Documenting the Financialisation of the Pharmaceutical Industry

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Abstract

The aim of this paper is to explore the growing financialisation of the pharmaceutical industry from the beginning of the 1990s onwards and to consider its implications. It examines a number of features that demonstrate the increasing influence of the financial sector on the industry, including changing patterns of shareholder ownership, the importance attached to the idea of maximising shareholder value, the pay and share options given to company chief executives and other senior managers, the use of share buybacks, the increase in the outsourcing of manufacturing, and of research and development, along with the growing use of mergers and acquisitions and of borrowing to fund them. The paper examines data in relation to each of these areas in turn in order to provide evidence of the growing financialisation of the industry and to highlight some of its consequences for the industry's task of developing medicines that enhance population health.

Keywords

pharmaceutical industry; financialisation; shareholder value; executive pay; mergers and acquisitions; research and development; outsourcing

The concept of financialisation has been used by a wide range of social scientists over the last twenty years or so to refer to the growing importance of finance capital in western societies since the early 1980s and the associated shift from 'industrial capitalism' to 'finance capitalism' – a form of capitalism in which the financial sector has become dominant in the economy and also influences social and political areas of life (van der Zwan 2014) – a shift closely linked to the growth of the ideology of neoliberalism and its support for free market capitalism (Palley 2013). While the precise definition and value of the

concept of financialisation has been contested (Roberts 2018), Epstein gives this oft-quoted definition: "financialization means the increasing role of financial motives, financial markets, financial actors and financial institutions in the operation of the domestic and international economies" (2005:3). Evidence shows that since 1980 the financial sector, which includes not only retail and commercial banks, but asset management firms, venture capitalists and hedge funds, as well as insurance companies and pension funds, has increased rapidly in size (Greenwood and Scharfstein 2013).

The majority of authors, while usually recognising that the financial sector has a useful role in the functioning of markets, for instance facilitating access to credit, nonetheless view financialisation as having largely negative consequences. On the one hand, they argue that it has adverse implications for the distribution of wealth, increasing social inequality by paying high rewards to those engaged in financial activities, whilst reducing the money going to wage earners. On the other, they contend that the growing involvement of the financial sector changes business practices, including encouraging short-termism and reducing companies' investment, including in research and development (R&D), thereby making them less productive – negative consequences visible, as will be clear, in the pharmaceutical industry.

This paper seeks both to explore the increasing financialisation of the pharmaceutical industry over recent decades and to examine some of its implications for the work it carries out and those affected by it – in particular its vital and sometimes very successful task of developing medicines that enhance population health.

Palley argues that there are three different conduits for financialisation: "changes in the structure and operation of financial markets, changes in the behaviour of nonfinancial corporations, and changes in economic policy" (2007:2). The focus of this paper is principally on the second conduit – the non-financial corporations that together constitute the pharmaceutical industry. But there is also some

consideration of the third – changes in economic policy that are particularly relevant to the industry's practices.

What aspects of pharmaceutical companies should be considered in order to explore the growing financialisation of the industry and its consequences? First, there is a set of interrelated issues relating to the changing character of shareholding in pharmaceutical companies, the increasing importance attached to maximising shareholder value, the changes in pay packages for senior management, and the growing role of share awards and options, as well as the use of share buybacks – areas where the role of the financial sector has become more prominent.

Second, there is a set of issues concerning pharmaceutical companies' increasing use and importance of mergers and acquisitions, the reasons for them, and their financing. Financial institutions are now usually at the centre of mergers and acquisitions, an important source of their income, providing financial advice at considerable expense, carrying out due diligence on the target company, and helping to secure large amounts of credit from banks, asset management companies, or venture capitalists that is necessary to finance the merger or acquisition. One consequence of these changes, as mentioned, is that fewer resources (money and time) are available for investment in the productive activity of the company, such as in-house R&D. Instead of profits being retained and reinvested in the company to the benefit of population health, they are often used for unproductive financial activities that benefit senior managers, shareholders and the financial sector.

In exploring these issues the paper primarily focuses on the top fifteen pharmaceutical companies – a listing that changes quite rapidly over time, not least because of ongoing mergers and acquisitions. Table 1 lists the top fifteen companies in 2017 ranked by a formula giving greatest weight to pharmaceutical sales (40%), but also some weight to factors such as the growth in pharmaceutical revenues and the proportion of revenue from their top three pharmaceutical products. The importance of the top companies to the industry as a whole is indicated by the fact that together the top ten accounted for

around 40 per cent of the global pharmaceutical market (ibid). Indeed the industry is often described as an oligopoly (Galambos 2000).

Table 1: Top 15 pharmaceutical companies, 2017

Rank	Company	Headquarters	Pharma Sales ($ millions)	Pharma sales as % of all sales
1	Pfizer	US	52,824	100
2	Merck & Co	US	35,151	88
3	Johnson & Johnson	US	33,464	47
4	Hoffman la Roche	Switzerland	39,494	77
5	Sanofi	France	35,850	100
6	Novartis	Switzerland	32,562	67
7	AbbVie	US	25,638	100
8	AstraZeneca	UK	23,002	100
9	Gilead Sciences	US	29,953	99
10	Amgen	US	22,991	100
11	Bristol-Myers Squibb	US	19,427	100
12	Teva	Israel	21,903	100
13	Bayer	Germany	17,241	35
14	Eli Lilly	US	18,064	85
15	GlaxoSmithKline	UK	19,969	59

Source: IgeaHub 2018

The companies listed all operate globally. Some, like Pfizer, Merck, Johnson & Johnson, and Eli Lilly, are long-established American companies, making their sales revenue mainly from patented drugs. In contrast Teva, based in Israel, focuses primarily on generics – drugs neither patented nor branded – while Gilead Sciences and Amgen, two US-based companies founded only in the 1980s, developed as biotechnology companies whose emergence is discussed below. And many are the result of mergers between long-established pharmaceutical companies.

