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Capitalizing Drugs

Shareholder Power and the Cannibalizing Company

> The main urgency that the biotech model assuages are the strategic needs of big Pharma to outsource most of its R&D process.
>
> —PHILIP MIROWSKI[1]

> They have come back to the well every time. . . . Some people are joking and say "they should just hire you."
>
> —RAY SCHINAZI, FOUNDER OF TWO BIOTECH COMPANIES, PHARMASSET AND TRIANGLE PHARMACEUTICALS, LATER ACQUIRED BY GILEAD SCIENCES[2]

While Pharmasset wrestled with what do with its promising hepatitis C asset, an array of established pharmaceutical companies viewed hepatitis C with hope and concern. Companies like Merck and Vertex were close to receiving approval for new treatments with higher cure rates than interferon-only treatments.[3] These new medicines, however, would still require patients to get weekly injections of the toxic interferon therapy. Many patients would likely continue to wait for better options. Given the large patient population and the prices (upwards of $50,000 per patient) that Merck and Vertex were expecting to charge, providing such an option seemed like it would be highly lucrative.

As a Vertex Pharmaceuticals executive put it, hepatitis C was "one of the largest pharmaceutical opportunities this decade."[4] Industry researchers and investment analysts expected the market to exceed $15 billion by 2015. As many as two dozen large and small companies were racing for this revenue, with the potential for drug compounds crystallizing. Graham Foster, a liver specialist and clinical advisor to several of these companies, put it bluntly: "There are half a dozen possible targets on the hepatitis C virus, so you don't have many things to test. There are hundreds of millions of people infected; the current cure rate is 60 per cent; and the drugs are virtually intolerable. . . . You'd want to play, wouldn't you?"[5] Yet as of 2011,

none of the large companies that had decided to play appeared to be in a position to develop what physicians and patients desired: a treatment that would cure the disease at higher rates, and without toxic side effects.

This chapter follows Gilead Sciences' hepatitis C gamble to show how capitalizing pharmaceutical assets—using accumulated capital to acquire growth—served as a central strategy for Gilead and its competitors. Far from a spontaneous emergence of market activity as might be implied by standard economic analysis, this strategy was a product of a series of political-economic changes since the 1980s that gave shareholders in financial markets greater influence over corporate governance. At stake would be the very purpose of large "life sciences" companies like Gilead: were they developers of novel science, or specialists in acquiring financial growth? The answer would reveal the relations of power between financial actors, business, and government that shaped the trajectory of sofosbuvir's price as well as the economic value that materialized with it.

LIFE SCIENCE AMID SHAREHOLDER POWER

In the summer of 2011, Gilead Sciences was in a predicament: internal R&D efforts had borne little fruit in the previous few years. A publicly traded company with established flows of revenue from treatments for HIV/AIDS, Gilead's scope for further growth seemed limited, with many Wall Street analysts pigeonholing it as a single-disease business.[6] Though improved treatments for hepatitis C signaled a new revenue opportunity, Gilead's development efforts appeared stuck. When Pharmasset surveyed Gilead's history in a 2011 strategy document, it noted: "Today Gilead is left wondering what to do in HCV" (hepatitis C virus), due to a "lack of successes."[7] Seeking growth without the internal pipeline to realize it, the company would turn to a set of strategies that had worked before.

Gilead's Ascent through Recombining Innovation for HIV/AIDS

Launched in 1987 by a medical and business school graduate, Michael Riordan, Gilead Sciences initially focused on a new biotechnology called *antisense* that could be used to shut down proteins responsible for viral replication.[8] Naming the company after an ancient region said to be the source of a healing balm, Riordan wanted science to be at the core of its business and emphasized it by adding the word to the company's name. The list of principles used in orientation of new employees started with "Gilead's business is science."[9] But he fully recognized the turbulent influence of the environment in which the new biotechnology business was operating. The next principle on the list: "Finance has its ups and downs."

Unlike Pharmasset, Gilead did not emerge directly from a university; it was founded in Silicon Valley in the early years of biotechnology. As a result of the changes described in chapter 1, a growing abundance of speculative capital was financing new ventures.[10] Gilead began with $6 million in venture capital.[11] With no products or profits, Gilead went public in 1992, and its NASDAQ IPO raised

$86.25 million.[12] This investment was based on the promise of a new approach: the company had shifted away from its antisense strategy and had acquired the rights to compounds that held financial value in the eyes of Wall Street.

Under the leadership of John Martin, a medical chemist recruited from Bristol Myers Squibb with experience in antiviral research, Gilead focused on nucleoside science. Martin envisioned a two-pronged business model: "in-licensing" compounds from other companies and institutions while also attempting to build up its internal research capabilities. In-licensing in this context means gaining rights to a particular scientific asset in exchange for royalties to the previous owner, who may not have the technical capability or the financial desire to further develop it. Pursuing this in-licensing strategy, Gilead acquired rights to compounds from two institutes in Europe with whom Martin had worked while at BMS. In 2001 one of these compounds, tenofovir disoproxil fumarate (TDF),would be approved in treatment for HIV, becoming the only once-daily pill for the disease at that time.[13]

Gilead sought to go further than in-licensing, turning to outright acquisition of firms with promising compounds by making financial bets in exchange for ownership of those assets. After a minor acquisition in 1999, Gilead's second purchase in 2003, Triangle Pharmaceuticals, positioned the company for dominance in HIV/AIDS. For $464 million, Gilead gained ownership of a compound known as emtricitabine, which had already received FDA approval.[14] As described in chapter 1, Ray Schinazi, also the founder of Pharmasset, had founded Triangle in 1996.[15] Both TDF and emtricitabine, the backbone compounds in their HIV regimens, came from university laboratories; Gilead brought them together in single pills for simplified treatment regimens.

Within three years of its acquisition of Triangle, Gilead offered two main treatments for HIV/AIDS: Truvada, launched in 2004, and Atripla, launched in 2006. Truvada was a combination of emtricitabine and TDF, while Atripla added a third compound licensed from Merck.[16] Before this, patients with HIV/AIDS typically needed to take many medications multiple times a day, making it difficult to adhere to treatment and increasing the likelihood of side effects. Gilead's combination of several medicines into once-daily treatments like Truvada and Atripla made it the leading manufacturer of HIV medicines. By 2008, 80 percent of HIV patients in the United States received one of Gilead's medicines.[17] From its launch in 2004 to the end of 2011, Truvada generated $13.5 billion in total revenue.[18] Atripla amassed $11.2 billion by 2011, surpassing Truvada in yearly sales in 2010. Gilead's HIV strategy had paid off, allowing the company to expand during the 2000s from a small publicly traded company with no products and sales to a growing biopharmaceutical company with $8 billion in annual revenue in 2011.

