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What you give is what you get: Investment in European biotechnology

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Abstract

The European biotechnology industry receives less funding, and less funding per company, than the North American industry, especially at the sensitive early stages of company development, and the European industry is substantially smaller in terms of employment, products and capitalisation than the US industry. The cause and effect of this relationship are explored in this paper. It is shown that if the European industry is immature it is because its growth has been slower, most probably because of low investment levels, and that the relatively lower value of biotech companies at initial public offering (IPO) is a result of the lower amount of investment they receive, not a reason for. This suggests that poor investment levels are a primary cause of the small size of European biotech companies and the European industry as a whole, not an effect of it. Investor mistrust and investment mechanisms are plausible reasons for this under-investment.

INTRODUCTION

The European biotechnology industry is substantially smaller than its US counterpart on most measures. Only in the number of companies does Europe exceed the USA,¹ and as the creation of a company as a legal entity requires no significant effort, intellectual property or business activity it is not clear that raw company number is a useful measure of industry size or success. There are a wide number of reasons suggested for this, and a range of consequences.

A common (if rarely formally expressed) complaint of entrepreneurs in biotechnology in Europe is the relatively low level of investment in companies in Europe compared with the USA (see, for example, Martin and Thomas,² Critical I³). A common explanation for this from investors is that it is hard for investors in European companies to obtain a good 'exit' for a company in Europe, ie to achieve liquidity in the shares so they can sell them at a good annualised value increase over their investment (see, for example, comments in Ward⁴). If you cannot float a company for a lot of

money, investing a lot of money in the company would be foolish. Explanations for this include that the European industry is 'younger' or 'less mature' than the US one.

This paper examines whether European biotechnology companies really do receive less funding than US ones, whether the industry is likely to be 'younger', and whether the failure of investors to obtain good exits in Europe is a cause or an effect of lower investment levels.

METHODS AND DATA

Data on company formation, funding and initial public offering (IPO) were collected from *Nature Biotechnology*,⁵ CapitalIQ,⁶ *The Times*,⁷ Biocentury,⁸ Burrill and Company,⁹ and from individual company web sites. All figures were converted to US dollars at currently prevailing exchange rates for comparison. 'Foundation' dates are taken as the date of first investment, as a company can be formally incorporated and yet not conduct any significant business for a substantial period. This was supplemented

with data from venture capital (VC) web sites for information on funding rounds and their levels in Europe and USA.

The amount of private investment was calculated from public announcements in these sources. Only companies for which records of investment from foundation to IPO could be verified from a complete company history were used in this study to avoid under-estimating the amount of investment a company had received. As a result, more companies are used for comparison of IPO statistics (524 companies) and for private financing statistics (283 deals) as were used for comparison of IPO with private financing (53 companies).

RESULTS

European companies receive less investment than US ones

Previous studies have suggested that European companies receive smaller amounts of investment at the same stage of their development than US ones. These studies are potentially flawed by sampling biases, so this study tested whether this finding could be replicated using a different sampling method. To avoid the problem that a study carried out in the UK will 'see' more seed-stage and high net worth ('Angel') investors in the UK than the USA, all the biotech investments made by institutional investment companies (VC) that commonly invest in UK biotechnology companies were examined: as all of these also invest in companies that are based in countries other than the UK, this reduces the institutional bias.

The results are shown in Figure 1. This confirms the substantially lower investment in European companies compared with North American ones in 2002, the period over which Critical I³ collected data. The picture appears to have improved by 2005. However this masks a persistent tendency to invest smaller amounts in young companies. Conventionally investment in any company is done in stages,¹⁰ called the 'A', 'B', 'C', etc. 'rounds' of investment

after the names of the share classes created at each round. The first major VC investment is the 'A' round. Figure 1b shows the breakdown of investment over the whole period 2002–2005 by investment stage, and shows that for A and B rounds European, and particularly British, companies receive substantially lower amounts than North American ones. The amount appears more equal for D and subsequent rounds: this is, however, in part an artefact of the way companies are financed in the two regions, as investors rarely invest in D or later rounds in European companies. A better reflection of the amount invested in D and later stage rounds in Europe is that the majority of companies have rounds of US\$0.

