

# Open Research Online

---

The Open University's repository of research publications and other research outputs

## Restructuring and innovation in pharmaceuticals and biotechs: the impact of financialisation

### Journal Item

#### How to cite:

Gleadle, Pauline; Parris, Stuart; Simonetti, Roberto and Shipman, Alan (2014). Restructuring and innovation in pharmaceuticals and biotechs: the impact of financialisation. *Critical Perspectives on Accounting*, 25(1) pp. 67–77.

For guidance on citations see [FAQs](#).

© 2013 Elsevier Ltd



<https://creativecommons.org/licenses/by-nc-nd/4.0/>

Version: Accepted Manuscript

Link(s) to article on publisher's website:  
<http://dx.doi.org/doi:10.1016/j.cpa.2012.10.003>

---

Copyright and Moral Rights for the articles on this site are retained by the individual authors and/or other copyright owners. For more information on Open Research Online's data [policy](#) on reuse of materials please consult the policies page.

---

[oro.open.ac.uk](http://oro.open.ac.uk)

## **Restructuring and innovation in pharmaceuticals and biotechs: the impact of financialisation**

### **Abstract**

In this paper we explore whether a financialisation perspective can provide a more empirically satisfying account of recent developments in the pharmaceutical industry than the more commonly used resource-based or transaction cost approaches. Specifically, we note the evolution of the pharmaceutical industry structure from giant vertically integrated firms, selling patent protected blockbuster products at premium prices, to greater vertical disintegration. Big Pharma<sup>1</sup> now sources a significant volume of early stage R&D activity externally, through outright acquisitions or alliances, especially with biotechnology firms. Much of the reason for such vertical disintegration is to be found in the fundamental tension experienced between the high R&D spend necessitated by the cost of pharmaceutical innovation and declining returns on this expenditure in terms generating new product sales and FDA approval rates, which have remained broadly constant at an average of 20-35 approvals per year. The new R&D outsourcing strategy has not delivered an increase in marketable drug discoveries or new 'blockbuster' profits. Instead, shareholder returns have been maintained through Big Pharma's decision to distribute cash back to shareholders via share buybacks and dividends (as advocated by Jensen). Thus we conclude that such developments within Big Pharma worldwide are best explained through the lens of a financialisation, as opposed to a resource-based or transaction cost framework.

Key words: financialisation, Big Pharma, biotech firms, resource-based frameworks, transaction cost frameworks.

### Highlights

- Discusses a financialisation perspective for the evolution of the Big Pharma business model
- Assembles and explores empirical evidence supporting financialisation interpretations
- Concludes that this perspective explains developments better than usual alternative frameworks.

### **1. Introduction**

The Big Pharma industry has undergone major changes since the time when Froud et al (2006 p.153) argued it enjoyed a 'licence to print money'. Operating as giant vertically integrated firms, Big Pharma's high returns arose from a combination of enforceable patent rights, price-insensitive purchasers and a sympathetic regulatory environment. In this environment, blockbuster drugs defined as ethical pharmaceuticals generating annual sales

---

<sup>1</sup> The term 'Big Pharma' refers to large usually multinational pharmaceutical firms such as Pfizer and GSK. By way of contrast, in using the term 'biotech', we are referring to small speciality pharmaceutical and diagnostics firms.

of at least \$1 billion, which were protected by patents, were sold into the healthcare market at premium prices.

However, this traditional blockbuster model now confronts a 'patent cliff' (Kaitin, 2010) as key patents in the major pharmaceutical firms' portfolios face imminent expiry with little or no replacement by newer products capable of generating blockbuster-sized revenues. The traditional business model of the Big Pharma industry was that of resource-based innovation, in which US Food and Drug Administration (FDA) approval facilitated long-lasting patents and strong cost recovery. Once blockbuster drugs go out of patent, generics invade Big Pharma's lucrative blockbuster markets, forcing considerable price erosion. Generics can quickly reduce drug prices by over 80% (Garnier, 2008) and so a significant proportion of Big Pharma's current revenue is progressively exposed to generic competition as key patents in portfolios expire.

The response of Big Pharma has been firstly to continue with a significant commitment to R&D, allied with heavy investment in marketing and distribution to maximise revenues from successful innovation. But secondly, and significantly, Big Pharma companies have increasingly focused on restructuring activity which includes both mergers and acquisitions as well as accessing the products of innovative effort carried out by smaller biotechnology firms (biotechs) (Andersson, Gleadle, Haslam & Tsitsianis, 2010; Haslam, Tsitsianis & Gleadle, 2011). This article assembles evidence that a traditional integrated model of the Big Pharma firm, whose high investment returns enabled it to focus on research-based drug discovery, has given way to a financialised model whose priority of defending returns to shareholders may no longer support the strategies most conducive to new 'blockbuster' discovery. We argue that financialisation occurs when the main objective of financial investors, to generate a higher and less risky return on equity and debt, gains in importance over – and moves out of line with - the concerns of employees, customers, suppliers and others directly involved in the flow of material and human (as distinct from capital) resources. Investor interests start to conflict with other stakeholders' once the relationship between investment, innovation and return on capital ceases to be clear. The conflict is exhibited in emergence of company strategies and an industry structure which preserve profitability without reversing the fall in R&D productivity and innovation.

During the period 1985-2000, Big Pharma delivered high shareholder returns, with an annual Return on Equity (ROE) of over 20% (Baber & Kang 1996, BusinessWeek 2004, Trombetta 2005). In this period the industry also continued delivering new drugs, benefiting customers while generating returns derived from earlier investments in internal R&D activity. We argue that subsequent to this period, a key symptom of financialisation is that Big Pharma firms ROEs are maintained using financial strategies (such as raising debt and outsourcing R&D) that no longer benefit customers. Associated structural change, especially the outsourcing of early stage R&D activity used to generate future revenue, has not arrested the rapid rise in cost for each new discovery.

This paper therefore assesses whether such a 'financialisation' perspective, taking greater account of external pressures on resources and strategy especially from financial markets, can offer a more empirically satisfying explanation for pharmaceutical/ biotechnology industry development than widely used transaction-cost and resource-based approaches. We argue that these widely adopted approaches do not easily explain the Pharma industry's move to greater outsourcing and geographically dispersion of R&D and production which have yet to yield new products comparable to the blockbusters delivered under the industry's previously vertically integrated structure. Nor are these theories consistent with the spread of strategic alliances between Big Pharma and biotech, as an alternative to full acquisition and vertical integration.

The paper adopts the following structure. Section 2 explores the tension between R&D for innovation and financial returns and FDA approval. Importantly, we argue that all R&D, both outsourced and in-house, represents a significant gamble given the low rate of approvals by the US FDA. Section 3 then discusses the current developing relationship between Big Pharma and the biotech industry which we argue is a direct response to the above changes. Section 4 focuses on the case of the Big Pharma firm, GSK, as it responds to the major problem faced by generics in a fashion that we argue is consistent with general industry trends. In Section 5, we return to the typology of section 2 to argue that the transition from an originally integrated to a more financialised firm is clearly visible in the Big Pharma industry, and GSK in particular, despite the complexity of restructuring to date.

## **2. The tension between R&D for innovation and financial returns and FDA approval**

Until recently, Big Pharma profitability was derived from a small number of highly profitable 'blockbuster' drugs, developed from investing in a wide portfolio of research projects, each with a low probability of success. Large, vertically integrated firms carried out virtually all the stages of the drug discovery and commercialisation process, from the discovery of the New Molecular Entities (NMEs) that constitute the active ingredients in medicines to large scale clinical trials, production and marketing. Globally, Big Pharma's R&D expenditure continued to rise until 2010 (Hirschler 2011). In the US, the dominant pharma market, R&D expenditure as a percentage of sales is still above 16%, a level first reached in the early 1990s as Figure 1 shows.