Yet even with its successes in HIV, the company faced a structural predicament. Its share price had risen between 2006 and 2008, mirroring its growth in HIV drug sales. "The cash continues to pile up," noted a *Forbes* article. By the close of 2009, the company had nearly $4 billion in accumulated capital. But when this growth began to plateau, in 2009 and 2010, the share price slumped back to its pre-HIV range

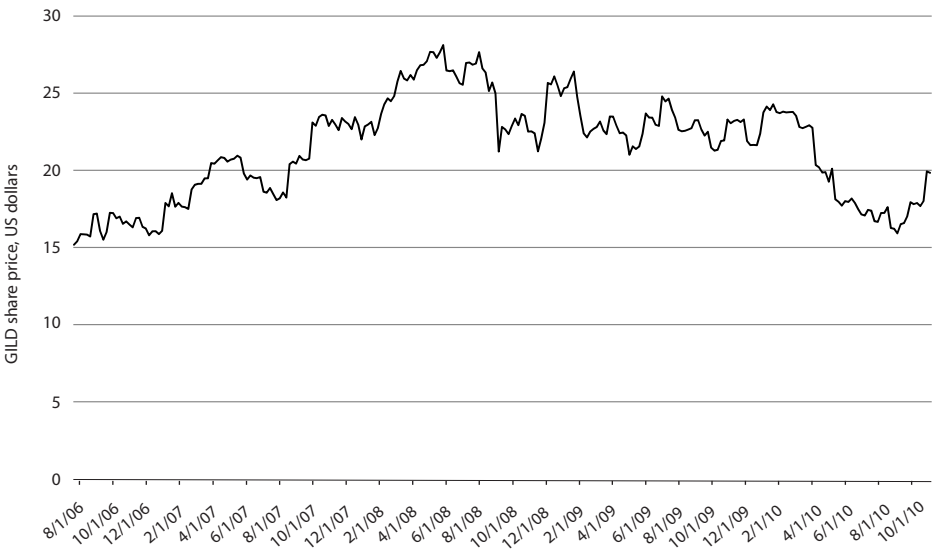

FIGURE 4. Gilead's share price between August 2006 and October 2010. After rising from $16 to nearly $30 on the strength of HIV sales in 2006 thru 2008, in 2010 it fell and stagnated between $16 and $20. Sales growth from HIV continued but slowed, and the company did not have another product in the pipeline anticipated to generate new growth. Source: Google Finance, GILD.

(Figure 4). The same *Forbes* piece summed up the sentiment on Wall Street: "As its earlier galloping growth begins to slow, investors are starting to wonder what Gilead plans to do for a second act."[19] Gilead's position in the innovation process—and its decision as to what to do for its "second act"—would in turn be shaped by the latest iteration of a long-running debate over corporate governance in the twentieth century.

The Rise of Shareholder Power and the Crisis of Growth

Wall Street's dissatisfaction with Gilead's performance, even as the company amassed billions in cash from a viable earnings stream, illustrated a structural crisis confronting large contemporary pharmaceutical businesses. This structural crisis centered on growth: with "maximizing shareholder value" deemed by Wall Street to be the core function of a business, pharmaceutical companies were supposed to pursue short-term and ongoing growth and distribute that growth to shareholders. Yet this went against the long-term, risk-laden, and investment-oriented financial commitment required for drug development. This "financialization" of American corporations, begun in the 1970s, would have significant ramifications for pharmaceutical companies like Gilead.

Maximizing shareholder value has not always been taken to be the core task of US corporations. For much of the twentieth century, large corporations employing thousands or even hundreds of thousands of employees dominated the US economy. These companies relied on what economists Lazonick and O'Sullivan call the

"retain and reinvest" approach.[20] By reinvesting the capital they had earned from sales of their existing goods and services, corporations—from pharmaceutical companies like Merck to General Electric, General Motors, IBM, AT&T, and Xerox—secured long-term growth.

For these companies, the primary role of shareholders was *not* to fund business. Contrary to today's prevailing mythology, most large businesses—from the birth of stock markets in the early twentieth century to today—have not needed money from their shareholders. Rather, as I described in chapter 1, aside from episodes where businesses undergo IPOs or issue new shares, the primary role of stock markets was to provide a vehicle for business transactions (acquisitions, for example) and trading in companies' stock.

The established businesses of much of the twentieth century preferred to use the retained capital from sales of goods and services to reinvest in employees, R&D, and other capabilities.[21] This strategy enabled a rising professional cadre of managers—rather than corporate shareholders—to have a greater degree of control over business strategy.

As Lazonick has chronicled, this cadre developed, through the maturing US system of higher education, to lead corporations by strategically investing retained capital in ways that could generate long-run economic growth. This dominant paradigm, in which corporations and their managers had control over their own resources and capital, allowed a "stakeholder" view of capitalism to predominate. By this view, corporate success depended on serving multiple interests, from customers to employees to local communities. In a famous 1932 debate in the *Harvard Law Review* over the purpose of corporations, professor Merrick Dodd argued that businesses were "an economic institution which has a social service as well as a profit-making function."[22] This stakeholder view of corporate governance would prevail well into the postwar era in the United States.

Yet this manager-led consensus broke down in the 1970s, amid headwinds from business slowdown, a challenging macroeconomic environment, and new scholastic fashions emerging from the worlds of law, finance, and economics.[23] After two decades of expansion in the 1960s and 1970s, the typical US corporation had become, many business analysts and economists argued, too large and diversified. Operating as conglomerates in unrelated industries, and with leadership too removed from actual processes to make informed investment decisions, US corporations performed poorly.[24] The macroeconomic environment exacerbated this slowdown. The rising powers in Japan and Germany, having recovered from World War II with skilled workforces and deep technical bases in multiple sectors, presented major new competition for the US. The "stagflation" of the 1970s—which brought together inflation from rising oil prices and higher rates of unemployment—added to corporate struggles. A growing perspective in academia and finance was that placing control in the hands of shareholders—away from corporate managers—would be critical to renewing prospects for economic growth. This shift toward shareholders would be underpinned by two core arguments.

First, on the "efficient-market hypothesis" promoted by economist Eugene Fama and his colleagues in finance, the main mandate of managers should be to distribute capital to shareholders, who could then allocate it to sectors and firms with better growth prospects.[25] This in turn would spur growth across the economy. Share price—as a measure of a firm's *potential* growth and corporate performance, rather than their existing profits—would serve as a market signal for this allocation of capital. This would reduce the ability of managers to pursue what financial markets might deem "inefficient" strategies.[26]

Second, as part of what has been dubbed the "law and economics" movement, legal scholars argued that any "residual" earnings of a corporation belonged to its shareholders, because shareholders had no contractual guarantee of reward—unlike salaries and payments to employees, vendors, suppliers. To discipline corporate managers to pursue this strategy, which came to be known as "maximizing shareholder value," these scholars argued for a "market for corporate control," in which companies with poor returns on their stocks could be the subject of takeover.[27] This idea came to fruition by the 1980s.

Financial deregulation, beginning in the 1970s and accelerating in the 1980s, gave rise to new powers for institutional investors—such as mutual funds, pension funds, and life insurance companies—which could now invest directly in corporate stocks. Aided by the lax enforcement of antitrust laws under the Reagan administration, these new financial actors bought up companies, fired their managers, and sold off divisions for quick profits.[28] Within a decade, nearly one-third of *Fortune* 500 firms had been acquired or merged. The sole measure of corporate performance became the higher share price and market capitalization of the company after the takeover.[29]

By the early 2000s, maximizing shareholder value—by generating growth and then directing capital to shareholders—became the reigning ideology of corporate strategy. And to bring executives further into the fold in pursuing this approach, corporate boards shifted their approach to compensation. Executives became major shareholders themselves, with compensation packages in the form of stock options alongside annual salaries.[30] This gave corporate managers a direct incentive to "maximize shareholder value."