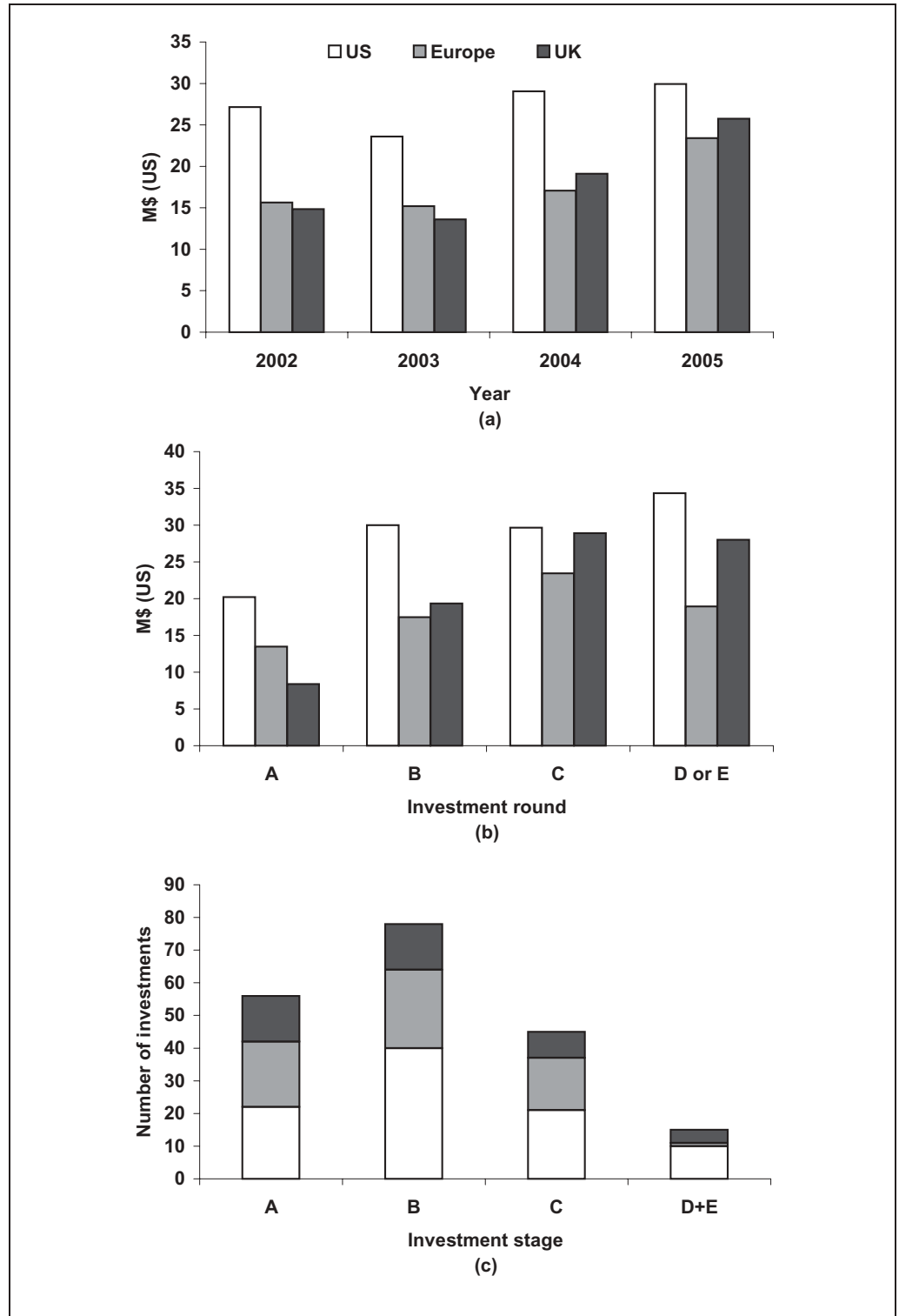
Is this because European companies are inherently smaller than US ones? This is unlikely. Ernst and Young have surveyed the 'survival time' of European companies, ie the amount of their last investment that they have left, compared with the rate at which they are spending it. US biotechs have always had a longer 'runway' ahead of them than European ones of the same stage.^{3,11,12}