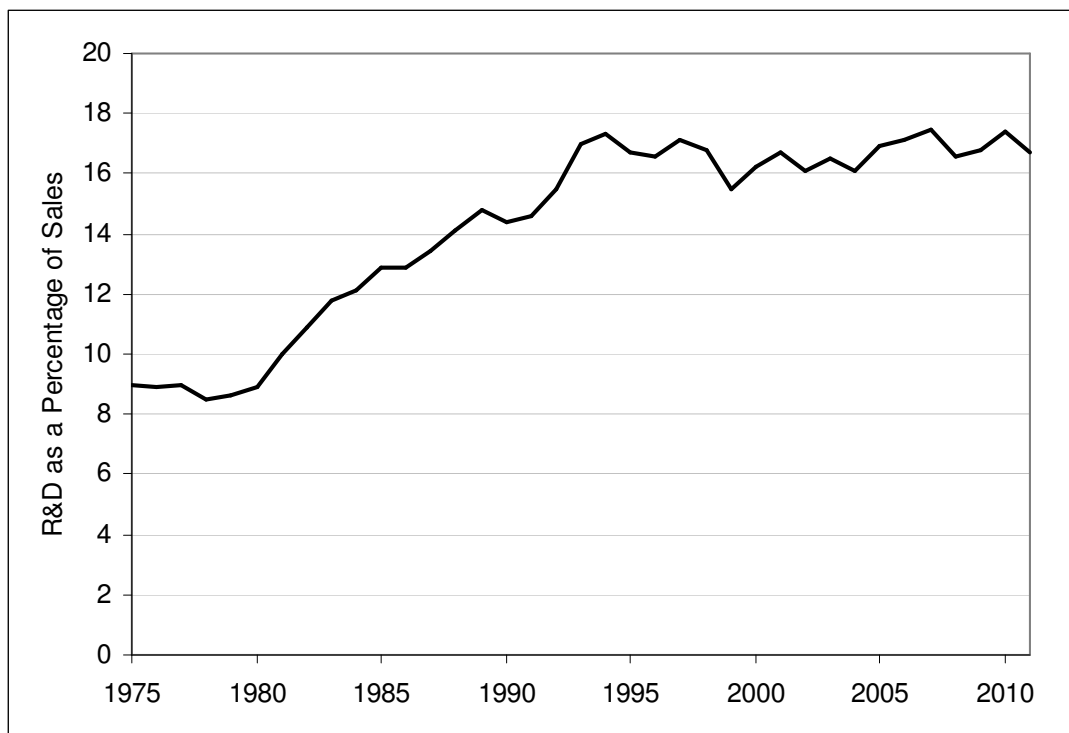


Figure 1 R&D as a Percentage of Sales, PhRMA Member Companies: 1975–2011

Source: PhRMA 2011, Table 2

However, Big Pharma has experienced a significant decline in R&D productivity. Slower discovery of NMEs from the late 1990s (see Figure 2), in spite of persistently high R&D investment as a proportion of sales (Hirschler 2011), has led to a drying up of Pharma drug development pipelines. Simultaneously, sales income from existing blockbusters is threatened by the prospective entry of providers of low cost generic drugs as a result of the expiry of key patents protecting existing blockbusters.

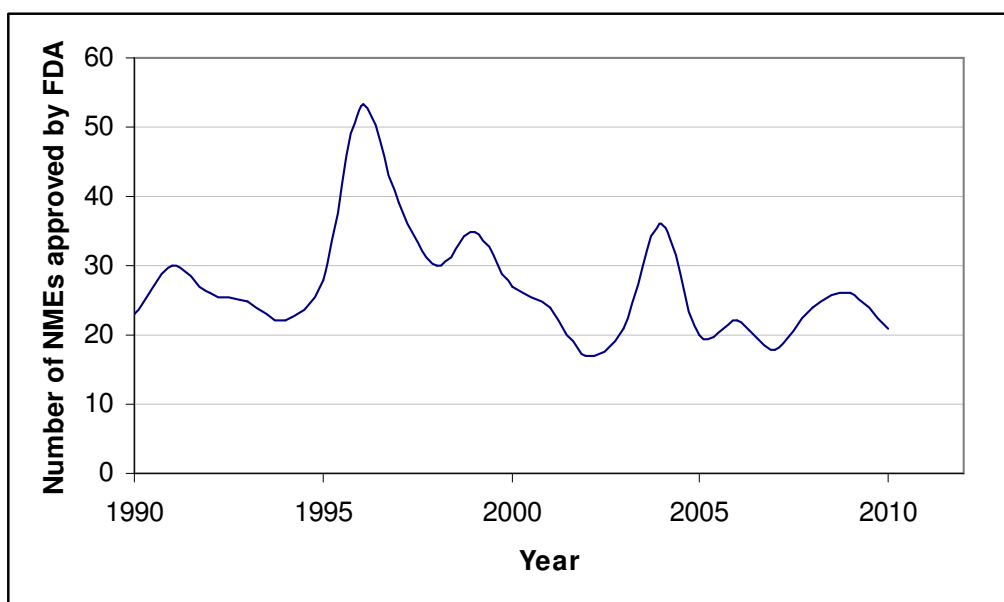


Figure 2 Number of NMEs approved by FDA

Source: US Food and Drug Administration

The industry’s traditionally high investment returns from past R&D are now under threat from shortening effective patent lives and rising generic competition, and its ability to retain a proprietary-technology advantage is challenged by lower and increasingly uncertain returns from its ongoing R&D spend. Figure 3 shows how productivity of pharmaceutical sector R&D has continued to decline, resulting in a rising cost per approved NME (Scannell et al, 2012). This decline in R&D productivity may have been exaggerated if, as critics of the industry’s data allege, it overstates its R&D spend (and understates its advertising spend) by misclassifying some promotional costs as research costs, especially in later-stage (Phase IV) trials (Gagnon & Lexchin 2008). But even a more restrictive definition of R&D spend does not remove the productivity decline. This may even be worse than Figure 3 suggests given that the therapeutic significance of NMEs has also declined, with NMEs now providing “only minor clinical advantages over existing treatments” (Light & Lexchin 2012).

As in US Big Pharma spend as percentage of current sales also represents a high level of investment in R&D required to generate a dollar of future income. The relatively unchanging number of NME approvals each year (Figure 2), and the rising costs of drug development (Figure 3), highlights the declining probability of a marketable output per unit of R&D input.