Some of the top companies, as Table 1 shows, make a considerable proportion of their sales from over-the-counter consumer products, such as toothpaste, health drinks, skin creams, and shampoo . Indeed, were companies ranked simply by total sales the ordering would be rather different, with Johnson & Johnson topping the list with total sales of $71,890 million in 2017 but only 47 per cent coming from pharmaceutical products. Bayer, at 35 per cent, had the lowest proportion of total sales from

pharmaceuticals in 2017. However, ten of the fifteen had 80 per cent or more their sales revenue from pharmaceuticals.

Methods

This study draws on a range of documentary sources focusing in particular as a criterion for selection on available data on the top fifteen companies. The key sources are:

1. Data produced by the finance industry on the top companies listed in Table 1, for instance Nasdaq data on shareholdings, and Bloomberg's profiles of pharmaceutical chief executives
2. The annual reports and websites of the top-15 pharmaceutical companies.
3. Press releases from the top pharmaceutical companies, such as those issued when mergers and acquisitions involving them occur
4. Data published by various pharmaceutical-related organisations, such as national and international pharmaceutical associations and trade-related publications. These sources mostly provide data on the top companies but also some material relating to the industry as a whole.
5. Academic articles that include data on the pharmaceutical industry and pharmaceutical companies.

Shareholders, shareholder value, senior managers' pay and share buybacks

The increasing financialisation of the pharmaceutical industry can be seen in changes in shareholding, the importance attached to shareholder value in decision making, senior managers' pay packages and the use of share buybacks. To examine these changes it is necessary to look at the industry in its historical context. Many of the oldest pharmaceutical companies were first established in the mid-nineteenth century, set up by individuals who began to see opportunities for selling medicines, often formulating them by combining available substances in distinctive recipes and giving them brand names, or else they were offshoots of the chemical industry. Typically companies were family businesses that passed down between the generations, and by the end of the century had mostly established themselves as legal entities (a process known as incorporation). For instance, Eli Lilly named after, and headed by, its founder, was

set up as a business manufacturing medicines in Indianapolis in1876 and incorporated in 1881, then passed to his son and then grandson, and only first headed by a non-family member as late as 1953.

However, though often already incorporated prior to the Second World War, most of the pharmaceutical companies remained in private hands and were not floated on any stock exchange. It was mostly only from the 1940s onwards that they began to become public companies. For instance, Pfizer, set up in 1849 in Brooklyn as a small business to make up and sell chemicals for therapeutic purposes, was incorporated in 1900, and became a public company in 1942. Johnson & Johnson, established in New Jersey in 1886 manufacturing and selling surgical dressings was incorporated the following year, and went public in 1944, while Glaxo, first established in New Zealand as a general trading company, was incorporated in 1906 following its success with dried-milk baby products, and went public in 1947. In contrast Hoffman-La Roche, set up as a small laboratory in Basel by the father of Fritz Hoffman-La Roche, became a public company in 1919, though initially mostly with family members as shareholders, following a series of major problems created by the First World War. And Merck & Co based in New Jersey, after separating from its German progenitor in 1917 during the War, incorporated in 1927, and became a public company in 1953, and Eli Lilly went public in 1952.

Becoming a public company was an important step, typically designed to allow the company to raise larger amounts of capital to invest in its activities by selling shares to the public. A public listing could also enhance a company's reputation, yet it also gives shareholders more potential power, and can on occasions somewhat constrain the power of company managers, perhaps directing them towards activities they might not otherwise have chosen. Certainly shareholders in return for their share ownership usually hope to secure a profit on their investment in the form of a regular dividend and/or a higher price for their shares when sold.

When pharmaceutical companies first went public, as with other companies, shares were still mostly held by private individuals, if no longer those personally known to the founders or their successors, data

showing that in the US from 1900 to 1945 institutional investors held only around 5 per cent of shares in publicly-listed companies (Blume and Keim 2012). However, since then there has been a growth in institutional shareholding in publicly-listed companies, and the proportion of shares held by institutions in the US had reached 67 per cent by 2010 (ibid). The evidence also indicates that in the case of large corporations the percentage of institutional shareholdings was often higher (ibid). As one would expect, the majority of institutions holding large blocks of shares are financial companies: asset management groups, pension funds, venture capital funds, mutual funds, banks, investment management funds, and insurance companies. And this applies to pharmaceutical companies as to other companies listed on stock exchanges across the world.

Table 2 shows the three largest shareholders in March 2019 in US pharmaceutical companies included in the 2017 top-15 list. Non-US based companies are excluded because their shares are primarily traded on other exchanges and no comparable data is available.