Thus several different approaches to data collection confirm that European companies receive less funding than US ones, especially at the crucial early stages of the company's development. There are several reasons why this might be so. It is not because European VCs have less funds than US ones: fund sizes across all stages of the fund life cycle are similar.¹³ Below two commonly cited ones are explored: that the European industry is younger than the US one, similar in development to the US industry 15 years ago when investment of a few million dollars per round was considered generous, and that European IPOs are low value, and hence cannot provide suitable returns to investors unless they only invest small amounts.

Is the European industry 'younger' than the US industry?

This argument can be disposed of fairly simply. The modern form of the

Figure 1: Amount invested in VC-backed biotechnology companies 2002–2005 by year (A), by stage (B) and (C) the number of investments by stage. All deals done in the ‘life science’ industry by those VC groups that routinely invest in UK biotechnology companies were surveyed for January 2002 to December 2005, a total of 282 deals. The average amount invested in such deals is shown for investee companies whose primary operation is in North America (USA and Canada), Europe (excluding UK, including Scandinavia) and UK. Part A: average for each year. Part B: average for each investment round. Part C: number of investments made at each stage by these investors in each territory



‘biotechnology company’ – a company backed by private institutional investment that uses new science to research and then develop new products (usually in healthcare) – arose in Europe no more than three or four years after the USA. Of

the three companies often cited as being in the vanguard of the industry in the early 1980s, two were US, one European (Genentech, Cetus and Biogen) (see, for example, Johnstone,¹⁴ Anon,¹⁵ Cookson¹⁶ and Tran¹⁷). Investment in

European biotech started in the early 1980s, with BIL raising a total of US\$71m for biotech investment. All its first investments were in US companies, accessing US deal flow through a US broker, and UK deal flow directly. BIL complained publicly of the poor quality of the UK companies it was shown, explaining this was why nearly all its investments had been in America. But it received 68 proposals from the USA, 16 from the UK (out of a total of 98 – a tiny deal flow compared with the 1,000 average a good VC would receive today), exactly in proportion to the population, and the chance that none of the 8 out of 98 BIL invested in was 1 of the 16 from the UK is 25 per cent, not nearly enough to suggest other than pure chance that the ones that caught BIL's eye were from across the Atlantic. BIL made an average investment of US\$3m (equivalent to US\$6.1m today).^{18,19}

By 1984 BIL, Technical Development Capital, Prutech, Cogent, Advent investing in biotech companies in Europe, but the majority of investment in such companies came from industrial conglomerates, not from these institutional investors: Grand Metropolitan (a hotel chain), Air Products, Ciba-Geigy, Eli Lilly, Schering Plough, Monsanto, and British and Commonwealth Shipping had all funded

biotech start-ups,^{14,20} including investing in Biogen and Celltech.

So in 1982 there were investable propositions, stable and growing companies, in number and strength in the UK comparable on a per-capita basis with the USA, and evidence for a growing industry elsewhere in Northern Europe: however in Europe institutional investment was a minor part of this growth.

Company formation in Europe in the late 1970s and early 1980s lagged behind the USA by no more than two years (Figure 2). From the late 1980s onwards this widened to three to four years,²¹ and by the early 1990s to six years.² So from a very comparable start the European industry has grown more slowly. The number of public companies reflects this (Figure 3), with the surge in European IPOs in 2000 mirroring in starting point and scale the surge in US IPOs a decade before. Similar comparisons of number of employees and revenue show a similar pattern of a European industry starting from a similar position to the USA in 1980 but growing much more slowly.