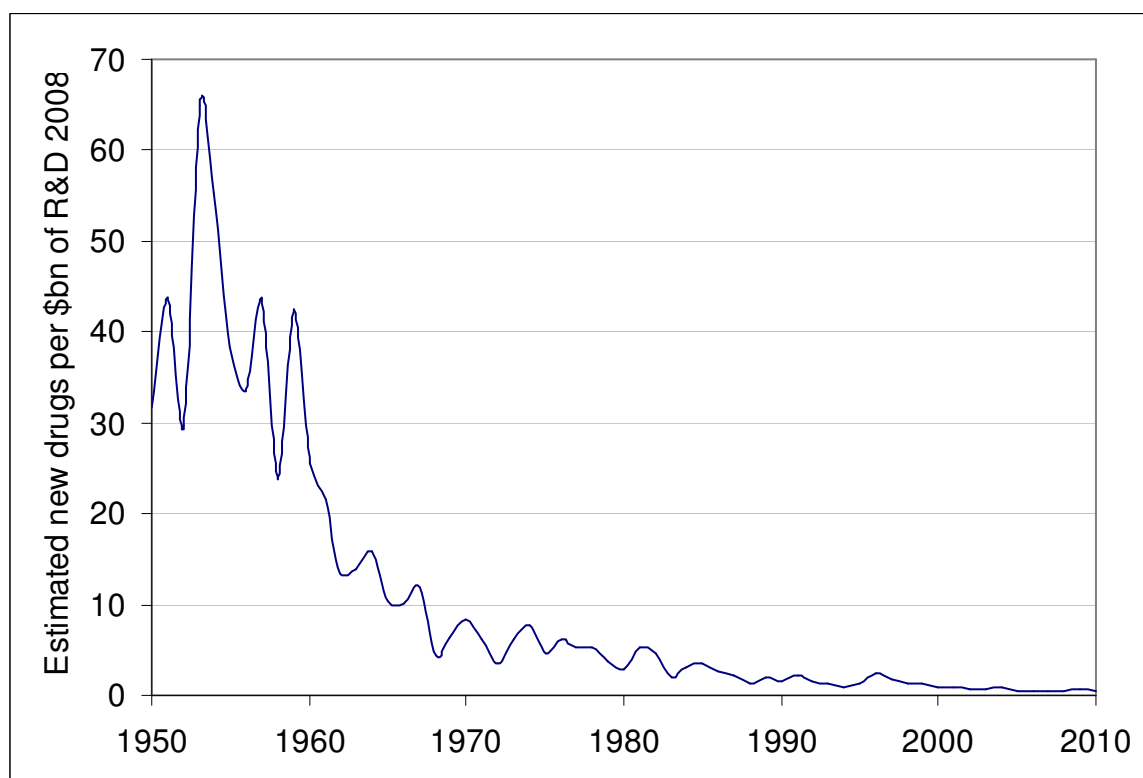


Figure 3 The decline in R&D productivity

Source: Scannell et al. 2012, dataset available at <http://www.nature.com/nrd/journal/v11/n3/suppinfo/nrd3681.html>

Pharma strategy has been to pursue a structural change in the industry following a strategy of mergers and acquisition (M&As). The industry has seen some mergers between pharmaceutical giants (such as Glaxo and Wellcome, and Sanofi and Aventis) to improve pipelines. Indeed, M&As have become so widespread in pharma that the value of the deals is often higher than R&D expenditure, as Figure 4 shows.

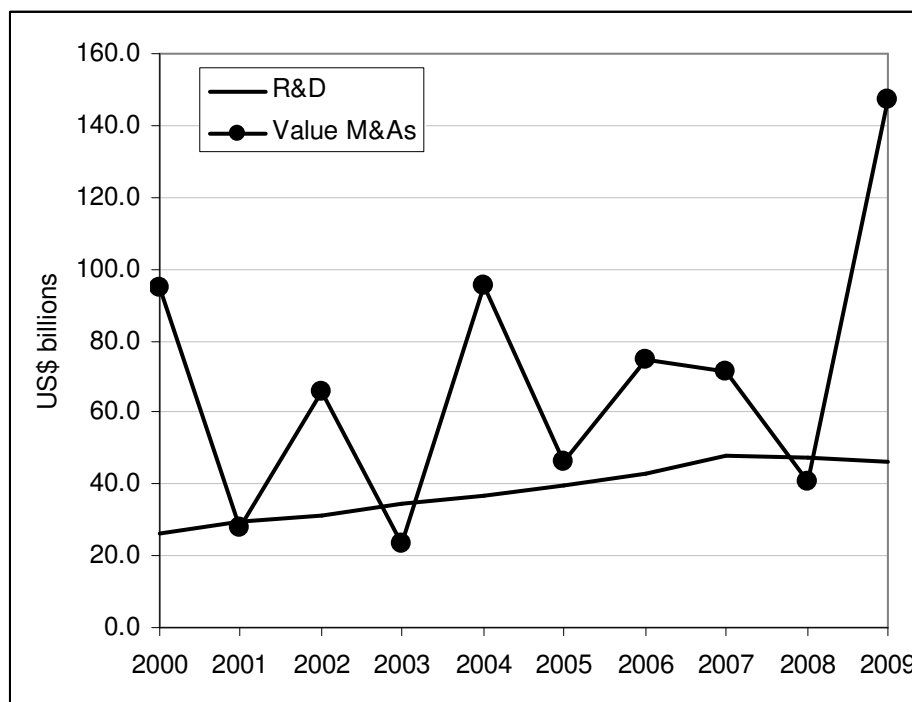


Figure 4 R&D expenditure by Pharma members and value of worldwide pharma M&As.

Sources: Pharma 2011, Table 1, and DealSearchOnline.com (quoted in Stone, 2012)

Moreover, many pharma companies have acquired science-based small innovative biotechnology firms with developing NMEs pipelines. The focus of Big Pharma M&A is towards biotechs with ‘late-stage assets’ whose contribution to the future product pipeline is already visible or highly predictable (Montalban & Sakinc 2011, Stovall 2012). Reliance on small independent innovators for early-stage research does not automatically mean Big Pharma reducing its own R&D commitment: externalised or acquired R&D appears to complement, rather than substitute, internal R&D provided this remains ‘high-level’ in terms of budgeting and commitment (Hagedoorn & Wang 2010). The expectation is more that by acquiring other firms, Big Pharma can improve their pipeline position and improve future revenue expectations:

*“The hope is that post-merger, the acquiring company will have a stronger pipeline of drugs that can be carried forward in its R&D organization (as well as an enhanced worldwide distribution system)” (Scherer, 2012)*

But increased 'outsourcing' of early-stage R&D, and acquisition of firms with products already in the pipeline, helps to spread the risks of R&D spending, substituting 'real options' on potential NMEs for direct expenditure on their initial development.

In spite of outsourcing and acquisitions, however, the pipelines of Big Pharma have not improved, and large firms increasingly rely on small biotechs for the discovery of new drugs, a trend recently acknowledged by the CEO of Sanofi Aventis:

*"We're not going to get out of research. We believe we do certain things well in research but we want to work with more outside companies, start-up biotechs, with universities. ... The reality is the best people who have great ideas in science don't want to work for a big company. They want to create their own company. So, in other words, if you want to work with the best people, you're going to have to go outside your own company and work with those people ..."* (Silverman, 2012)

Big Pharma's increasing reliance on biotechs for effective innovation has led to a structural change in the industry, with science-based small innovative biotechnology firms developing and patenting NMEs. Big Pharma firms follow up their vertical disintegration of R&D with the acquisition of late-stage R&D outputs, or of firms that control them (Haslam et al, 2011; Stovall 2012), licensing the compounds and concentrating on later stage development, marketing and production. Their spending on advertising now substantially exceeds that on R&D (York University 2008, Froud et al, 2006). The focus of Big Pharma M&A has shifted towards biotechs with 'late-stage assets' whose contribution to the future product pipeline is already visible or highly predictable (Montalban & Sakinc 2011, Stovall 2012).

The evolution of biotech challenges conventional explanations for the sector's transformation – including the transaction-cost and resource-based perspectives - which tend to assume a consonance between firms' strategic changes and an industry's structural changes, so that restructuring improves performance. Transaction-cost approaches assume that firms decide whether to be vertically integrated (make) or rely on suppliers (buy) by comparing the costs of market transactions with those arising from internal coordination of economic activities. Whereas most transaction-cost explanations identify efficiency improvements for the industry through vertical separation and horizontal differentiation (e.g. Williamson 1971, 1985; Carroll et al 1999), pharmaceutical restructuring is often found to have been dysfunctional from an industry perspective (Pisano 2006, Nightingale & Martin 2004). Technological collaboration between independent firms is frequently held back by non-publication of results, especially those showing compounds' ineffectiveness, lack of trust and on-going competition, especially when the partners differ in size and market power (Dodgson, 1993). Transaction-cost theories have previously pointed to vertical integration as an efficient solution to such problems.