Table 2: Institutional investors in the top US pharmaceutical companies, March 2019

Company	Institutional holdings %	Largest holding	2nd largest	3rd largest
Pfizer	75.1	Vanguard	BlackRock	State Street
Merck & Co	76.8	Vanguard	BlackRock	State Street
Johnson & Johnson	68.1	Vanguard	BlackRock	State Street
AbbVie	70.1	Capital Research	Vanguard	BlackRock
Gilead	80.1	BlackRock	Vanguard	Capital Research
Amgen	79.3	Vanguard	BlackRock	Capital Research
Bristol Myers Squibb	74.3	Wellington	Vanguard	BlackRock
Eli Lilly	79.7	Lilly Endowment	Vanguard	BlackRock

Sources: Nasdaq ownership summaries, 25.3.19

As can be seen, the same institutional investors appear again and again. Vanguard Group, a Pennsylvania investment company, was one of the top three shareholders in all eight of the top US pharmaceutical companies, as was the US-based BlackRock, currently the world's largest asset management company. Notably in the case of Eli Lilly, Lilly Endowment, a large private family foundation, held a significant

proportion of the shares; however the next two largest shareholders were Vanguard and BlackRock. And below the largest shareholders come many more financial companies with smaller holdings

The shift to a situation where financial companies hold the bulk of a company's shares is a clear indicator of the financialisation of the pharmaceutical industry, and is an important means by which the financial sector can exercise power over companies, even though the percentage of shares in any company held by a leading institutional investor is rarely more than 10 per cent and mostly less. An institution with a significant shareholding has far more potential influence than a private individual with a far smaller one, and the sale of a large shareholding is often treated as a sign that the company is not doing well. Hence threatening to sell shares if the company does not find ways to increase share prices or dividends can be an effective way of altering its behaviour. And while financial institutions such as asset management companies often hold shares long term, others such as hedge funds mostly acquire them on a speculative short-term basis using credit, moving their money between companies as a result of anticipated movements in share prices. In either case the share price and the dividends paid out become important markers of a company's success. Equally financial companies can use the threat of supporting a takeover of the company to encourage compliance to their objectives, or put pressure on a chief executive to stand down if they are not satisfied with their performance as, for instance, happened with the chief executive of the British AstraZeneca in 2012 (New York Times 2012). Consequently the chief executives of top pharmaceutical companies have in practice less power over decision making than they had thirty or forty years ago.

Financial institutions can, for instance, try and influence the strategic direction of pharmaceutical companies, as occurred with GlaxoSmithKline when in 2015 Neil Woodford, a UK investment fund manager who had held shares for 15 years, took the company to task (Lobo 2015) for its refusal to consider breaking itself up into more specialised units, as had occurred with Abbot Laboratories which split off its pharmaceutical business as AbbVie in 2012. Woodford proceeded to sell his GSK

shareholding in 2017. However GSK and Pfizer are now in the process of establishing and splitting off a joint consumer healthcare business.

One consequence of such pressures is that the chief executives and other senior managers of pharmaceutical companies are encouraged to ensure that both share prices and dividends are kept high. Indeed, maximising 'shareholder value' has become something of an obsession with the managers of major corporations (Lazonick et al 2017). The term itself simply refers to the returns delivered to shareholders, though precisely how this is to be measured is a matter of debate (Smith 2015). A focus on shareholder value is particularly encouraged by the growing practice of awarding shares and share options as part of the pay packages of senior managers, which means that they have a direct financial interest in maximising share prices and dividends.

Lazonick and colleagues (2017) note the very high percentage of share options and share awards in the total compensation paid to chief executives of US pharmaceutical companies included in Standard & Poor's list of the top 500 corporations – making up around 90 per cent of their pay packages over the period 2006-17. They also note that the newer biotechnology companies were the first of the pharmaceutical companies to start paying exceptionally high remuneration packages to their chief executives, pointing to the case of Gilead, whose chief executive was the highest or second highest paid pharmaceutical chief executive in the six years from 2009 to 2015 (ibid). Significantly shares are not taxed when first acquired, and are taxed at lower rates than salaries. One contributor to the increasing size of the financial packages of chief executives and other senior managers has been the growing use of share buybacks. Share buybacks are an important financial device that companies now use, usually in an effort to raise the price of shares and dividends When a company buys back shares not only is money for dividends divided across fewer shares, raising earnings per share, but it often also pushes up the value of the shares on the stock market. For example, in 2011 following a difficult year in which the company had to settle litigation over a diabetes pill that was pushing down the share price, GSK introduced a share buyback programme of £1 to £2 billion that immediately "cheered investors and lifted GSK shares more

than 3 per cent" (Hirschler 2011). The rise in share prices may be short-lived but sufficient for individuals and institutions to sell off shares at a considerable profit that is taxed at lower levels than salaries. Until 1982 share buybacks were usually considered illegal and rarely used. However that year the US Securities and Exchange Commission added Rule 10b-18 that authorised the repurchase of shares under certain conditions. Since then their use has markedly increased and their use has spread to many other countries.

Of the eight major leading US pharmaceutical companies included in the 2017 top fifteen list i, two, Pfizer and Johnson & Johnson, spent more on dividends and share buybacks than their total net income over the period 2006-15, and two, Pfizer and Amgen, spent over 70% of their net income on buybacks (Lazonick et al 2017). Moreover and importantly, companies do not solely fund share buybacks from profits, they may also obtain credit to finance them. Here the tax policy of a country may encourage such practices, as in the US, where taxes on profits have been higher than those on interest payments so that there has been a direct incentive to borrow rather than to increase profits (Palley 2007).