Yet this ideology rested on a logic of growth at odds with the long-term risk-taking required for drug development. A typical drug takes ten to fifteen years to develop. But shareholders expect capital gains at a magnitude and on a timetable that can be incompatible with such risk-taking. For example, investment analysts on Wall Street typically expect growth in the pharmaceutical sector in the double-digit range—that is, about 10%, *annually*.[31] This expectation comes from comparing pharmaceutical companies against competing vehicles for growth or the overall "market rate of return"—what a trader or investor can garner from allocating their capital elsewhere in the stock market. These "returns" are assessed

by Wall Street every few months on quarterly earnings calls, a practice linked to what some have dubbed "quarterly capitalism."[32]

This configuration of extractive growth—directed to shareholders on short time horizons and at significant scale—produces what Sunder Rajan has described as recurring episodes of structural "crisis" for pharmaceutical companies, like Gilead, that are in the ostensibly risk-laden and long-term business of drug development.[33] As Gilead entered into 2011, staving off this crisis and transcending the projections of Wall Street would be central to its strategy.

Overcoming Recurrent Crisis: From Research and Development to Search and Development

By the metrics of profitability, Gilead Sciences performed exceedingly well in the years leading up to 2011. Between 2009 and 2011, for example, Gilead's rates of profitability ranged from 33% to 38%.[34] In 2011, the average rate of return for the companies in the S&P 500 stood at about 8%. Gilead's profitability was largely due to its patent-protected revenues in a single therapeutic area: medicines for HIV. Between 2008 and 2011, Gilead's revenues climbed by about $1 billion each year, from $5 to $8 billion, with its HIV medicines making up 85% of that revenue.[35] But as the growth from HIV sales slowed, so did the company's share price. The fear that Gilead would remain a single-disease business, with limited prospects for higher rates of growth, was pushing the share price down. How could the company overcome this dim prognosis?

As Sunder Rajan described in his study of the pharmaceutical industry, Gilead faced two conundrums—looming patent cliffs and limited pipelines.[36] First, Gilead's existing products had a finite life based on the length of their intellectual property protections. Though the threat was not immediate, these "patent cliffs" still loomed over Gilead's prospects. The patent on their key HIV compound, TDF, would expire in 2017 in several key markets, including Europe, which threatened to expose their most lucrative HIV treatment regimens to generic competition in a little over five years.[37] Like other big pharmaceutical companies, Gilead would try to extend the length of its patents and their dominance in their current "market" via a number of dubious strategies (described in chapter 3).

Though Gilead's HIV treatment regimens had delivered steady revenue growth for the company, as the HIV epidemic plateaued they could not produce the magnitude of growth shareholders demanded.[38] But that growth was also threatened by another dynamic: limited internal potential for new drugs, or what are known in the industry as "drug pipelines." The very shareholder imperative to produce short-term growth undercuts a company's appetite for the long-term risks needed to develop new treatments. Instead, maximizing shareholder value has meant directing as much capital as possible to shareholders. Though Gilead's revenue totaled $33 billion between 2007 and 2011, the company invested $3.3 billion, or

10%, in R&D.[39] Meanwhile, it directed $9.9 billion (three times its R&D budget) to shareholders by buying up its own shares ("share buybacks")—a practice I detail later in this chapter.

Gilead's R&D investments included clinical trials for hepatitis C. Like many of its competitors among the large drug companies, Gilead faced a wider industry conundrum. A study by Boston Consulting Group found that of the 712 unique drugs for hepatitis C in company pipelines between 1995 to 2014, only twelve were ultimately approved in a major market. On the other hand, the same study found that of the drugs that made it to phase III trials, more than half made it across the finish line and were approved for clinical use. This dynamic of high failure rate from preclinical through phase II trials can help explain why Gilead—facing pressure to grow—looked to Pharmasset.

Gilead had brought two compounds to phase II trials, but both appeared to lack the effectiveness of competing compounds like PSI-7977. Monitoring Gilead's pipeline, Pharmasset's executives noted that "their protease inhibitor is not very potent and has a resistance problem," and observed that their other compound showed the potential for adverse heart-related events at the necessary dosages.[40] Evaluating Gilead's pipeline and looming patent expirations, an analyst with Bloomberg business said, "We continue to be pessimistic about Gilead's long-term growth." Yet this analyst upgraded the stock from a sell to a buy because of "a large share buy-back plan announced earlier this month."[41] This short-term focus epitomizes the contradictions of financialized drug development: decrying the company's lack of growth possibilities, while applauding it for distributing capital to shareholders that could have otherwise been reinvested to develop stronger pipelines.

To generate this near-term growth in the context of patent cliffs and limited pipelines, Gilead would turn to their preferred approach: acquisitions of promising drugs using their stockpiled capital. Reflecting on its position on an earnings call with Wall Street analysts, then-CEO John Martin said, "We typically like things where we can have impact on Phase III [of clinical trials] and where we can accelerate those products either into the approval process or into greater indications after the approval process."[42] Gilead's senior leadership saw their company as a late-stage *acquisition specialist*, buying compounds in their final steps of development and thereby taking control of potential future earnings streams just as the compounds neared and then crossed the regulatory finish line. Such an approach had worked for HIV; to produce the next wave of growth, Gilead would need it to work again for hepatitis C.

Gilead's approach had by then become common across the industry. A 2010 report by investment bank Morgan Stanley, "Pharmaceuticals: Exit Research and Create Value," synthesized a view that had come into vogue.[43] The report encouraged large pharmaceutical companies to "exit" risky, early-stage research in small molecules and instead focus on acquiring patents on promising compounds. In other words: "research and development" should become "*search* and

development." This approach, Morgan Stanley argued, could lead to a three-fold increase in profitability. Internal research could be used to support external "search" strategies aimed at buying the right treatments. The industry has largely heeded this advice. A Deloitte report in 2015 reviewing the performance of 12 leading large and midsize pharmaceutical companies found that over 80% of the financial value of their drug pipelines came from "external innovation": assets they had acquired, or developed in partnership with a smaller company.[44]

As 2011 wore on, Gilead knew that losing out on the hepatitis C market could have dire consequences for the business. Its dependence on HIV treatments left the business in a vulnerable position, especially if one of its competitors, like Merck or Bristol Myers Squibb, were to "win" the hepatitis C gamble by coming to the market first or with a better treatment regimen.[45] Conceivably, a larger company could launch a takeover attempt to gain control of Gilead's HIV revenue stream.[46]

In August 2010 Gilead hired John McHutchison to lead their "search" for the right hepatitis C asset. An Australian doctor who had led many clinical trials in hepatitis C for multiple biotechnology companies, including early-stage trials for Pharmasset's PSI-7977, McHutchison was viewed as a leading expert on the potential of hepatitis C treatments then under development.[47] Pharmasset's senior leadership noted the hire, observing "the very clear signals from Gilead and John are that they will be making some strategic moves in HCV."[48] These strategic moves would require a major financial bet, as Gilead sought to beat its competitors in the rush to acquire growth.