There has been a similar difficulty matching vertical separation to resource-based explanations, which explain industry structure by focusing on the distinctive internal capabilities of firms. It has been argued that small biotechs are better-suited to early stage



R&D because they provide a vibrant environment for creative science and escape the bureaucracy built up around past innovations, whereas Big Pharma is better adapted to the more standardised and higher-cost procedures of later stage R&D. But distancing the capability for innovation (associated with biotech) from the resources for innovation (concentrated in Big Pharma due to their size and profitability) appears to have restricted information sharing, created inefficiencies in the discovery process due to the high attrition rate of biotech firms (Pisano, 2006). And by moving control of innovation projects from management to investors (Gopalakrishnan et al., 2008), it does not necessarily release laboratory practice from profit targets and cost accounting.

Strategic alliances have gained in popularity – rising almost twenty-fold in the period 1980-2002 (Montalban & Sakinc 2011) - despite the absence of clear advantages from a transaction-cost and resource-based perspective,. These approaches usually ascribe the continued innovation problem in pharmaceuticals, after vertical disintegration, to technological and institutional factors - such as deceptive early rewards from low hanging fruits, long lead times from discovery to innovation and problems with the patent system (Jaffe and Lerner, 2004). However, such explanations neglect the role and motivation of financial institutions and investors in driving the industry's development since the 1980s.

Industry restructuring that appears dysfunctional from a traditional 'productionist' perspective may be better understood from a 'financialisation' perspective that focuses on financial stakeholders' motives. Financialisation is here defined as a change in strategic priority from delivering value to customers (in the form of marketable products) to delivering value to creditors and shareholders (in the form of distributable profit or financial instruments saleable at profit). Table 1 summarises the shift in strategic priorities caused by financialisation, as defined in this way.

**Table 1 Strategic priorities under idealist 'Integrated' and 'Financialisation' perspectives**

	Integrated approach		Financialisation approach	
	Pharma	Biotech	Pharma	Biotech
Priority stakeholder	Customers (doctors, patients, state agencies)	Customers (Pharma companies, independent distributors)	Shareholders, bondholders, banks	Pharma partners, other equity and bond holders
Main product focus	Marketable drugs	Marketable or development-stage drugs	Retrade-able bonds, shares, strategic share-holdings	Retrade-able shareholdings, development-stage drugs
Main performance indicator	Market share, growth rate, patents, new product	Patents, new products	Return on equity, distributable profit, share price.	Return on equity, IPO valuation, share price

	pipeline			
--	----------	--	--	--

This definition encompasses the growing power of financial markets over companies, in particular through greater pressure to maximise share prices and shareholder value (e.g. Froud et al, 2006). Financialisation involves a shift of profitability from 'real' operations to the 'financial', both within companies and for the economy as a whole. It can also involve shifts in financial structure, between equity and debt, driven by their relative costs when adjusted for perceived risk. Financial investors' preference for spreading risks through portfolio diversification, rather than letting managers do so through long-range diversification, led to a break-up of American and European conglomerates in the 1980s and 90s. This 'return to core competencies', while consistent with resource-based theories, left managers of the newly-focused companies looking for other ways to spread their risks of sales and earnings fluctuation.

Financialisation implies greater pressure on management to maximise returns on capital – these being a measure of success increasingly built directly into executives' financial incentives, via share options and other performance-related pay. From a financialisation perspective, given the deterioration in R&D productivity, a consistent level of high R&D spending on own product development and use of capital to acquire or sell on NME prospects are seen as a financial gamble that managers have to take in order to sustain the high level of ROCE required by financial markets.

### **3. The relationship between Big Pharma and biotechs**

With vertical disintegration, the biopharmaceutical industry's survival and future growth has become increasingly dependent on an efficient transfer of financial resources from Big Pharma to small biotech, repaid by an efficient transfer of marketable innovations from biotechs' early-stage research to Big Pharma's later-stage testing and commercialisation. In the long interval before any income from marketable products, most biotechs must rely on external financial resources to support their costs of innovation. Technological uncertainties, over whether NMEs will be effective, are compounded by financial uncertainties, over whether investor confidence will be retained and funding channelled to the next stage of research. Convincing narratives (Froud et al 2006; Andersson et al, 2010; Haslam et al, 2011) over the coherence of the research programme, and its likely outcomes, become increasingly important for assembling and maintaining a coherent network of stakeholders around the potential innovation.

Shareholder value approaches envisage that the resource flow to new technologies will be faster and more efficient if powerful financial markets exist which can shift capital from high-profit low-growth corporations to new firms with innovation potential. In particular, Jensen (1986, 2000) argues that the stock market acts as an effective mechanism forcing mature corporations to distribute free cash flows, which value-driven investors can then channel to whatever new areas offer the highest return. Arrighi (2010) shows that

financialisation at the late stage of a long upswing enables profits to be re-assigned from mature technologies to newly emerging ones. These otherwise contrasting perspectives on financialisation are united on its capacity to transfer profit from the corporate into the financial sector, and so enable the reallocation of investment to new technological areas. The financing of new product development, previously carried out in the 'internal capital markets' of Big Pharma, has become more reliant on external capital markets that smaller biotechs need to access.

Rather than biotechs developing as competitors to Big Pharma, the significant risk of biopharmaceutical innovation has resulted in the emergence of a co-dependency between biotech and Big Pharma. The uncertainty in the drug discovery process requires biotech operate a mechanism to reduce risk of failure (Pisano, 2006). The high risk of failure of any individual drug candidates necessitates spreading risk across a range of NMEs in various stages of development and precludes, for most biotechs, following any one NME all the way to the market. These risks, together with rising cost of innovation through each stage of development requires biotech firms to reduce the risk of the late stages of the innovation process by trading intellectual property assets, whose sale on the basis of early test results avoids incurring significant trialling, manufacturing or marketing costs. To achieve the return on equity required by their high risks, innovative biotechs must therefore generate new products that have a probability of achieving high-volume sales under patent (Nikisch et al. 2009), and then successfully sell the intellectual property rights to a Big Pharma firm. The principal reason for small innovators not bringing their products to market (and relying on Big Pharma to do so) is the high cost of later-stage development, especially the large-scale clinical trials. However, even after avoiding the later stage development costs, biotechs still need high returns to offset risk and their correspondingly high costs of capital. This may offer an explanation for the increasing concentration of R&D investment in high risk opportunities characterised by a low probability of success but reflecting large unmet therapeutic needs (Pammolli et al. 2011).

At the earliest stages of the innovation process, when investors face the greatest risk, external finance has partly been absorbed by public-sector provision and subsidy. An increasing amount of basic research has been conducted within research institutions and universities, in some cases providing the initial intellectual opportunity for a biotech company (Vallas et al. 2011). To the extent that they financed the groundwork for innovation in the past, however, governments are increasingly concerned to reduce their subsidy cost or to attain a return on their investment, and government policy is often focused on developing innovation systems that encourage public sector researchers to generate their own financing by commercialising their intellectual property (DTI 1999).

External financing of biotech commercialisation is generally staged to account for the changing risk profile of the research and discovery process. The different funding channels available to biotechs follow the development of the firm from early stage basic research,

through to pre-clinical testing and several phases of clinical tests. Early stage research is when the investment risk greatest and direct access to public equity markets is unlikely. Instead, specialist private equity and venture capitalist intermediate, raising investment funds from markets acting as specialist investors in early stage commercialisation opportunities. As the biotech progresses, it can expect to gain access to additional private equity and subsequently, if expectations of performance are perceived as credible, raise finance directly on public markets.

Private equity (including venture capital) partnerships borrow on wholesale markets to finance equity holdings in non-financial firms, operating on a 3-5 year time horizon which is typically much longer than that of commercial banks geared to working-capital finance. Private equity tends to acquire expertise in a targeted range of industries, and to build up a portfolio of participations that spreads risks while staying within an area of industry expertise. It aims for trade sale or initial public offering (IPO) of the equity stake as the usual means of exit, making profit mainly by capital gain on equity sale.