The primary limiting factor for the industry is the availability of active, participatory private capital.^{2,19,23} Such capital has been limited in Europe since the early 1980s.²⁴ The primary reason for failure of new companies of all sorts is

Figure 2: Number of biotechnology companies formed per year in North America (USA and Canada) and Europe (including UK and Scandinavia) from 1975 to 1985

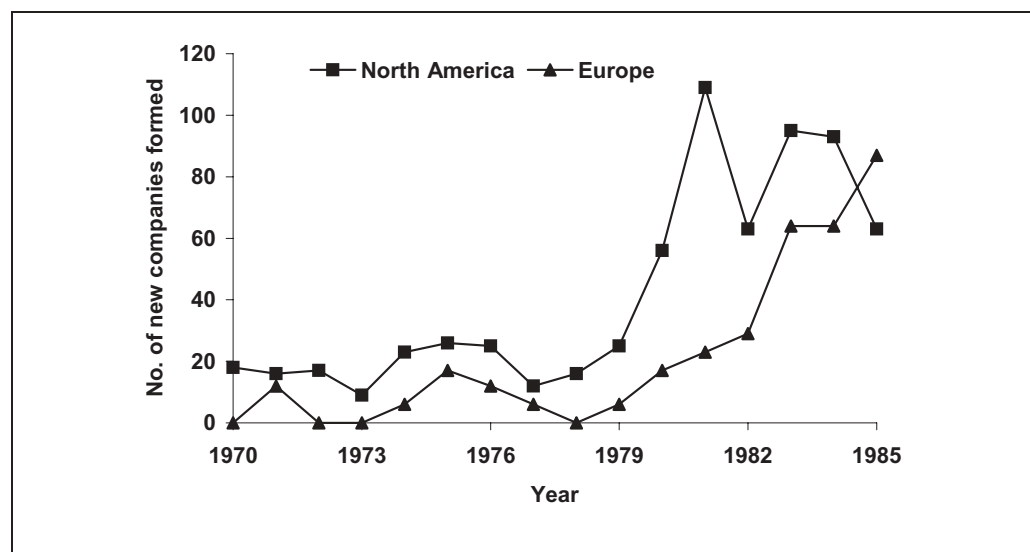
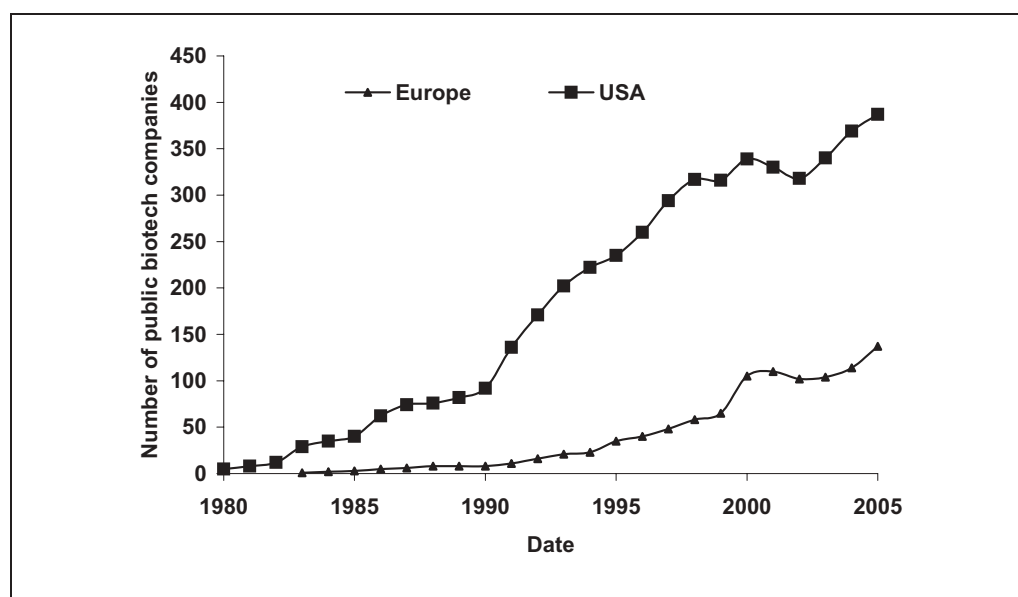


Figure 3: Number of companies listed as 'public' whose shares are traded on a substantial stock exchange (including AIM, excluding Ofex, and with similar rules for other European countries). Data from Bioscan, and Ernst and Young reports^{11,12,22}



under-capitalisation.²⁵ So, as the European industry started out similar to the US one but has grown much more slowly since, the single most obvious difference between the two from the start was there was less institutional investment in European companies than in US ones, and as lack of investment is known to result in slow company growth and company failure, it seems reasonable to suppose that the slow growth and relatively small size of the European industry today is a causal result of lower investment.