CHASING THE GOLDEN SNITCH, AND A HEPATITIS C GOLD RUSH

By the summer of 2011, both Pharmasset and Gilead faced a strategic decision over hepatitis C: should they pursue a business "combination," and if so, what would be the right price? Pharmasset's primary concern was whether a suitor would pony up for its valuable hepatitis C asset, PSI-7977. For its part, Gilead could take a financial gamble, or one of its competitors might swoop in to buy Pharmasset instead. With PSI-7977 showing promising data in late-stage trials, Gilead began deliberations on how to approach a potential acquisition.

To assess Pharmasset's value to the company, Gilead hired Barclays Capital to run a financial modeling exercise called Project Harry. Drawing inspiration from Harry Potter, Gilead was Gryffindor; Pharmasset was Harry. The compound ultimately called sofosbuvir, PSI-7977, was akin to the golden snitch in a game of quidditch: acquiring it could mean winning the game of hepatitis C drug development.[49] Project Harry showed that Pharmasset would indeed be worth a big bet. A speculative race unfolded to acquire Pharmasset and its potential competing hepatitis C assets, as large companies gambled against each other on drugs in their late stages of development in hopes of acquiring future revenue growth.

TABLE 3 Key figures used in Gilead's and Pharmasset's capitalization exercises

	Gilead's Project Harry model (with Barclays Capital)	Pharmasset's Project Knight model (with Morgan Stanley)
Expected price for PSI-7977	$80,000	$36,000*
Cost of capital	10%	8%
Years of sales (from approval year to patent expiry)	2012–2030	2014–2030
Net present value (NPV)	$25.5 billion	$11 billion
NPV translated to Pharmasset share price	$250 per share	$136 per share
Market price of Pharmasset as of July 2011	$70 per share, or $4.8 billion	
Mean target price for Pharmasset forecasted by 16 Wall Street analysts	$100 per share, or ~$8 billion	
Final acquisition value	$137 per share, or $11.2 billion	

NOTE: Each of these figures was tested in modeling exercises with different assumptions to develop sensitivity ranges, but for simplicity I give the median figures here.

* In its modeling, Pharmasset assumed a price of $36,000, or about half of what they thought a final regimen would be priced at ($72,000). This is because Pharmasset anticipated that it would need to be paired with another compound to be the kind of simple, once-daily treatment with high cure rates that could gain a dominant market position (US Senate Committee on Finance 2015: 886).

This process of capitalizing drugs, in turn, would rest on power relationships central to financialized drug development—the industry's power to price drugs and accumulate capital to buy assets, as well as the role of stock markets in driving speculative financial gains for shareholders.

Accounting for the Future and the Powers to Capitalize PSI-7977

To determine the value of a possible acquisition, Gilead performed an accounting exercise that is common in business: capitalization. Put simply, in this scenario, capitalizing something, such as a pharmaceutical asset, means valuing it for its expected monetary returns. In one sense, capitalization exercises are a technical operation that guides how a business can allocate capital. Such exercises involve forecasting multiple variables, ranging from the length of PSI-7977's patent life, the likelihood of regulatory approval, the extent of potential competition, and critically, its potential future price (see the main figures relevant to my analysis in Table 3). Based on Project Harry's results, Gilead's models showed that the compound could be worth over $25 billion to the company, even after accounting for an estimated $10 billion acquisition cost. The figures were tested across ranges of different assumptions, but all the models reinforced the "value" that Pharmasset could offer Gilead.

Pharmasset's executives also assessed the value of their own company, and their capitalization exercises showed that PSI-7977 would be worth approximately $11

billion were it to remain in their own hands as a solo company. The difference between the two figures—$25 billion versus $11 billion—stemmed in large part from Gilead's anticipation that it could use PSI-7977 in combination with its own compounds to develop a single, daily oral tablet that would gain a large global share of the hepatitis C market. Given its regulatory, distribution, and marketing expertise, Gilead believed it could use this simplified treatment regimen to become the dominant manufacturer of hepatitis C medicines.

Valuing these streams of possible earnings from PSI-7977 required the application of *discounting*, an idea central to capitalization exercises. The idea is that money today is worth more to an investor or business than that same amount in the future. To determine the value of a future stream of earnings, businesses "discount" future cash flows, to get what is known as *net present value*.[50] As Muniesa has put it, the discounting process "signals how much a capitalist would be prepared to pay to receive a future flow of money."[51] The discount rate used by corporations like Gilead and Pharmasset is equivalent to the minimum rate of return expected by shareholders from their existing mix of investments; this is also known as the *cost of capital*. Only projects showing a return greater than the cost of capital would make an investment worth pursuing.[52] For example, Gilead used 10% as its cost of capital, based on the rate of return expected by financial market actors on the company's existing mix of shares and loans. And even discounting the future of PSI-7977's earning streams by 10%, Gilead's models showed that acquiring Pharmasset had a high probability of returns in excess of $25 billion—making it a potentially wildly successful bet.

Yet capitalization exercises are more than technical pricing operations carried out by businesses. They also reveal the dynamics of power that are at play in business strategy.[53] In his reading of Veblen, the political economist Gagnon observes that "not only are productive assets capitalized in the process, but also any institutional reality is capitalized as well, be it social, legal, political, cultural, psychological, religious, technical or anything else that can grant an earning capacity." On a basic level, a 10% cost of capital indicates the powerful imprints of the financial sector, which reward businesses for pursuing projects that have double-digit growth rates—rates of return significantly better than what might be made in the stock market otherwise. As Gilead's leadership sought to exceed the returns expected in financial markets, Project Harry would also reveal two other power relationships critical to financialized drug development: the pharmaceutical industry's power over drug pricing in the US and globally; and its power to spend accumulated capital to buy assets like Pharmasset.

One of Gilead's steps in valuing Pharmasset was determining the price it could charge for PSI-7977 on its approval. These predictions were not abstract calculations but represented confidence in the company's power to translate predicted prices into realized outcomes. For example, Gilead anticipated that health systems could be compelled to pay at least as much, but probably more, for a superior

clinical outcome. In the Project Harry model, for example, Gilead assumed a price of $65,000 per patient in the US, while also testing a sensitivity range of prices $10,000 below and above that point.[54] They chose $65,000 for sofosbuvir's future price in the US based on the price of the existing standards of care for hepatitis C. Both Merck and Vertex's treatments, just recently approved, would be launched with total treatment costs exceeding $65,000 for many patients (depending on the amount of interferon required) and with lower cure rates.[55] Per Gilead's formulation, sofosbuvir-based treatments could one day offer a lower "price per cure" and thus be promoted as a good "value" for health systems. In interviews with US Senate investigative staff, Gilead said that this was a conservative estimate in the run-up to the acquisition; its focus was on the chance to sell in this rough price range to a large number of patients with hepatitis C.[56]

To execute this strategy successfully in the US—which large pharmaceutical companies typically consider their most lucrative market—Gilead could count on the political influence of the pharmaceutical lobby. With one of the most influential lobbies in Washington, DC, the pharmaceutical industry had spent $240 million just in 2011 and nearly $1 billion in the previous five years.[57] In European countries and Japan—the next-largest markets in which Gilead anticipated making significant revenues—national health systems typically have more negotiating power than in the US and are able to command lower prices. But the US launch price still mattered in this global context. In its Project Harry modeling, for example, Gilead forecast European and Japanese prices as a discount from the US price, at 75% and 57%, respectively.[58] Even with these discounts, high-income countries would offer enormous revenue potential.