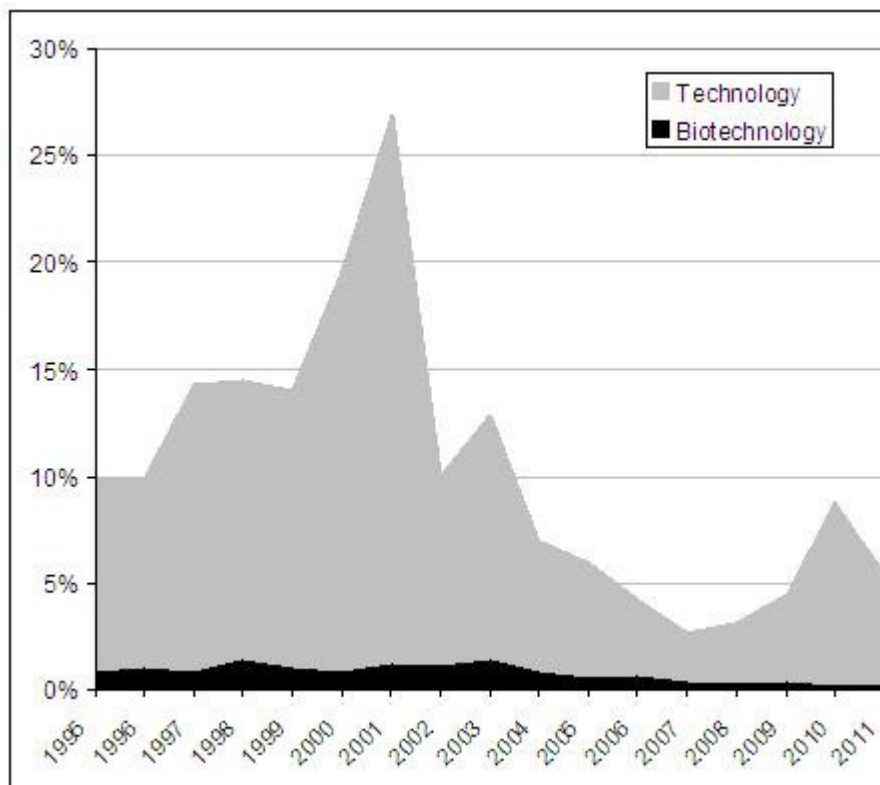
The success of Big Pharma's strategy to acquire future products and revenue from biotechs partly relies on the ability of investors to raise funds for private equity and venture capital to invest in new biotech opportunities. A successful outcome of increasingly financialised strategy would result whereby capital is efficiently re-allocated via a series of intermediaries, fund managers and investors to support the next generation of promising entrepreneurial and innovative companies and industry leaders. The prospect of very high speculative gain provides a motive for private equity to subscribe capital to early-stage biotech, even though any marketable outputs are likely to arise well beyond its typical 3-5 year time horizon. Here public equity markets' contribute to the efficient capital re-allocation, in by firstly returning capital to successful venture capital and private equity investors, those that have invested in firms able to achieve IPO. Secondly and relatedly, that by gaining access to public markets, biotechs can obtain additional capital to invest in their own product development.

Pension funds and other institutional investment funds, searching for higher yield at a time of low long-term interest rates and blue-chip equity returns, have raised their portfolio allocation to venture capital (especially in the US and UK) in the past 15 years, substantially increasing total capital flow to the sector (Gompers 1998, Jeng and Wells 2000). This move was assisted by pension-fund regulatory changes, and tax changes including the creation of limited partnerships.

However, speculative gains for investors in biotech have generally failed to materialise (Pisano, 2006). In the longer term this model of investment has proven unsuitable for companies that will typically require 10-15 years of development time, especially as the change of ownership after re-sale (by IPO) can often disrupt the specialist teams and working environment that initially drove the research project (Pisano 2006). In addition the funding of high-risk SMEs from venture capital has experienced a shift of strategy towards

larger, lower risk investments (Lockett, Murray & Wright, 2002; BIS, 2012). These have become more focused on later-stage product and process development or the restructuring, merging and downsizing of established larger firms. As pension funds raised their exposure to private equity and expanded their share of total private-equity funding, the private equity funds receiving their investment, have tended to become more risk-averse. Institutional investors' movement towards later stage involvement means that although the UK private equity investment sector is the largest in Europe, investment for early stage opportunities has declined. For instance data from the British Venture Capital Association (BVCA) members' survey show that the size of biotech investment is insignificant compared to the overall investment total. While explaining how biotechs' high risks can be absorbed into 'mainstream' portfolios, this indicates the low priority of biotechnology and technology investment generally assigned by venture capitalists in the UK (see Figure 5).

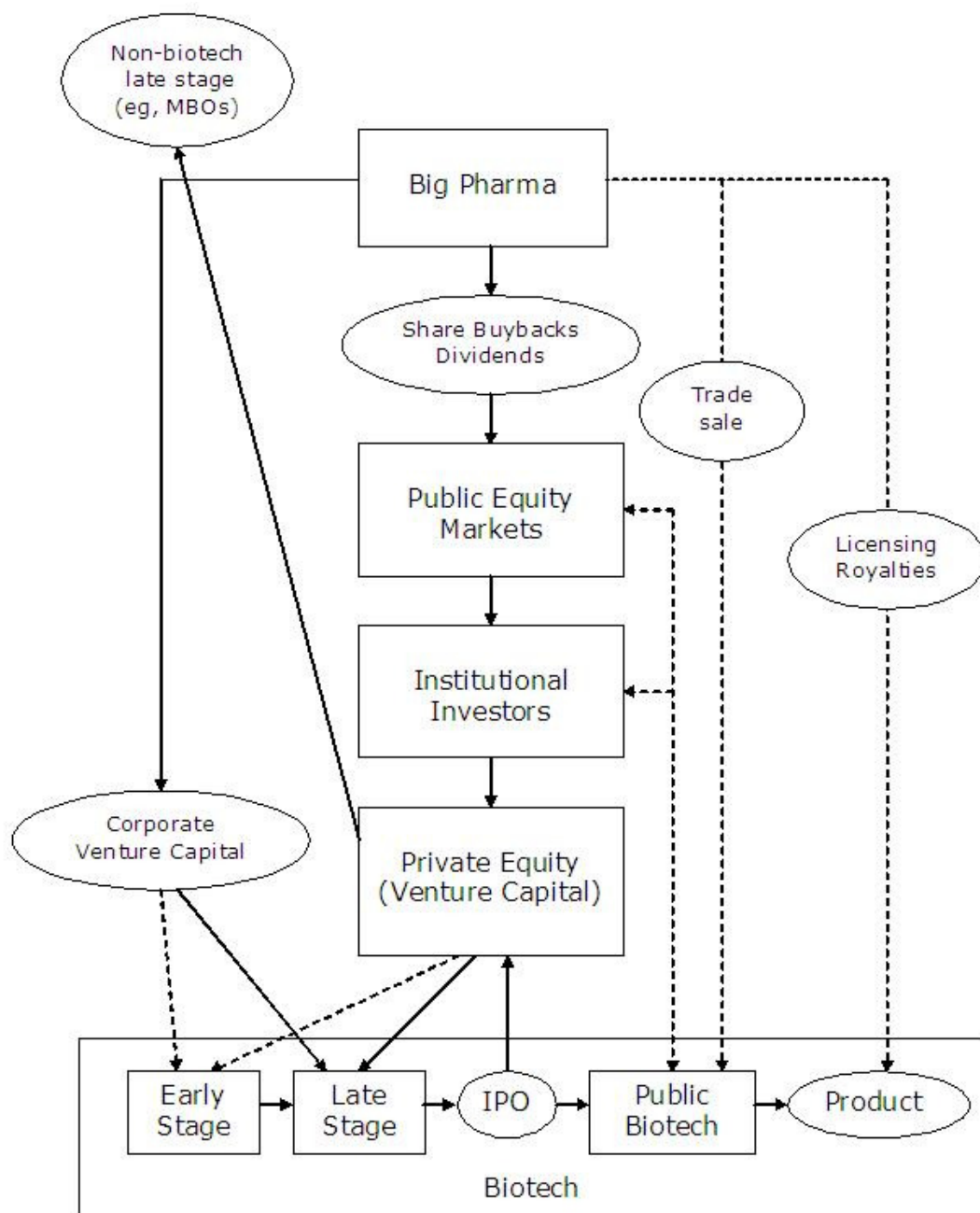
In the case of a biotech with innovative outputs appropriate for acquisition by Big Pharma, either via trade sale, or purchase of intellectual property, the transfer of funding from Big Pharma to biotech is clear. Although harder to measure, an increased return of capital to shareholders by Big Pharma, for example via dividend or share buybacks, could be one means of increased channelling of equity or debt capital into biotechs (or other small innovative businesses) by private or institutional investors or by banks. In fact the return of cash to shareholders via dividends and share buybacks increased through the 1990s, apparently in response to greater capital market pressure on management (Lazonick and O'Sullivan 2000). But the performance impact of return of capital by Big Pharma (and big companies in general) has usually been negatively assessed, especially when conducted through share buybacks, both for medium-term operational and long-term final performance (Lazonick and Tulum 2011; Lazonick 2008).