The orientation to maximising shareholder value and the use of devices such as share buybacks may also have been encouraged by the fact that a significant proportion of the chief executives of the top pharmaceutical companies have formal qualifications in business, mainly MBAs, or economics degrees. MBAs in particular tended in the final decades of the twentieth century to emphasise the importance of maximising shareholder value (Stout 2012; Murray 2013). Analysis of the qualifications of the chief executives of the 2017 top 15 companies in March 2019 shows, five of the fifteen had MBAs and a further three economics degrees (Bloomberg Executive Profiles, 2019). Only seven had degree-level education in science, and this is apparently not considered a prerequisite.

What are the consequences of the focus on share prices, share dividends and share buybacks? The first, previously mentioned, is that companies can become more short-term oriented seeking to maximise immediate shareholder returns instead of making investments that look to the long-term health of the

company (Palley 1997), a short-termism arguably encouraged by, and reflected in, the practice of making quarterly financial returns to the public, mandatory in the US since the 1930s and used elsewhere. In the case of pharmaceutical companies trend data indicate that they have been keen to maintain or increase dividends over recent years, notwithstanding the 2008 financial crisis. Lazonick and colleagues (2017) analysed data on the eighteen US pharmaceutical companies over the period 2006-15 included in the Standard and Poor's top-500 Index in January 2016 and found that over this period they distributed 99 per cent of their profits to shareholders, 49 per cent as dividends and 50 per cent as share buybacks.

A second consequence is that the company may raise the prices of pharmaceutical products to pay for costly share buybacks and dividends. Hence in order to cover their costs companies may need to charge high prices for their medicines to push up revenues. One example is provided by Gilead Sciences which acquired the biopharmaceutical company, Pharmasett, in 2012 that was developing a new drug for the treatment of hepatitis C. When put on the market by Gilead the US prices of what had become two drugs - Sovaldi and Harvoni – were so high, and far higher than Pharmasett had planned, that a Congressional enquiry was set up to investigate (Senate Committee on Finance 2015). Significantly, the increase in Gilead's revenue resulting from the sales of the two drugs was associated with a markedly increased programme of share buybacks (Lazonick et al 2017). There are also numerous examples of steep price rises for drugs already on the market (Angell 2001).

A third consequence is that where the company orientation is towards revenue maximisation then more money is usually spent on marketing and advertising in order to push up sales – what Angell calls 'the hard sell' (2004:115). The high level of spending on marketing by pharmaceutical companies has long been noted, but there is evidence of increased spending in the US at least over the last two decades. A study by Schwartz and Woloshin (2019) found that US marketing expenditure increased from $17.7 billion in 1997 to $29.9 billion in 2016. And while spending on marketing directed at health care professionals accounted for the largest share, spending on direct-to-consumer advertising (legal in the US

since 1985 and made easier by the FDA in 1997) increased significantly. Such marketing means that the prescribing of medicines increases as does the medicalisation of everyday life (Conrad 2007).

A fourth consequence is that if more money is spent on dividends, share buybacks, managers' pay and marketing, less is available to invest in R&D and the development of new drugs Lazonick et al (2017) calculate that share buybacks of the top eighteen US pharmaceutical companies over the years 2006-15 reached as much as 56 per cent of the companies' total spending on R&D. They also note that in the case of Gilead almost all their new drugs since the company was founded came from company acquisitions – a point discussed further below. Moreover, exceptionally high salary packages for senior managers and spending on dividends and buybacks can increase companies' indebtedness and its associated costs.

Fifth, companies oriented to shareholder value can also be especially keen to cut the costs of production and manufacturing. Apart from trying directly to reduce staff within the company one means of doing this, not new to the industry, but that has increased over recent decades, has been the outsourcing of both manufacturing and R&D, usually to countries where labour costs are lower. The former has a rather longer history (Miller 2017) than the latter and is more extensive, but outsourcing of R&D, both basic research and clinical trials, is now occurring quite widely, partly generated by the wish to cut costs but also by companies' lack of success in identifying new drugs (Schuhmacher et al 2016), and is arguably more problematic. Some of this outsourcing is to academic research centres and some to contract research organisations, sometimes in the country where the pharmaceutical company has its headquarters; sometimes to countries where labour costs are lower. While such outsourcing can be effective, there are also drawbacks. It can, for instance, lead to the closure of older R&D facilities and the breakup of research teams, which can weaken the R&D capability of pharmaceutical companies (Ebnesajjid 2017) and may also lead to the loss of jobs in the country where the company has its headquarters. However, the outsourcing of manufacturing, mostly overseas, has not entirely escaped criticism both for the local reductions in employment, but also on grounds of safety. For example, 40 per cent of active pharmaceutical ingredients are made up and supplied by companies in China and this is currently a matter

of some concern since the oversight of such manufacturing is often weaker than in western countries with poor record keeping and fewer spot checks, and there have been a number of recent scandals concerning products (Hancock and XueQiao 2018).