Perhaps most critically, this accumulation strategy would rest on Gilead's anticipated control over PSI-7977's patents, with threats coming from two directions. With respect to corporate competitors, Gilead would later make significant investments in a legal armamentarium aimed at fending off patent litigation from companies like Roche and Merck. With respect to governments, Gilead could rely on national and global policy favoring patent monopolies. In the territories Gilead forecast as most lucrative, the US and Europe, governments have the power to license such intellectual property to generic manufacturers, but in recent decades they have rarely done so, even amid public health emergencies or with patents derived from significant public investments. Gilead also saw significant financial potential in middle-income countries, where millions were infected with hepatitis C. This potential would be shaped by the World Trade Organization's TRIPS Agreement, through which low- and middle-income countries have been forced to "harmonize" their patenting systems to grant protections to global pharmaceutical companies in their specific territories. (TRIPS stands for Trade-Related aspects of Intellectual Property Rights.) The pharmaceutical industry's lobbying efforts via the World Trade Organization and other supposed "free-trade" agreements aim to enact ownership claims over knowledge across as much of the world as possible.

The other power revealed by Project Harry's capitalization exercises was the ability of large pharmaceutical companies like Gilead to accumulate the capital needed to even fathom betting billions on Pharmasset. In each of its models, Gilead estimated a price tag in the range of $10 billion for Pharmasset and projected how it would mobilize the capital for this purchase. At the time of the acquisition, Gilead was already sitting on *$10 billion in cash*, primarily from its sales of Atripla and Truvada.[59] These sales were in part driven by price increases: Atripla, for example, rose from $13,800 per year in 2006 to $25,874 per year in 2011.[60] Payment for these treatment regimens came from public-sector programs across high-income countries. Even in the US, with its large private insurance markets, the public sector finances treatment for over half of all individuals diagnosed with HIV, through a special government program begun amid the AIDS epidemic in the mid-1990s, and 80% of HIV patients in the US were on a Gilead treatment regimen at the time.[61]

Gilead's position echoes Zeller's description of pharmaceutical companies as "accumulation centers" within global capitalism, with earnings stockpiled from their ownership claims over assets like HIV medications. By using its considerable patent protections and attendant market power to set and raise prices and then accumulate capital, Gilead could both redirect this capital to shareholders and leverage it to acquire further assets. As the company planned for a potential acquisition, it anticipated using this accumulated capital to pay for Pharmasset. With its stockpiled capital and a clear projection of the future financial value of PSI-7977, Gilead readied itself for the big bet.

The Stock Market and a Speculative Race to Buy Growth

In the summer and fall of 2011, the acquisition process unfolding between the two companies would reveal the key logics of the stock market in financialized drug development, less as a source of capital for innovation and more as a vehicle to drive speculative accumulation for shareholders. This speculative accumulation would be driven by two dynamics: pricing in asset-based markets, as highlighted by Birch; and the positioning of shareholders as major winners in stock markets, as described by Lazonick.

First, because drugs are configured via patents as financial assets, the acquisition process shows how increased demand can significantly raise the price and value of these assets in stock markets. As Birch has described, assets like patents for drug compounds gain their value via ownership of future earnings. When the demand rises for such assets, asset prices rise as well.[62] This asset-based dynamic contrasts with prices for commodities, which typically *fall* with increased demand as more producers are incentivized to enter the market. For example, between Gilead's first bet on Pharmasset in September 2011 and the acquisition in November, Gilead raised its bid by over $3 billion. Gilead initially bid $8 billion, or $100 per share. This bid rested on Gilead's use of forecasts by Wall Street analysts. While Pharmasset at

the time was trading at about $70 per share, for a value of $4.8 billion, the analysts expected that forthcoming PSI-7977 trial data would boost Pharmasset's share price to near $100. Yet Pharmasset rebuffed Gilead's initial offer at this price, because its executives knew that their phase II trial was even more promising than many had anticipated. As described earlier, Pharmasset's own internal capitalization exercise led its executives to believe that their hepatitis C assets were worth about $11 billion, or somewhere between $135 and $140 per share.

Leveraging their private clinical trial data, Pharmasset drew Gilead into an auction process, inviting multiple companies to confidentially review the new evidence and make bids. Given the possibility of competition—even though none eventually surfaced—and new knowledge about PSI-7977, Gilead raised its bid to $125 per share. Pharmasset's executives again rejected the offer. Pharmasset's leadership were betting on a better negotiating position in November, when they planned to publicly release PSI-7977's clinical trial data at a major medical conference, the annual meeting of the American Association for the Study of Liver Diseases.[63] And this bet was correct: Gilead would raise its bid a total of three times.[64]

On November 20, 2011, Pharmasset agreed to be bought for $137 per share, or $11.2 billion.[65] This was the largest-ever price for the acquisition of a small biotechnology company at the time, but it fell right into the range of values that Pharmasset's senior leadership had expected to get for PSI-7977 as a stand-alone company.[66] With this bid from Gilead, Pharmasset could guarantee its shareholders a payout *now*, and avoid the multiple downstream barriers associated with bringing a drug to global markets.

This dynamic of an escalating price for Pharmasset's hepatitis C asset did not fit the conventional understanding of "market competition." Rather, it was connected to the distinctive economic dynamics of assets that Birch has described. Unlike with commodities, competition for assets like PSI-7977 helps to escalate prices, as potential owners look to gain control over a potentially lucrative revenue source.

These logics are reflected in the very discourse of those who have described this pursuit of hepatitis C assets. Illustrating this speculative, bubble-like dynamic, one close observer of antiviral clinical trials called the pursuit a "hepatitis C gold rush."[67] Gilead's acquisition only raised the stakes for competitors like Merck and Bristol Myers Squibb, which had long coveted hepatitis C drugs as a potential growth opportunity. Pointing to the competition over increasingly scarce assets, Andrew Berens, an analyst with Bloomberg, said, "We are going to see a land grab."[68] Within a month of Gilead's acquisition, Bristol Myers Squibb announced that it had bought Inhibitex for its INX-89 asset, at a price of $2.5 billion, or $26 per share.[69] On the prior day of trading, Inhibitex had been valued at $9 per share, with the price hovering even lower at the time of Pharmasset's acquisition.[70] Two years later, in June 2014, Merck made a similar move, buying Idenix for its

IDX-21437 asset at a price of $3.85 billion, or $24.50 per share. On its previous day of trading, Idenix had been valued at $7 per share.[71] The potentially lucrative market in hepatitis C, underscored by Gilead's bet on sofosbuvir, drove up the valuations of these smaller companies. Like Gilead, the large pharmaceutical companies all faced similar imperatives in financial markets: to acquire growth.