**Figure 5: Early stage biotech and technology investment as a percentage of total BVCA member reported investment activity (BVCA, 2012)**

The full range of channels by which external investors can finance biotech and capture returns from investment in NMEs before or after they are brought to market, is shown in Figure 6. By tracing the different financial market routes, this highlights the complex financial relationship between Big Pharma and biotechs. This complexity is further illustrated by our case study of GlaxoSmithKline (GSK), which is used to investigate the impact of financialisation on the relationship between Big Pharma and biotech.

Figure 6 Financial-market routes for capital flow from Big Pharma to biotech



#### 4. The case of GSK

The impact of a weakening ‘blockbuster model’ on financial performance of Europe’s largest Big Pharma company, GlaxoSmithKline (GSK), is shown in Table 2. The expansion of equity in 2003-8, at a faster rate than post-tax profit, also points to a declining return on equity. Return on capital employed (ROCE) declined even more sharply because of the rapid rise in corporate debt – though without this, return on equity might have declined even more sharply. During this period, under chief executive Jean-Pierre Garnier, GSK was still attempting to raise its R&D productivity by improving the allocation and application of resources through its ‘internal’ markets for financial and human capital. Garnier created 12 autonomous research centres, each focused on a particular ‘family’ of diseases and stage of

new product development, designed to give high-achieving scientists the same degree of power and financial reward that they might expect in a smaller innovation-based company – and to deter them from quitting to join such companies, or switching into general management for career progression. “These inspiring product finders represent less than 1% of the R&D population, but their value is exponentially greater. They must be identified, protected and supported” (Garnier 2008:72). At this stage, the aim was still to create an environment within Big Pharma that could retain the ‘best people’, as identified by Silverman (2012), by giving them the rewards and resources that they would otherwise seek in stand-alone research based companies.

Table 2: Profit, Capital employed and ROCE, GSK

£ Billion	Post tax Profit	Long Term debt	Equity	Post Tax ROCE
2003	4.3	3.6	5.1	49.4
2004	4.0	4.3	5.9	39.2
2005	4.8	5.3	7.3	38.1
2006	5.5	4.7	9.4	39.0
2007	5.3	7.0	9.6	31.9
2008	4.7	15.2	7.9	20.3
2009	5.7	14.7	10	23.1
2010	1.8	14.8	8.9	7.6
2011	5.4	12.2	8.0	26.7
Total/Average	41.5	81.8	72.3	26.9

Source: Authors’ calculations from annual accounts

When Garnier left the company in 2008, he claimed measurable success for this strategy, with GSK enjoying R&D productivity 2-3 times its competitors’ average, and the largest number of drugs/vaccines in late-stage development (Garnier 2008:70). But as Table 2 suggests, this reconfiguration of in-house R&D had not arrested the decline in investment returns, or the underlying drop in R&D productivity. “From 1998 through to 2007 the company spent about \$4.2bn annually on R&D with no satisfying results” (MarketLine 2011 p10). Acquisitions during this period, designed to strengthen in-house R&D, contributed to the decline in ROCE by expanding equity, which virtually doubled in 2003-10, and multiplying its debt.

Garnier’s decentralisation strategy had also laid the foundation for a decisive step away from ‘internal’ markets for labour and intermediate products, towards outsourcing “anything that is not critical to the core mission and R&D process” (Garnier 2008: 72). Under his successor, Andrew Witty, GSK abandoned its attempts to keep major NME development in-house, and began to spin-out major stages of the R&D process, drawing on the work of exceptional scientists in specialist companies rather than trying to re-create the ‘biotech’ environment within the Big Pharma bureaucracy. In 2008 it narrowed the focus to 8 in-



house Centres of Excellence for Drug Discovery, while also pursuing 50 'discovery programmes' at its Centre of Excellence for External Drug Discovery. Annual R&D spend rose 8% to £3.9bn (\$6.1bn (or £4.4bn, \$6.9bn after £0.5bn major restructuring costs) in 2010, and GSK has pledged to keep it at 14% of annual sales; but since 2008 only 30% of this has gone to preliminary research (MarketLine 2011 p10). Witty made clear that more R&D would now be pursued in collaboration with external partners, announcing that, "Externalising R&D enables GSK to capture scientific diversity and balance expenditure and risk in drug development. In the future, we believe that up to 50% of GSK's drug discovery could be sourced from outside the company" (GSK 2008). The R&D contract with Anacor, for anti-infectives research, typifies the new type of conditional collaboration: GSK in 2007 agreed to pay an initial £12m, £10m in follow-up investment and £250-£330m (\$390-520m) in 'milestone' payments for candidate drugs in return for exclusive global licensing rights to any compound that proves commercialisable (PharmaWatch 2007).

From a financial perspective, the change of strategy showed early success: the trend decline in ROCE was reversed in 2009 and, after a setback to profit linked to the UK and Eurozone recessions, the upturn resumed in 2011 (Table 2). However, this improvement was not connected with a measurable improvement in R&D productivity: the increased buying-in of research results was associated with a 33% rise in R&D expenditure between 2007 and 2010 (Table 3) without a comparable rise in marketable NME approvals. Over the same period, the company significantly increased its return of cash flow to shareholders, via share buybacks (SBBs) and dividends (Table 3). SBBs were suspended in 2009-10 during the 'credit crunch' that followed the 2008 banking crisis. A new long-term SBB programme was launched in 2011, with repurchases of £1-2bn targeted for that year, reflecting a commitment "to use free cash flow to support increasing dividends, undertake share repurchases or, where returns are more attractive, invest in bolt-on acquisitions" (GSK 2011 p4). This SBB resumption in 2011 was associated with the first significant fall in GSK's R&D outlay (Table 3), suggesting a recognition by management that the company's R&D could not offer shareholders a higher return than they would get by re-investing elsewhere.