Mergers and acquisitions

The increasing financialisation of the pharmaceutical industry and its consequences can also be seen in the changing character of, and importance attached to, mergers and acquisitions in the industry. It can also be seen as a reflection of the spread of neo-liberal ideas across Western countries. There is a long tradition of mergers and acquisitions involving pharmaceutical companies. These can be an important means to expand a company and enhance its standing, or they can be used to maintain profit levels, or as a defensive strategy to try to ensure survival. However, from the 1990s onwards they have played a more dominant role in the industry, are often larger in scale, take up a large proportion of managers' time and effort, and are associated with a heavy involvement of the financial sector and often increased indebtedness. Prior to the 1990s, mergers and acquisitions in the industry were less frequent (Walton 2001), mostly small-scale, often financed from the accumulation of cash from profits or sometimes bank loans, and overall the financial sector played a smaller role (Andrade et al, 2001). From the 1990s onwards the exchange of shares, along with securing credit and the use of devices such as leveraged buyouts, have become more common methods of financing takeovers, and the financial sector has been more heavily involved.

Following the Second World War through to the 1990s mergers and acquisitions in the pharmaceutical industry were not only somewhat less frequent, but usually less central to companies' activities. In this period pharmaceutical companies were becoming increasingly successful, investing heavily in their own in-house R&D, establishing laboratories to identify new medicines, mostly by testing chemically-synthesised small molecules for their therapeutic properties largely on a trial and error basis. This activity was spurred in part by the success of several US pharmaceutical companies in producing penicillin on a mass scale during the war (Younkin 2008). Companies benefited from patenting the processes they

developed to manufacture penicillin in large quantities, though penicillin itself, first developed by academic researchers, was never patented. Subsequently, while continuing to benefit significantly from government-funded academic research (Kinch 2016), companies were keen to patent the new small molecules they synthesised which had therapeutic potential, since patenting provided a monopoly for a period of time (20 years from the date of filing for countries signing up to the World Trade Organization's 1995 Trade-Related Aspects of Intellectual Property Rights (TRIPS) agreement) that allowed them to charge a higher price if and when, sometime later, the drug came onto the market. New drugs in the early post-war decades included antibiotics such as streptomycin, new psychoactive drugs such as chlorpromazine, and in the 1960s various minor tranquillisers like Valium and Librium, as well as the first contraceptive pill –approved for menstrual disorders in 1957 by the FDA and then for contraceptive use in 1960 and approved in the UK the following year

Legislation introduced in most western countries in the 1930s meant that many drugs required a medical prescription. As a result companies invested heavily in marketing their products to doctors with practices such as 'detailing' – the sending of company representatives to doctors to encourage them to prescribe the new medicines – for instance, a practice widely used in the US to encourage the prescription of chlorpromazine to treat schizophrenia. Drugs also had to be approved by a government agency before release onto the market, with regulatory regimes strengthened following the thalidomide scandal of the early 1960s. Nonetheless, the industry flourished, and the period from the 1940s through to the mid-1970s has been described as its golden age when innovation and profitability were high (Malerba and Orsenigo 2015). The top companies derived the bulk of their profits on the back of a few widely-used drugs, with some becoming 'blockbusters' – now defined as drugs with an annual income of $1 billion or more, but earlier more loosely as drugs selling exceptionally well – such as Valium developed by Roche in the 1960s and marketed as a treatment for anxiety. A later drug, and the first to meet the $1 billion-a-year definition, was Tagamet in 1986 – a treatment for heartburn and stomach acid developed and first marketed by Smith, Kline and French, now part of GSK.

Yet, while a golden age for the companies and many users, there were some disadvantages for the wider society. These included the companies' heavy reliance on introducing profitable 'me-toos' – drugs similar to those already available but sufficiently distinct for a patent to be obtained – rather than on developing new, more innovative products whose chances of success were much lower (Angell 2004; Light and Lexchin 2012) – an issue discussed further below. They also included the relatively high prices charged for patented drugs, especially in the US, as well as the focus on, and heavy promotion of drugs, often for preventive purposes, that could be prescribed for long periods of time, sometimes termed drugs for life (Dumit 2006), such as statins and drugs for hypertension that generated large profits, along with the neglect of medicines for rarer illnesses and those common in poorer countries. There were also other business practices that have been widely criticised such as the farming out of testing to poor countries, often with lower ethical requirements for such trials, as with the testing of the contraceptive pill on Puerto Rican women.

However in the 1990s the situation of the industry started to change. In particular the flow of new innovative chemically-synthesised medicines slowed down in part because in-house R&D had often focused on producing similar drugs to those already on the market rather than more innovative products; in part because the links with academic researchers carrying out the blue skies research on which drug innovation was often based had sometimes weakened (Cockburn 2004). Hence there were anxieties about the loss of income once the patent of a drug on which the profits of a company depended expired – the so-called patent cliff – and this prompted a wave of mergers and acquisitions. Companies wanted to maintain their income flow in future years and ensure it did not suddenly dry up once a patent ended, and this encouraged them to look to acquire or merge with companies which had new patented medicines in the pipeline that had recently secured, or were likely to secure, regulatory approval. For example, Pfizer's (2002) Press Release about their planned acquisition of Pharmacia not only mentioned the number of drugs the two companies had in the pipeline, but also emphasised that whereas the patents of

Pfizer's products would mostly expire within the next ten years, those of Pharmacia would last into the following decade.

However, decisions to take the strategic path of spending on mergers and acquisitions, rather than say making further, often riskier, investments in their in-house R&D, were almost certainly also influenced by the growing importance of the financial sector. Mergers and acquisitions were actively encouraged by the sector since they helped to increase the profits of financial corporations through the large fees charged for advising on services such as identifying target companies, assessing their financial standing, and making arrangements for any necessary credit, for instance, through leveraged buyouts, or effecting complex share exchanges. Mergers and acquisitions are big business for the financial sector and their increasing use across the industry constitutes an important indicator of financialisation, given the major role of the financial companies in enabling them.