Alongside the asset-based dynamic that can push up prices in stock markets is a second dynamic: shareholders are positioned to be major financial winners. Pharmasset's shareholders emerged with significant gains from the acquisition, with the purchase price of $137 per share representing an 89% premium over the last trading day before the announcement, when it traded at $72 per share. At the time of the acquisition, five institutional shareholders, all pension or hedge funds, each held more than 5% of Pharmasset's shares, amounting to an aggregate 39% stake.[72] Ray Schinazi, the original founder of Pharmasset, received $440 million for his 4% stake in the company.[73]

Whether Gilead's shareholders would "win" now depended on whether the predictions for PSI-7977 would be realized. In the days of news coverage that followed, business analysts expressed concern over the size of the acquisition.[74] And while the clinical-trial data looked promising, evidence of the drug's efficacy against hepatitis C's most common global variant (or genotype) was still pending. Under the headline "Gilead's Risky Revival Procedure," the *Wall Street Journal*'s "Heard on the Street" column worried: "With the Pharmasset deal, Gilead has transformed itself into a much riskier company. While all the signs suggest Pharmasset's drug is on a successful path, if something goes wrong, the value of the company could disintegrate."[75] In other words, Gilead had exchanged the technical risks associated with earlier-stage drug development for the financial risk of betting over $11 billion on a single company.[76]

Yet while Gilead faced significant financial risks as a company, its shareholders—who would ultimately receive the lion's share of the rewards from innovation—had not been the source of its risk-taking capital. To come up with the $11.2 billion for the acquisition, Gilead spent $5.2 billion of its approximately $10 billion HIV cash stockpile, saving the rest to pay down previous debt or finance future acquisitions and share buybacks. The company also raised about $6 billion in capital through new debt—a combination of bank loans and corporate bonds—for the remainder of the acquisition.[77] Rather than issue new shares, then, Gilead borrowed money—itself a function of the good credit status derived from its accumulated capital. Rather than providing capital for the drug development process, Gilead's shareholders continued to trade in the company's stock on the anticipation of sofosbuvir's phase III clinical trials. Though they had not risked their own capital, they stood to garner massive rewards.

This process highlights what Lazonick describes as one of the roles of stock markets: to facilitate "combinations" like that of Gilead and Pharmasset. Such acquisition deals, he writes, "may enable the combination to build productive capabilities

TABLE 4 Sofosbuvir-related clinical trial costs for Pharmasset and Gilead, 2007–2014

Trial sponsor	Phase	Reported cost for sofosbuvir specifically	Total firm R&D costs during period of sofosbuvir development
Pharmasset	Preclinical to Phase II trials	$62.4 million	$281 million (2001–2011)
Gilead	Phase III combinations* (actual)	$880.3 million	$4.02 billion (2012–2013)
	TOTALS	$942.7 million*	Total costs: $4.3 billion

*Includes clinical trial costs for combination treatments that used sofosbuvir as a backbone compound with Gilead's other antivirals to create more effective regimens.

SOURCE: US Senate Committee on Finance (2015: 23–24).

that support value creation"; indeed, the creation of a safe and highly effective all-oral tablet, made possible through Gilead's bet on Pharmasset, represented a pivotal improvement for patients with hepatitis C.[78] Yet, he goes on, "with the added cash flow that an acquisition brings to the acquiring enterprise, those who control the new combination will have much greater scope for value extraction."[79] In facilitating this acquisition, the stock market would be less a financier of a speculative bet, and more a mechanism used to derive financial gains for shareholders.

In the process, price and value became tethered to the stock market, and would bear no relation to Pharmasset or Gilead's actual R&D costs. To the Senate, Gilead reported spending in the amount of $880.4 million on final-stage clinical trials of sofosbuvir and its combination therapies.[80] Pharmasset had spent $62.4 million on developing the PSI-7977 compound that would go on to become sofosbuvir. Using this self-reported data, the total direct costs would be $942.5 million. The total research investment *across all therapeutic areas* during the main hepatitis C development periods for both Pharmasset and Gilead was approximately $4.3 billion (Table 4). Uncoupled from the sums spent in laboratories and in clinical trials, the speculative cost of acquiring sofosbuvir was instead tethered to the financial market's expectations and predictions regarding Gilead's potential profits from hepatitis C.

With the backbone sofosbuvir compound now in hand, in 2012 and 2013 Gilead fashioned a clinical-trial strategy bearing the imprints of its HIV approach: bringing multiple compounds together to create a single daily oral pill. Like many established companies, Gilead had had recent success in developing compounds for the NS3/4 protease and NS5a polymerase targets; yet each of these compounds had little value on its own. With sofosbuvir, Gilead now completed the hardest part of the puzzle by finding the backbone compound necessary for a simplified treatment regimen. For the new "combination strategy," Gilead brought together sofosbuvir and its internal secondary compounds in a series ("waves") of phase III trials. Each of these trials confirmed Gilead's confidence in the PSI-7977 compound, with cure rates near 100%.[81] In late 2013, Gilead received FDA approval for the first in a series of sofosbuvir-based treatments.

THE CANNIBALIZING COMPANY: FOLLOWING GILEAD'S HEPATITIS C MONEY

Coming out ahead in this competition, Gilead Sciences launched sofosbuvir (branded as Sovaldi) in December 2013, and a next-generation sofosbuvir combination (branded as Harvoni) ten months later. The toxic interferon treatments would soon be retired from clinical use, as patients were cured at rates exceeding 90% by taking a single pill daily for just three months. The treatments produced jaw-dropping financial results: before the COVID vaccines, this was the fastest, most profitable drug launch in history, earning over $10 billion in just the first year.[82] Lipitor, previously the most profitable drug, had taken four years to reach this mark. Gilead's executives would have significant decisions to make over how to use this money. While I dissect the drug prices that would be responsible for these record-breaking revenues further in the next chapter, here I trace the flow of capital from hepatitis C to uncover the spectacular levels of *value extraction* that can occur in financialized drug development.

Paying Forward or Buying Back?

The flow began as a geyser. From their launch in December 2013 to the end of 2016, Gilead accumulated $46.4 billion in worldwide revenue from sofosbuvir-based regimens. In just three years, Gilead's total revenues as a business tripled, from $11.2 billion in 2013 to $32.6 billion in 2015.[83] Hepatitis C sales drove this escalation in revenue, accounting for 60% of all sales in 2015 and 50% in 2016, with the remainder coming largely from their steadily growing HIV sales.[84] With the relatively low cost of production for its HIV and hepatitis C medicines, the company's gross profits were 87% of revenues, totaling $75.9 billion between 2014 and 2016.[85] Where did these earnings go? Of this $75.9 billion in gross profits, Gilead's executives stockpiled $32.4 billion in cash and cash equivalents[86] by the end of 2016 (compared to $2.6 billion in cash at the end of 2013) for potential acquisitions and distributions of capital to shareholders.[87] The company also directed $32.6 billion toward share buybacks and dividends in those three years.[88] By contrast, the company reported spending $11 billion, or 14.4% of gross profit, on R&D.[89] The rest went to taxes and general operating expenses. Gilead's revenues and gross profits, as well as its capital allocation strategies, are depicted in Figure 5.[90] The bottom line: Gilead's leadership translated nearly 86% of its gross profits over three years into a cash stockpile and distributions of capital aimed at shareholders.[91] This flow of capital demands closer attention.

