a few ideas that someone caught in such circumstances should consider:

- Employers are particularly interested in having their terminated employees execute a release of claims – that is, they want them to agree to not sue their now former employer. It is the employer's desire for such an agreement that provides the departing employee with bargaining power.
- Severance packages in general today are much less generous than they were in the past. Unlike those in earlier years that paid salary and benefits for as long as three years, most typically include four weeks to six months (or, at the most, 12 months) salary.
- These packages, however, are often negotiable. While it may be difficult to get additional salary, companies are often more flexible on what a former executive will receive in health benefits or altering the terms of the stock option and restricted stock grants by either accelerating their vesting or extending their expiration dates.
- Labor laws vary from state-to-state and generally are designed to protect employees from corporations. Consequently, prior to entering into any negotiations with an employer – much less agreeing to a release of claims – it is important to obtain competent legal advice.

2. Developing a Personal Branding Strategy

An equally important aspect of career planning is the development of a personal brand within the industry. Just as professionals in the pharmaceutical industry can no longer assume that a job well done will automatically lead to advancement along a well-defined career path, they also must have a strategy for making key decision-makers aware of their abilities and expertise.

**Personal brands
make it possible to be
considered for the best
new opportunities**

As part of a branding strategy, it is essential to develop a relationship and reputation with executive recruitment firms. Pharmaceutical companies use their human resource professionals to recruit and fill their college/entry level jobs. However, for senior positions that require substantial experience and expertise, pharmaceutical companies, venture capitalists and other industry players invariably turn to executive recruitment firms.

As part of the branding process, it is important to be receptive to calls from recruiters, even if the opportunity being presented may not represent the "right fit." Recruiters maintain massive databases on professionals within the industry and closely follow the careers of potential future placement candidates. Further, the demand for different types of expertise is cyclical. As one senior executive at a recruitment firm explained, although there is currently immense demand for clinical researchers, 12 months ago, pharmaceutical companies and biotechnology firms alike had great demand for business development executives. Consequently, it is worth establishing a relationship with a recruiter now, even if he or she does not have any ideal opportunities as there will likely be others in the future.

Further, each contact with an executive recruitment firm should be used to help them get to know who you are. In particular, it is essential to ensure that these firms know in detail specific accomplishments and contributions to the development and commercialization of new products. Publications and patents should also be included in the executive recruiter databases.

It is likewise critical that the executive recruiters understand how one's career has evolved and its circumstances. For example, there is currently great demand for those people who have international experience and, more importantly, developed during that phase of their career, an understanding of how business is done in a particular country or region of the world. Additionally, while in the past it may have been somewhat taboo to leave a large pharmaceutical company for a small one and then attempt to return to a large company, small company experience now actually enhances the marketability of an individual.

Be Candid with Executive Recruiters

Keep in mind that these recruiting organizations are staffed by individuals who have had successful careers working at pharmaceutical and biotechnology firms. They understand how these companies work and how products are developed and commercialized. Thus, it is likewise important to be as candid and specific as possible.

One senior executive at a recruitment firm noted that 26 different people recently interviewed from one pharmaceutical company had taken primary credit for the development and commercialization of the same treatment. As this person noted, while each of these individuals had clearly played a role in this drug's development, no one individual could have played as broad a role as each person was claiming. Consequently, each had diminished (as opposed to enhanced) their credibility and marketability.

Additionally, different executive recruitment firms work in the different areas and levels of the biopharmaceutical industry. Just like any other business, there is a great deal of specialization. Additionally, the top firms – such as Russell Reynolds Associates and Korn/Ferry International – typically work with individuals at the vice-president level and higher and, on occasion, at the director level. For those people in the industry who are not this senior, their focus should be on the middle-market and smaller executive recruiters.

Recruiters have worked in the industry and understand how products are developed and commercialized – it is important to be candid with them

Build Relationships with Peers through Professional Organizations

Another component of a personal branding strategy should include participating in professional organizations for one's specialty. By participating in professional organizations, publishing in their journals and attending and speaking at their conferences, one can both expand his or her knowledge of a product category and identify themselves as having a particular expertise in that area. It also allows someone to keep abreast of developments within the industry and the competition. The same organizations with which one competes today may tomorrow try to recruit him or her to join their enterprise.

A Final Thought: Begin with a Comprehensive Self-Assessment

An executive coach can provide a dose of reality

While there are a lot of different approaches to career planning and no one method would be appropriate for everyone, several experts that we interviewed recommend that the first step in the process should be a comprehensive self-assessment.

To plan a career, individuals need to realistically understand from where they are starting – e.g., what exactly they offer a potential employer in terms of skills, experience and knowledge – as well as what type of working environment is best suited to their personality. An equally important part of this self-assessment is developing an understanding of what it is they want to do with their careers and lives. The challenge is putting together a plan that somehow balances one's goals and the type of work one wants to do with how hard and long one wants to work and where one wants to live.

While all of this may sound fairly commonsensical, it is often difficult for someone to candidly assess his or her own strengths and weaknesses given the fragile nature of the human ego. It can also be difficult to realistically assess what goals are attainable relative to the sacrifices one is willing to make in the other aspects of his or her life.

An alternative many people have successfully used to better understand themselves is to engage the services of an executive coach. These individuals have typically worked with dozens of individuals in similar circumstances and have a comprehensive understanding of the labor markets in the pharmaceutical industry. They also are adept at identifying opportunities for people that they might not have considered on their own.

V. Conclusion

The next decade for professionals in the pharmaceutical industry is going to be exciting. The industry is going to be transformed.

Regardless of how the industry changes, however, there will continue to be a need for the skills and expertise of its professionals. The combination of an aging population in developed countries and the rising prosperity of emerging ones will create an insatiable demand for new and innovative medications essential to better health care. And the development and commercialization of these new treatments will require thousands of capable and experienced professionals.

As pharmaceutical companies change, so too will the lives and careers of their employees. Many will take on greater responsibilities at their current employers or at other large companies. Some will work in foreign countries. Others will embark on new careers, either at smaller companies or as independent contractors.

**The industry's turmoil
will create numerous
opportunities for those
who are prepared**

For someone who has worked in the industry over the last quarter century – a period of unparalleled prosperity – the idea that it will change so much so quickly can be difficult to fathom. In thinking about the upcoming decade, however, it is important to accept that the industry's evolution is inevitable, driven by broad macro forces that shape every industry. The pharmaceutical industry is simply entering a new business cycle that will force it to rationalize its operations and be more cost-efficient at creating and marketing new treatments.

Rather than wait for the industry to change and then try to react, industry professionals must try to anticipate, prepare for and embrace these changes. The industry's turmoil will create numerous, previously unforeseen opportunities, but only those who are prepared will be able to capitalize on the evolution.

Achieving success will require that professionals take charge of their own destinies and design their own career paths. Doing so will involve a multitude of variables and will require many difficult and personal decisions.

Further, all choices, including remaining at one's current employer, involve complicated risk/reward tradeoffs. They also require a dose of realism about one's strengths and weaknesses.

On the other hand, for those who adopt a strategy of inertia – i.e., simply waiting for the industry to change and then trying to react – the next decade will be challenging. Many will find only limited demand for their skills and expertise and often only in unappealing opportunities.

In sum, as one executive reminded us, all great scientific breakthroughs are "lucky accidents for the prepared mind." The industry's evolution is going to displace many people from their current career paths while at the same time present many other new opportunities. Those who will have the greatest success will be the industry professionals prepared to take advantage of such "lucky accidents."

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