Such factors underpinned the mergers and some acquisitions involving the major pharmaceutical companies in the 1990s and 2000s. Table 3 lists those occurring between 1989 and 2009, with a number of companies appearing more than once.

Table 3: Mergers and acquisitions of top pharmaceutical companies, 1989-2009

Date	**Merger or Acquisition**	**Combined company name**
1989	Bristol-Myers (US) and EJ Squibb (US)	Bristol-Myers Squibb
1993	Kabi Vitrum (Sweden) and Carla Erba (Italy)	Pharmacia
1995	Glaxo (UK) and Burroughs Wellcome (UK)	GlaxoWellcome
1995	Pharmacia (US) and Upjohn (US)	Pharmacia and Upjohn
1996	CIBA (Switzerland) and Sandoz (Switzerland)	Novartis
1999	Astra (Sweden) and Zeneca (Britain)	AstraZeneca
2000	Hoechst (Germany) and Rhone Poulenc (France)	Aventis
2000	Glaxo Wellcome (UK) and SmithKline Beecham (US)	GlaxoSmithKline
2000	Pfizer (US) and Warner-Lambert (US)	Pfizer
2001	Bristol-Myers Squibb (US) acquires DuPont Pharma (US)	Bristol-Myers Squibb
2003	Pfizer (US) acquires Pharmacia (US)	Pfizer
2006	Bayer (Germany) acquires Schering (Germany)	Bayer
2009	Merck & Co (US) with Schering-Plough (US)	Merck & Co
2009	Pfizer (US) acquires Wyeth (US)	Pfizer

Though these mergers and acquisitions might suggest increasing consolidation of the industry, globally the total number of pharmaceutical companies with active pipelines was growing, increasing from 1,198 in 2001 to 4,323 in 2019 (Pharma Intelligence 2019). Consequently the share of the top ten companies actually fell: 46 per cent in 2000 (Busfield 2003) by 2017 it was, as noted earlier, only 40 per cent. However, there is evidence of some consolidation in particular therapeutic areas (General Accountability Office 2017).

From the 2000s onwards, top pharmaceutical companies also engaged in a rather different set of acquisitions involving some of the new biotechnology companies that were springing up. Biotechnology companies had been founded from the mid-1970s onwards, with a focus on 'biologics' – biological rather than chemically-based drugs and medicines – and their character and research direction were rather different from those of the existing pharmaceutical companies. Most were relatively small with a strong scientific orientation and had little expertise in sales and marketing, some licensing their products for these purposes to the major pharmaceutical companies.

Biologics, which are derived from naturally occurring biological substances, were not new. Many early medicines were based on natural substances. Vaccines used for preventive purposes from the end of the eighteenth century are biologics, as is insulin, a substance identified in the early 1920s as the key treatment for diabetes, and for a long period produced for therapeutic purposes from animals, usually the pancreases of pigs. In contrast however, the new biotechnology companies drew on scientific developments in genetics, and their work largely resulted from developments in DNA technology carried out by academic researchers at several universities, particularly those in California.

Of especial importance was the development of recombinant DNA techniques hat combined DNA molecules. This enabled, for instance, the development of human insulin in 1978, one of the original successes of Genentech set up in 1976, the first of the new biotechnology companies to be established. Another was Biogen founded in Geneva in 1978 and best known for the drug Interferon. Many new

biotechnology companies followed, facilitated in part by the 1980 Bayh-Dole Act that allowed US companies to retain patent rights from federally-sponsored research – a direct subsidy to them (Kinch 2016) and a clear indication of the importance of neoliberal economic policy for corporations. Yet another was Amgen established in 1980 that made much of its early profits from the drug Epogen, a version of the hormone erythropoietin first isolated by an academic researcher, and then produced using recombinant engineering (Goozner 2004) – a firm now one of the top 15 (bio)pharmaceutical companies. Yet another was Gilead Sciences founded in 1987, best known for its antiviral Tamiflu, and also now a leading company.

The financial sector has been especially important in the establishment of some of these companies that often depended heavily on investment particularly from venture capitalists. Venture capitalists played an active role in the establishment of some of the new companies, as with all four mentioned above – Amgen, Biogen, Genentech, and Gilead. Starting from scratch they needed considerable capital for staff and equipment to get the business off the ground.

The biotechnology companies initially developed as separate companies somewhat outside the framework of the pharmaceutical industry, and the products they developed were targeted at very different markets. Whereas the ideal drug for the major pharmaceutical companies of the golden era had a very extensive market, usually underpinned by long-term use, the new biologics were, after the first successes, often targeted at far smaller groups, such as those with relatively rare cancers – a shift facilitated in the US by the Orphan Drugs Act of 1983 that increased the tax incentives for work on drugs for rare disorders and subsequently permitted fast track approval. Yet by charging exceptionally high prices the drugs could still be made very profitable despite the limited markets.