Rents and Value Extraction in Financialized Drug Development

To Gilead's senior leadership, share buybacks were part of a strategy to "maximize shareholder value." In an earnings call with investors in 2015, Robin Washington, Gilead's CFO, said that share buybacks would be the company's primary strategy "for shareholder return," reassuring Wall Street that, "if you look over the past several years, we've returned about 50%."[92] In this framing, shareholders are conceived

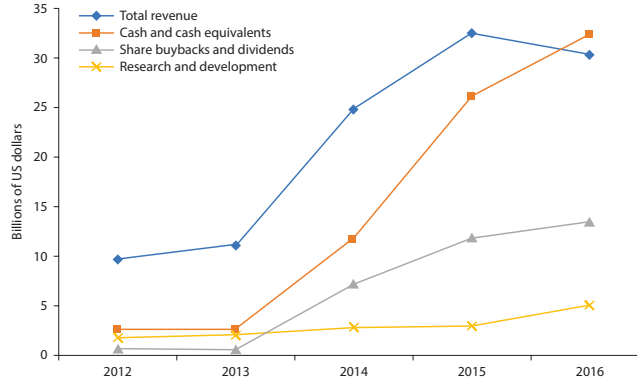

FIGURE 5. Gilead's revenues and capital allocation decisions, 2012–2016 (in billions of dollars). Source: Gilead's SEC filings.

of both discursively and materially as the source of risk capital to whom a surplus must be "returned." Yet this is an inversion of what actually occurs. For example, between 2006 and 2017, a net amount of $412 billion flowed *from* US businesses *to* shareholders *annually*.[93] In the case of sofosbuvir, Gilead's shareholders were *not* the primary source of risk-laden capital; they traded on the company's stock price to pursue capital gains. But the flow of capital to Gilead's shareholders illustrates the scale of *value extraction* possible under the conditions of financialized capital. This value extraction, in turn, is connected to the economic concept of *rent*.

As Mariana Mazzucato described in her book *The Value of Everything* and subsequent publications, rents were an important category of analysis by classical eighteenth-century economists like Adam Smith and David Ricardo. To them, rents represented *unearned income*. This concept of rent reflected a normative theory of value linked to the division of labor in the economy. As Mazzucato et al. write, "We need to recognize, as Adam Smith did, that there is a difference between profits and rents. . . . The first is a reward for taking risks that improve the productive capacity of an economy; the second comes from seizing an undue share of the reward without providing comparable improvements to the economy's productive capacity."[94] Economic activity defined as "rent" was epitomized, in David Ricardo's view, by landowners who collected rent without contributing to the productivity of land; he deemed them economic parasites.

In her book, Mazzucato traces how with the advent of neoclassical economics in the nineteenth and twentieth centuries, this normative theory of value—and along with it the notion of rent as unearned income—dropped from view. Instead, prices in markets came to be seen as an outcome of the preferences of economic agents maximizing their utility, with any income defined as "value" and a measure of economic productivity. Financialized capitalism has supercharged this view of value, as share prices in stock markets are seen as commensurate with the value and productivity of businesses.

But if we revive the earlier conception of rent in the context of contemporary economic processes like drug development, as Mazzucato urges, three key insights emerge. First, rents are made possible from intellectual property monopolies granted via patents, in which socially produced knowledge is turned into a scarce asset from which its owners can derive financial value. Second, the particular *flow* of rents is configured via a system designed to maximize shareholder value, in which shareholders are purported to have claims on capital even though they are *not* the primary source of risk capital for businesses. Third, the combination of intellectual property monopoly and the strategy of maximizing shareholder value enables economic actors—in this case corporate shareholders—to appropriate value produced elsewhere in the economy. In this case, Gilead's shareholders collected large financial rewards, even as the company's hepatitis C assets materialized from a social, collective process with significant public sources of finance.[95]

This understanding of rents has two important implications. First, it challenges the dominant view of "value," in which prices reflect the preferences of customers in a neoclassical sense. The theory of value advanced by Mazzucato and the classical economists allows us to conceive of value as a dynamic flow, involving processes of value *creation* as well as value *extraction*. With this dynamic theory of value, we can understand the drug prices and flows of capital that emerge from the prevailing system of financialized drug development as a product of specific political-economic relations of power.

Second, once this view of value is made visible, we can apprehend what processes—alongside intellectual property—make the contemporary scale of value extraction possible. As Birch has said, the "capture of monopoly rents is a proactive process"—one that we can observe in the flow of capital from sofosbuvir-based treatments.[96] Studying the flow of capital that emerged from Gilead's ownership of sofosbuvir-based assets—in particular share buybacks, executive compensation, and tax avoidance—reveals the processes of value extraction intertwined with financialized drug development as well as the magnitude of that extraction.

Disinvesting and Distributing Capital: Buybacks, Executive Pay, and Tax Avoidance

Gilead's share buybacks, conceived as a way to maximize shareholder value, illustrate a central strategy of value extraction in the financialized drug development process. The scale of buybacks shows that rather than stock markets financing businesses, the reverse has been true: businesses—and thus their customers and government buyers—have been funding the stock market. A Reuters investigation into the rise of buybacks across large publicly traded US businesses provided an apt name for this strategy: the "cannibalized company."[97]

Of the $30.7 billion that Gilead's executives distributed to shareholders in its first three years of hepatitis C treatment sales, $26.3 billion went to share buybacks

(or "repurchases"), along with $6.3 billion in dividends.[98] By buying back shares, Gilead's executives aimed to raise the value of the remaining ones, promoting trading in the stock, and pushing up its price.[99] The main way to increase share price using buybacks is by artificially boosting a company's earnings-per-share ratio, a key financial indicator used by stock traders: reducing the share count reduces the denominator of this ratio, making the stock more attractive to traders in the near term.[100]

But share buybacks are not a natural feature of corporate strategy and financial markets. Before the 1980s, companies purchasing their own shares in such quantities would have been deemed to be engaging in illegal and manipulative stock trading. In 1982, however, the US Securities and Exchange Commission (SEC) introduced Rule 10-b-18, which gave companies "safe harbor" against charges of manipulation in pursuing such transactions.[101] This gave companies another way, besides dividends, to direct earnings to shareholders. In subsequent decades, share buybacks have grown as a corporate practice. Between 2005 and 2014, the nineteen pharmaceutical companies on the S&P 500 spent a total of $226 billion on buybacks—equivalent to 51% of their combined R&D expenditures.[102]

The rule change came as part of the Reagan administration's deregulatory agenda, with a former brokerage executive, John Shad, heading the SEC at the time. Shad described his agenda plainly to the *New York Times*: "to facilitate the accumulation of capital by corporations by removing regulations."[103] Yet as the pharmaceutical sector and Gilead's case illustrate, the rule change would have a paradoxical effect: though corporations could accumulate more capital, it did not stick around.[104] The buyback rule facilitated the *distribution* of this capital to shareholders via the purchase of a company's own shares. In contrast to the "retain and reinvest" strategy that prevailed in the US economy of the mid-twentieth-century, Lazonick and O'Sullivan term this approach "downsize and distribute." Here, maximizing shareholder value required the distribution of capital from firms to shareholders.[105] Lazonick has a more colorful description: "the legalized looting of the U.S. business corporation."[106]