Table 3 GSK share buy-backs, dividends and R&amp;D

£ Billion	SBB	Dividends	R&D
2000	1.2	2.0	2.5
2001	0.8	2.3	2.6
2002	2.2	2.3	2.9
2003	1.0	2.3	2.8
2004	1.5	2.5	2.8
2005	1.0	2.3	3.1
2006	1.4	2.6	3.4
2007	3.5	2.8	3.3
2008	3.7	2.9	3.6
2009	0.0	3.0	4.1
2010	0.0	3.2	4.4
2011	2.1	3.1	4.0
<b>Totals</b>	<b>18.4</b>	<b>31.3</b>	<b>39.5</b>

Source: GSK published accounts

A summary of GSK's financial performance across the decade (Table 4) confirms that debt-financed acquisitions which significantly increased its long-term debt, and share buybacks multiplied leverage and significantly reduced ROCE. While R&D continued to rise in line with sales, declining R&D productivity meant that ROCE fell (Table 2). The explicit switch to an externalised R&D strategy from 2008 coincided with commitment to an increased return of cash to shareholders, creating conditions in which it is very difficult to continue increasing R&D spending (internal or external) in line with sales unless the long stagnation of R&D productivity is suddenly reversed.

Table 4 GSK 2000 to 2011

£ Billion	2000	2005	2011
Sales	18	21.7	27.4
R&D	2.5	3.1	4
Profit post tax	4.3	4.8	5.4
Equity	7.7	7.3	8.0
Debt	1.7	5.3	12.2
Capital Employed	9.4	12.6	20.2
Capital to Sales %	52.2	59.0	76.6
Profit ROCE %	45.7	38.1	26.7
R&D to Sales %	14	14.3	14.5
Debt to Equity %	22	68	138

Source: GSK published accounts and authors' own calculations

## 5. Discussion and conclusions

In this paper we have characterised the change in the Big Pharma innovation model from vertical integration towards a restructuring with an increasing dependence on the acquisition and transfer of marketable innovations from sources external to the firm. Previously in the vertically integrated Big Pharma industry (Table 1), the firm would be expected to minimise transaction costs and achieve cost advantages via economies of scale in production. Such cost advantages, coupled with internal discovery processes which generated patent protected blockbuster products, provided significant revenues and high ROCE.

However, such high ROCE expectations have proven unsustainable for Big Pharma in recent years, as the price and profit position of blockbusters post patent expiry, have been eroded by competition from generics. In addition Big Pharma R&D productivity has fallen, threatening future revenue income. We argue that the demands of financial markets have pushed Big Pharma towards a financialised model –R&D via internal resources and capabilities can no longer support the drug discovery process to generate the returns expected. As new discoveries in biochemistry and cell biology quell earlier hopes of simple

links between NMEs and specific diseases, R&D generally has become viewed as being more of a financial gamble, which can deliver desired returns to shareholders only if internal R&D commitment is combined with sourcing NME opportunities external to the firm to maintain future pipelines, and supported by narratives communicated to investors.

In a financialised world, returns on investment depend on how firms restructure via capital markets, as well as how their capital is internally deployed. Jensen (1986, 2000) stresses that managers should use debt and repay cash to investors, so that finance can flow to the most productive parts of the industry. In pharmaceuticals this is consistent with Big Pharma's transition from an integrated to a more disaggregated model, in which – beneath continued high headline rates of R&D spending - investment (and investment risk) are significantly redirected to innovation specialists, the more successful of which are later acquired.

To achieve this vertically disintegrated model, biotechs and other developers of NMEs offering significant future prospects, might expect improved access to funding and so the industry as a whole would benefit thereby from increasing numbers of marketable drugs. However, we have indicated that outsourcing the discovery and development of NMEs has not resulted in a substantial increase in new drug approvals. In fact approval rates have remained relatively constant over time (Figure 2) – whilst expenditure on R&D and acquisitions, as shown in Figure 4 increased. Likewise, private equity and venture capitalists have been unwilling to significantly increase funding to small firms in the biotech industry as indicated by the BVCA statistics presented in Section 3, as the risks of failure remain too high.

In this financialised Big Pharma-biotech business model, external sources of NMEs (such as biotechs) are expected to reduce the R&D gamble for Big Pharma, so that it can tackle the R&D productivity decline and continue to meet external shareholder expectations. Big Pharma companies position themselves to acquire leading drug candidates, and subsequently apply their scale advantages to later-stage development, manufacturing and marketing in order to achieve the necessary ROCE. However, although this process has been under way for more than a decade, we have identified a distinct lack of positive results, which can be traced to the new industry structure's departure from the efficiencies revealed by transaction-cost and resource-based theory. The spinning-out of R&D to specialist companies might improve access to innovative researchers (who are drawn to them by small-firm autonomy and financial incentives), and might improve the industry's allocation of risk (small biotechs absorbing that of early-stage research, Big Pharma that of later-stage clinical trials). But it has significant structural disadvantages - particularly the fragmentation of knowledge across non-communicating teams, barriers to inter-firm knowledge transfer and the duplication of research due to non-disclosure of negative results – which have been well documented by resource-based and transaction-cost studies of technological collaboration.

The GSK case study in Section 4 provides an example of the impact of financialisation. The firm's debt to equity ratios have increased, as has capital employed. ROCE has generally fallen, exacerbated by the long development times in the industry (i.e. a lag between investment and receipt of profits arising from that investment), but also by the stubbornly low probability of success of investment, resistant to a strategy of outsourcing the discovery and early stage development of NMEs. In fact, the GSK share price has underperformed the FTSE100 since 2002 (GSK, 2012). Like many other pharmaceutical firms, GSK has increased flows of finance to shareholders in the form of increased dividends and greater use of share buy-backs (Jack, 2011).

A pattern of returning investment to GSK shareholders is reflective of industry trends. Big Pharma's inability to raise its return on capital, despite continued high rates of knowledge development in the life sciences, raises questions over whether the financialised model can be sustained, or was merely a transitional feature as the industry moved away from its 'blockbuster' model and searched for alternatives that could justify its historically high R&D commitment. As a result of its continued failure to address the fall in R&D productivity, Big Pharma is now reducing its R&D spending, re-assigning funds to marketing/advertising or returning them to shareholders on the basis that this will bring better returns for shareholders. Although the American Pharmaceutical Manufacturers' Association (PhRMA 2011) shows R&D spending still rising as a proportion of sales between 2005 and 2010, the independent Thompson-Reuters survey shows a decline beginning in 2010 (Hirschler 2011). GSK and AstraZeneca announced large R&D spending reductions in early 2010 (Dorey 2010); and Pfizer, the largest life-sciences R&D spender, announced significant cuts for 2012 (R&D Magazine 2011).

The possibility that growing external shareholder and creditor pressure on Big Pharma has led to changes in R&D strategy, and delivery of returns to investors without development of new products for customers, is of significant public interest. The evidence reviewed in this paper suggests that externalisation of early-stage research has allowed Big Pharma to reduce technological risks and improve shareholder returns without arresting the long decline in R&D productivity. Indeed, it may have promoted a redirection and fragmentation of R&D which reduces the chance of its yielding significant breakthroughs, despite the arrival of new genomic and biotech research techniques. Major companies' commitment to return funds to shareholders, via dividends and buybacks, and increases in long-term debt, set up an outflow of cash which is likely to squeeze R&D budgets even if profitability remains at past comparatively high levels. This pressure will intensify if pressure on public healthcare budgets, and generic competition, lead to pricing policies which reduce Big Pharma's future profitability.

The case of Big Pharma studied in this paper has demonstrated that there is a mismatch between traditional indicators of profitability and R&D, suggesting that financialisation has damaged the process of allocation of resources devoted to innovative activities. Other

studies (Froud et al. 2006; Lazonick, 2008) have shown that similar processes have affected other industries. Further research is needed to gain a better understanding of the dynamics of financialisation and its impact on the innovative performance of the economy.

## 6. References

Andersson T, Gleadle P, Haslam C, Tsitsianis N. Bio-pharma: a financialized business model. *J Critical Perspectives on Accounting* 2010;1(7):631-641.

Arrighi G. *The Long Twentieth Century*. London: Verso; 2010.