Indeed, once the achievements of the new biotechnology companies, in terms both of product innovation and profitability were apparent, not surprisingly they became the object of takeovers by leading pharmaceutical companies. These, after their successes in the decades following the Second World War

were, as noted, having less success in identifying new medicines with large-scale markets. as one company advising on mergers and acquisitions argued:

> The large, complex organizations of the originators are unsuited to fostering innovation. An ecosystem of venture capital has proven much more effective in selecting early-stage biomedical research opportunities. Essentially, venture capitalists today pre-finance the early-stage development for pharma companies (Kurmann Partners undated)

The term 'originators' refers to the companies first authorised for worldwide marketing of a new medicine. Hence instead of investing more extensively in their own in-house R&D, which had often focused on developing me-toos rather than on more innovative medicines or early-stage research, top companies increasingly regarded it as cheaper and more effective to take over a biotechnology company, or to license in some of their products. For example, Hoffman-La Roche acquired Genentech in 2009 – a company in which it already had a significant stake – even though Genentech initially opposed the full acquisition (Knowledge@Wharton 2010). Table 4 lists some of the acquisitions of biotechnology companies, mostly US-based, by the leading pharmaceutical companies since 2000, mainly over the second decade.

Table 4: Leading pharmaceutical companies acquisitions of biotechnology companies, 2001-18

Company	**Biotech acquisitions**	**Price $ billion**
Pfizer	2015 Hospira (US) 2016 Medivation (US) 2109 Array Biopharma (US)	17.0 14.0 10.6
Merck & Co	2014 Idenix Pharmaceuticals (US) 2014 Cubist Pharmaceuticals (US)	3.9 8.4
Johnson & Johnson	2017 Actelion (Switzerland)	30.0
Hoffman la Roche	2009 Genentech (US)	44.0
Sanofi	2011 Genzyme (US) 2018 Ablynx (Belgium)	0.1 4.8
Novartis	2018 AveXis (US)	8.7
AbbVie	2016 Stemcentrx (US) 2019 Allergan (Ireland)*	10.2 63.0
AstraZeneca	2007 MedImmune (US) 2012 Ardea Biosciences (US)	15.6 1.3
Gilead	2011 Pharmasset (US)	11.2
Amgen	2001 Immunex (US) 2013 Onyx Pharmaceuticals (US)	16.0 10.4
Bristol-Myers Squibb	2012 Inhibitex (US) 2012 Amylin Pharmaceuticals (US) 2015 Cardioxyl (US)	2.5 7.0 2.0

	2015 Flexus (US) 2019 Celgene (US)*	1.3 74.0
Teva	None	
Bayer	None	
Eli Lilly	2017 CoLucid (US)	1.0
GlaxoSmithKline	2012 Human Genome Sciences (US)	3.0

Note: includes biotechnology acquisitions priced at $1billion or more.
* Not yet completed

As Table 4 shows, such acquisitions have been frequent, with all but two of the leading companies making them. The acquisitions have been considered necessary because the biotechnology companies were proving more committed to, and versatile and creative in, drug innovation than the leading pharmaceutical companies. Yet some of the target companies had not made any profit and were bought on the basis of the products under development, some of which failed after the takeover. Evidence of the leading companies' belief in the value of the new companies as the source of product innovation and potential profitability is provided by the fact that some of the major pharmaceutical companies also set up their own venture arms to invest in new biotechnology companies across the world (ABPI 2017). One result of the acquisitions has been the blurring of the boundaries between the two types of company and the increasing use of the term 'biopharmaceutical'.

Moreover, alongside these acquisitions, some of the major companies have divested themselves of components of their businesses or split up in order to become more specialised and leaner (Gautam and Pan 2016), such as selling off animal welfare and consumer product arms – the strategy that Neil Woodford had sought for GSK. The best-known example is Abbot Laboratories' division into two companies in 2013, Abbott for health care products and AbbVie for pharmaceuticals. Another indicator of the growing financialisation of the industry is pharmaceutical companies' increased use of credit and leveraged buyouts in order to finance costly mergers and acquisitions. For example, one acquisition of a pharmaceutical company not listed in Table 3, since neither was in the 2017 list of top companies, is Japanese Takeda's acquisition of Irish-based Shire Pharmaceuticals in January 2019, which will probably put the combined company in the list of leading companies. In order to finance this $62 billion deal

Takeda, actually the smaller of the two companies, had to borrow $31 billion from the banks (Du and Takahashi 2018). Similarly Teva's $40.5 billion acquisition of another pharmaceutical company, Actavis Generics, from Allergan was largely financed through loans including a $34 billion initial bridging loan (Bloomberg 2017).

Yet while top pharmaceutical companies clearly see mergers and acquisitions as necessary and desirable they can have negative consequences. In the first place it is common for the acquiring company to do less well financially than the target company in terms of falls in share price (Andrade et al 2001) and credit rating (Neville 2019). Another consequence can be the stifling of innovation with innovation in the combined company becomes less dynamic One study of 65 pharmaceutical mergers looked at innovations before and after the event comparing them with companies in similar markets without such acquisitions, found that "R&D and patenting within the merged entity decline substantially after a merger, compared to the same activity in both companies beforehand" (Haucap and Stiebale 2016:4). Indeed Haucap and Stiebale argue that reducing competition can be a motive for the acquisition. They also suggest that mergers and acquisitions can reduce the innovation of competitors. Yet, as noted, large pharmaceutical companies increasingly rely on the acquisition of smaller companies for product innovation, as with Gilead mentioned above. Comanor and Scherer (2018) contend that one problem is that the combined company may try to reduce what they consider the 'duplication' of R&D (they give the examples of Pfizer's takeover of Wyeth). However, they contend that having 'parallel paths' of research with different individuals trying out different possibilities can be the best means of making technological progress. In contrast Shepherd (2018) argues that the fact that R&D internal to the company is no longer the main source of drug innovation is unproblematic, and simply indicates the development of a new business model where drug innovation is generated externally. However, if the acquisition of a company stifles innovation then this is highly undesirable.