The use of this buyback strategy to extract capital relied on a second dynamic: linking the strategic interests of senior executives with those of shareholders. In the 1990s, institutional shareholders increasingly tightened the link between the interests of shareholders and senior executives by pushing corporate boards to significantly increase the proportion of executive compensation coming from stock options and awards.[107] Regulatory changes in the early years of the Clinton administration aimed to limit the tax deductibility of salaries over $1 million for the top five executives in a company—unless the additional pay was linked to performance. The most popular "innovation" resulting from this regulatory shift was to use stock options as a primary method of "performance-based" compensation so that executives would have strong incentives to increase share prices. The rise in executive pay over the last three decades—with senior executives

TABLE 5 Compensation for Gilead's top five executives, 2014–2016 (millions of US dollars)

	2014	2015	2016*
John Martin (CEO, now retired)	192.80	231.96	98.15
John Milligan (COO, then CEO, now retired)	89.50	103.35	58.10
Gregg H. Alton (EVP)	56.20	22.57	8.50
Norbert Bischofberger (head of R&D, now retired)	50.70	95.53	7.00
Robin L. Washington (CFO)	26.60	21.97	5.53
Percent from stock-based pay	95%	95%	80%
Total compensation†	415.80	475.37	177.28

SOURCE: Gilead's SEC 14-A proxy filings, 2014–2016.

* As described in chapter 3, the lower 2016 figures reflect Gilead's falling share price in light of slower growth from curative hepatitis C treatments.

† Total of all three years: $1,068,450,000.

today earning 949 times as much as the average worker—has been attributed to this shift to stock-based compensation.[108]

Gilead's senior executives fit this now-common pattern.[109] Between 2014 and 2016, for example, Gilead's top five executives made a total of $1.07 billion in compensation (Table 5). In 2014 and 2015, 95% of that came in the form of stock options and awards; in 2016, 80% did.[110] As Gilead's shares rose on the strength of hepatitis C drug sales, and as its executives directed $26.3 billion to share buybacks, they also exercised their options and grant awards to make sizeable gains from Gilead's ascending share price. As shareholders themselves, Gilead's senior executives have been structurally incentivized to distribute capital to shareholders and to stockpile cash for potential acquisitions.

Value extraction was enabled not only by financial market rules on share buybacks and executive compensation, but also by corporate tax rules that reduced the state's ability to collect rewards it helped produce. Gilead's maneuvers with intellectual property (IP) protections of sofosbuvir are a prime example. In a February 2013 earnings call, Robin Washington, Gilead's CFO, told investment analysts, "The IP of 7977 [sofosbuvir] is domiciled in Ireland, so as we commercialize that, there is opportunity for our tax rate to decline over time."[111] Gilead had transferred the ownership of sofosbuvir to one of its six Irish subsidiaries, and created a licensing arrangement, letting it report lower US profits.[112] Though two-thirds of Gilead's hepatitis C sales were in the US, the company's US tax rate fell by 40%, from 27.3% in 2013 to 16.4% in 2015.[113] A report by Americans for Tax Fairness found that just in 2014 and 2015, Gilead had avoided $10 billion in US taxes by "domiciling" sofosbuvir in Ireland.[114]

This strategy is enabled by legal loopholes in the US tax code, by which companies routinely avoid paying corporate taxes (at that time, 35%) by holding earnings overseas.[115] Companies have argued that this rate hinders domestic investments,

making such "tax planning" maneuvers a matter of survival. Yet when, in 2005, Congress and the Bush administration temporarily lowered the tax rate on profits to be repatriated from 35% to 5.25%, companies directed 92% of their $300 billion in repatriated profits toward the type of share buybacks and executive bonuses described in this section.[116] This was repeated with the Trump tax cut of 2017, which lowered the US overall corporate tax rate to 21%, and the rate for repatriated capital below 15%. US corporations proceeded to spend an unprecedented $1.1 trillion on share buybacks in 2018.[117] In sum, Gilead's strategies show the interconnected ways in which share buybacks, executive compensation rules, and tax avoidance are used to extract value via the financial market, with value flowing from a collective drug development process to Gilead's shareholders.

FROM R&D TO M&A AND BUYBACKS

Two years after the launch of its sofosbuvir-based medicines, Gilead Sciences' then freshly minted CEO John Milligan summed up the company's view of its strategy. "For us it's fairly simple," he told investment analysts. "We have the flexibility to do both things; that is, return shareholder value through stock repurchases and dividends and of course continue to be opportunistic in M&A" (that is, mergers and acquisitions). In reassuring Wall Street, Milligan distilled Gilead's *raison d'ĕtre*—it was a financialized business oriented toward distributing capital to shareholders. By tracing sofosbuvir's trajectory, this chapter uncovers three dynamics of this financialized business strategy and the pricing and value logics it entailed.

First, the financialization of American businesses—a function of the rise of maximizing shareholder value as corporate ideology—incentivized Gilead away from long-term research toward being *acquisition specialists* in the drug development process. Meanwhile, a set of scholastic fashions and political-economic forces present from the 1970s onward shifted the core purpose of business from profits to *growth* in profits—with this growth distributed to shareholders through maneuvers like dividends and buybacks. Yet meeting the double-digit growth expectations of shareholders runs counter to the long-term and risk-laden drug development enterprise. And with its pipelines drying up for lack of long-term investment, Gilead Sciences sought to generate growth by buying it, in the form of drug assets with promising future revenue streams. The prime example: its $11 billion acquisition of Pharmasset and the large revenue streams sofosbuvir promised.

This leads into a second key dynamic in sofosbuvir's trajectory. Gilead's capitalization of Pharmasset's hepatitis C asset revealed the relations of power at play in the pricing and value of medicines. In making its bet, Gilead valued sofosbuvir as an asset that could make the company tens of billions of dollars—far exceeding Wall Street's growth expectations for the business. This valuation would rest on Gilead's ability to turn its prediction of sofosbuvir's "value-based price" into a realized outcome. Gilead's power to project this future drew on two sources: its

anticipation of acquiring Pharmasset's intellectual property and gaining monopoly power over prices; and its confidence that health systems could be compelled to pay more for a better drug. Capitalizing drugs, in turn, required capitalizing politics. Gilead's and the pharmaceutical lobby's sizable "investments" in political lobbying related to drug pricing and intellectual property regulations exemplify this influence. Buying the compound for $11 billion would also require another related power: large stockpiles of capital, much of which the company had accumulated from its prior sales of high-priced HIV medicines.

Gilead's eventual financial windfall from sofosbuvir reveals the third key dynamic in financialized drug development: the role of financial markets in extracting value for shareholders. The company made over $46 billion in revenue in its first three years of sales of sofosbuvir-based regimens, and it spent three times as much on buybacks and dividends as it did on its own R&D. This scale of value extraction is connected to the concept of economic rent, or unearned income. Gilead's shareholders garnered significant financial rewards by trading on an asset that was the product of collective public and private efforts, even as they had risked little of their own capital in the process.

Though Gilead Sciences had prided itself since its origins on being a technoscientific company—as represented in its very name—Milligan had revealed a tension at the heart of financialized drug development. Soothing the "ups and downs" of finance that Gilead's founder, Riordan, had warned his employees about many years ago required a balm of its own sort, one not discovered in its laboratories but driven by Wall Street. It was to specialize in acquiring growth and extracting value for shareholders. But this approach would pose a threat to health systems and patients—and to future breakthroughs as well. We trace these consequences next.