Baber, W, Kang S-H. Estimates of economic rates of return for the US pharmaceutical industry 1976-87, *Journal of Accounting & Public Policy* 1996; 15 (4):327-346.

BIS, SME Access to External Finance 2012. BIS Economic Paper No. 16 January 2012. <http://www.bis.gov.uk/assets/biscore/enterprise/docs/s/12-539-sme-access-external-finance>.

BusinessWeek, Investment outlook scoreboard 2004, 2010, 27 December, Issue 2194, p149-180.

BVCA, Private Equity and Venture Capital Report on Investment Activity 2011. British Venture Capital Association 2012. <http://www.bvca.co.uk>.

Carroll G, Spiller P, Teece D. Transaction cost economics: its influence on organizational theory, strategic management and political economy. In: Carroll G, Teece D, editors. *Firms, markets and Hierarchies*. Oxford: Oxford University Press; 1999: 60-88.

Dorey E. Big Pharma cuts its R&D budgets. *Chemistry & Industry* 2010;22 Feb: 5

Dodgson M. *Technological Collaboration in Industry*. London: Routledge; 1993.

DTI (Department of Trade and Industry). *Biotechnology Clusters*. London: Department of Trade and Industry; 1999.

Froud J, Johal S, Leaver A, Williams K. *Financialisation and strategy, narrative and numbers*. London: Routledge; 2006.

Gagnon M-A, Lexchin J. The cost of pushing pills: A new estimate of pharmaceutical promotion expenditures in the United States. *PLoS Medicine* 2008;5(1):29-33.

Garnier J-P. Rebuilding the R&D engine in Big Pharma. *Harvard Business Review* 2008;86(5):68-76.

Gompers PA. Venture capital growing pains: Should the market diet? *Journal of Banking and Finance* 1998;22:1089-1104.

Gopalakrishnan S, Scillitoe J, Santoro M. Tapping deep pockets: the role of resources and social capital on financial capital acquisition of biotechnology firms in biotech-pharma alliances. *Journal of Management Studies* 2008;45(8):1354-1375.

GSK. Detailed Share Price data. 2012. <http://www.gsk.com/investors/detailed-share-price.htm>.

GSK. GSK sets out new strategic priorities. Press release 2008; 23 July.

GSK. Strategic progress drives positive underlying sales growth; increasing pipeline potential and improved cash generation. Press release 2011; 3 February.

Hagedoorn J, Wang N. Is there complementarity or substitutability between internal and external R&D strategies? *Research Policy* 2012;41(6): 1072-1083.

Haslam C, Tsitsianis N, Gleadle P. UK bio-pharma: Innovation, re-invention and capital at risk. Edinburgh: The Institute of Chartered Accountants of Scotland; 2011.

Hirschler B. Drug R&D spending fell in 2010 and heading lower. Reuters; 2011.

Jack A. GSK pledges £2bn share buy-back. *Financial Times*. 2011.  
<http://www.ft.com/cms/s/0/33b936fe-2f95-11e0-834f-00144feabdc0.html#axzz24qFoMDie>.

Jaffe A, Lerner J. *Innovation and Its Discontents*. Princeton University Press; 2004.

Jeng LA, Wells PC. The determinants of venture capital funding: evidence across countries. *Journal of Corporate Finance* 2000;6(3):241-289.

Jensen M. Agency costs of free cash flow, corporate finance, and takeovers. *American Economic Review* 1986; 76(2): 323-329

Jensen M. The modern industrial revolution, exit, and the failure of internal control systems. In M Jensen M editor. *Theory of the Firm*. Harvard University Press; 2000.p.16-62

Kaitin KI. Deconstructing the Drug Development Process: The New Face of Innovation. *Clin Pharmacol Ther* 2010;87(3):356–361.

Lazonick, W. The quest for shareholder value: stock repurchases in the United States. *Louvain Economic Review* 2008;74(4):479-540

Lazonick W, O'Sullivan M. Maximizing Shareholder Value: A New Ideology for Corporate Governance. *Economy and Society* 2000;29(1):13-35.

Lazonick W, Tulum O. US biopharmaceutical finance and the sustainability of the biotech boom. Industry Studies Association Working Paper Series 2010.

Light D, Lexchin J. Pharmaceutical research and development: What do we get for all that money? *British Medical Journal* 344:e4348 2012; August.

Lockett A, Murray G, Wright M. Do UK venture capitalists still have a bias against investment in new technology firms? *Research Policy* 2002;31:1009-1030.

MarketLine. GlaxoSmithKline: Through mergers and acquisitions to success. Case Study ML00001-070 2011; December.

Montalban M, Sakinc ME. How financialization shapes productive models in the pharmaceutical industry. FINNOV Working Paper 5.2b 2011; February.

Nightingale P, Martin P. 'The myth of the biotech revolution', *Trends in Biotechnology* 2004;22(11):564-569.

Nikisch K, Greuel J, Kerstin M. How can pharmaceutical and biotechnology companies maintain a high profitability? *Journal of Commercial Biotechnology* 2009;15(4):309-323.

Pammolli F, Magazzini L, Riccaboni M. The productivity crisis in pharmaceutical R&D. *Nature Reviews Drug Discovery* 2011;10:428-438.

PharmaWatch. GlaxoSmithKline: strengthening R&D in anti-infectives, *Monthly Review* 2007;6(11): 23.

PhRMA. Pharmaceutical Industry Profile. Washington DC: Pharmaceutical Research and Manufacturers of America; 2011; April.

Pisano GP. *Science Business: The Promise, the Reality, and the Future of Biotech*. Boston: Harvard Business School Press; 2006.

R&D Magazine. 2012 Global R&D finding forecast: Industrial R&D – Life Science. *R&D Magazine* 2011;53(7):46-7.

Scannell JW, Blanckley A, Boldon H, Warrington B., Diagnosing the decline in pharmaceutical R&D efficiency. *Nature Review of Drug Discovery* 2012;11:191-200.

Scherer A. M&A in Big Pharma: Holy Grail or Buying Time? *Contract Pharma*. 2012. [http://www.contractpharma.com/contents/view\\_expert-opinions/2012-03-21/ma-in-big-pharma/](http://www.contractpharma.com/contents/view_expert-opinions/2012-03-21/ma-in-big-pharma/). (Accessed 20 August 2012).

Silverman E. Sanofi CEO: Who Needs Big Pharma Scientists? *Pharmalot.com*. 1 March 2012. <http://www.pharmalot.com/2012/03/sanofi-ceo-who-needs-big-pharma-scientists.htm>. (Accessed 13 August 2012).



Stone K. Big Pharma's Merger Mania. About.com Pharma. 2012.

<http://pharma.about.com/od/BigPharma/tp/Big-Pharmas-Merger-Mania.htm>. (Accessed 20 August 2012)

Stovall S. Pharma M&A surge spurred by necessity and opportunity. Wall Street Journal. 27 April 2012. <http://online.wsj.com/article/BT-CO-20120427-713097.html>. (Accessed 3 June 2012).

Trombetta, W. Industry audit. *Pharmaceutical Executive*, 2005, Sept, 25(9):68-80

Vallas S, Kleinman D, Biscotti D. Political structures and the making of US biotechnology. In F. Block F, Keller S, editors. *State of Innovation: The US government's role in technology development*. Colombia: Paradigm; 2011. p. 57-76

Williamson O. The vertical integration of production. *American Economic Review* 1971;61(6):112-123.

Williamson O. The modern corporation. *Journal of Economic Literature* 1985;19(4): 1537-1568.

York University. Big Pharma spends more on advertising than research and development, study finds. *ScienceDaily*, 5 January 2008.

<http://www.sciencedaily.com-/releases/2008/01/080105140107.htm> (Accessed 30 March 2012).