Another consequence can be that companies seek to reduce the size of the workforce, often encouraged by the need to show cost savings to justify the merger or acquisition and to pay for the borrowing that has

been necessary. For example, when Pfizer merged with Wyeth in 2009 – a merger motivated by the desire to acquire the statin Lipitor, so far the best-selling drug of all time – the chief executive of Pfizer promised to make $4 billion in savings. One means of doing so was to reduce the labour force. In 2008, before the merger Pfizer had 81,800 employees, and Wyeth 47,246, a total of 129,226. By the end of 2009 following the merger the combined total had fallen to 116,500, and by the end of 2013, it was only 77,000, although some of this reduction was due to Pfizer spinning off certain parts of the business. Altogether, however, something like 35,000 jobs were lost (Staton 2014). This may have been good for the business, but that would not have been how the majority of the job losses were experienced by those involved, and indicates how mergers and acquisitions encouraged by the financial sector can redistribute resources away from employees. Indeed this, combined with the enhanced resources going to top managers, can be a source of increased inequality within a country.

Neoliberal economic policy has played an important role in these developments, as with both the 1980 US Bayh-Dole Act that allowed the patenting by commercial companies of substances and processes grounded in academic research, and the SEC's new 1982 rule permitting share buybacks. Pharmaceutical companies have benefited in numerous other ways from such policies over the period from the 1980s onwards. Of particular importance was the WTO's 1995 TRIPS agreement that covers matters such as copyright, trademarks and patents, which is widely used to protect intellectual property rights across the world including those of pharmaceutical companies. While patenting is usually justified as a way of protecting a company's investment in a drug, it can be to the detriment of low-income countries that cannot afford the prices of the drugs produced by high-income countries, but are prevented from producing generic equivalents or the newer biosimilars. The Doha Declaration of 2001 relating specifically to public health did, however, allow intellectual property rights to be overridden in some cases, permitting compulsory licensing by a government of drugs for certain conditions, such as HIV and malaria, and of others in situations of emergency such as the spread of major epidemics.

In addition, the regulatory approval process for new drugs has been somewhat loosened over this period. On the one hand, the increasing internationalisation and the intense lobbying by major pharmaceutical companies helped to lower some thresholds for approval (Abraham and Reed 2001; Davis and Abraham 2013). On the other, through legislation such as the US 1983 Orphan Drugs Act it was determined that drugs for rare and life-threatening conditions do not have to have the same level of testing before release onto the market (Kinch 2016). Such loosening, while usually advantageous for the pharmaceutical companies' revenue, means that individuals prescribed the drugs soon after they are released onto the market become guinea pigs and may suffer major adverse consequences.

Conclusion

The pharmaceutical industry has been transformed since the beginning of the 1980s. While its core business is still that of producing and selling substances with therapeutic value for the benefit of patients, and there continue to be some important successes, the companies now differ considerably in character from those in the decades following the Second World War. The changes in character are linked to neoliberal economic policies and an increasing financialisation of the industry, most obviously visible in the high proportions of shares in pharmaceutical companies held by major financial companies, but also in the business strategies they adopt. These include changes to the size and character of the financial packages paid to senior managers, now typically concentrated on share options and share awards, along with the extensive use of share buybacks and increased spending on marketing, all of which take up an growing proportion of company expenditure. They also include the heavy reliance on securing new, potentially profitable drugs, via mergers and acquisitions, and in many cases the dependence on borrowing with the aid and encouragement of the financial sector to accomplish them. While some of the factors underpinning these business strategies come from within the industry, they are also encouraged and supported by the interests of the financial sector, and by the economic policies of governments whose neoliberal thinking has facilitated the growth of the financial sector.

What also becomes clear is some of the negative consequences of this financialisation, not least because of the need to cover the costs of dividends, share buybacks, senior managers pay packages, and marketing, as well as the various costs of mergers and acquisitions. The first is the very high prices now often charged for new or existing drugs, including those acquired from smaller biotechnology companies. This has major implications both for patients and health care systems. In the US, for instance, this can mean the price of a drug is prohibitive even for those individuals with health insurance or covered by Medicare or Medicaid given the high level of deductibles, co-payments or co-insurance that can be required. And high drug prices also push up state health care costs. Second, because of the costs of financialisation less money is available to spend on increasing investment in R&D that could generate new medicines. Whilst the leading companies mostly continue to spend significant sums on R&D, the main sources of innovation are now to be found in smaller companies. Moreover, the extensive use of mergers and acquisitions can also contribute to declines in drug innovation when the two companies merge and so have adverse consequence for patients. Third, leading companies also continually engage in cost cutting exercises by increasingly outsourcing production, manufacturing, testing and even R&D to countries where labour costs are lower. Whilst this is judged necessary by companies, the consequences for those who lose their jobs are very different and along with managers' large pay packages increases inequality.

Hence while overall he results of financialisation may be positive from the point of view of the companies themselves, the senior managers and their shareholders, the consequences for patients, employees and the wider society are far more negative.

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