Can you get good IPOs in Europe?

If 'immaturity' is an effect, not a cause, of low investment, we might suppose that the other end of the company developmental scale, the exit, is a driver for poor investment. Specifically, is an inability to get 'good IPOs' in Europe the reason for under-investment in start-ups?

It is stated that European stock markets will not support high-value IPOs, so there is no point investing substantial sums in companies before IPO. This is fallacious for two reasons. Firstly, it is quite clear that it is possible to get very high value IPOs in Europe. European markets, and particularly the London Stock Exchange, can accommodate flotations valuing

European biotechnology or emerging pharmaceutical companies at over US\$1,000m. However it is true that the average IPO pre-money valuation is less in Europe than the USA: in the USA biotechs have twice the pre-money IPO value and raise twice as much money (Figure 4).

However, if European companies receive less investment, might this not result in less valuable companies that *therefore* have lower values at IPO? Figure 5 suggests this is so – there is a clear ($R^2 = 0.48$) correlation between the amount of money invested in a company in its pre-IPO history and its value at IPO. The relationship for US and European companies is essentially the same, and European companies that receive substantial investment can achieve high IPO valuations well within the US range. However, as noted in Figure 1, European companies usually receive less money than US ones. Lower IPO prices are inevitable. In essence, if you put a lot in, you get a lot out. McGully has noted a similar effect for US companies, finding that the 'technology value' of a company at IPO is on average equal to invested cash,²⁶ ie that investing a lot creates a lot of value, investing little creates little value.

The three outlier exceptions are three companies floated by IP2IPO, now called

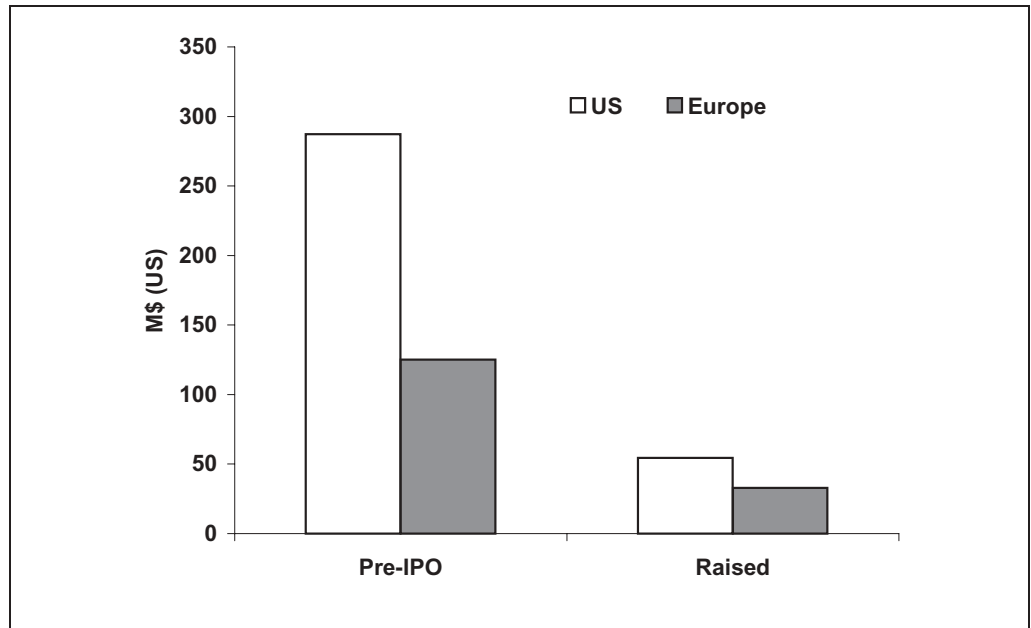


Figure 4: Average pre-money valuations at IPO and average amounts raised for US and European companies. The companies are the same as those analysed in Figure 5

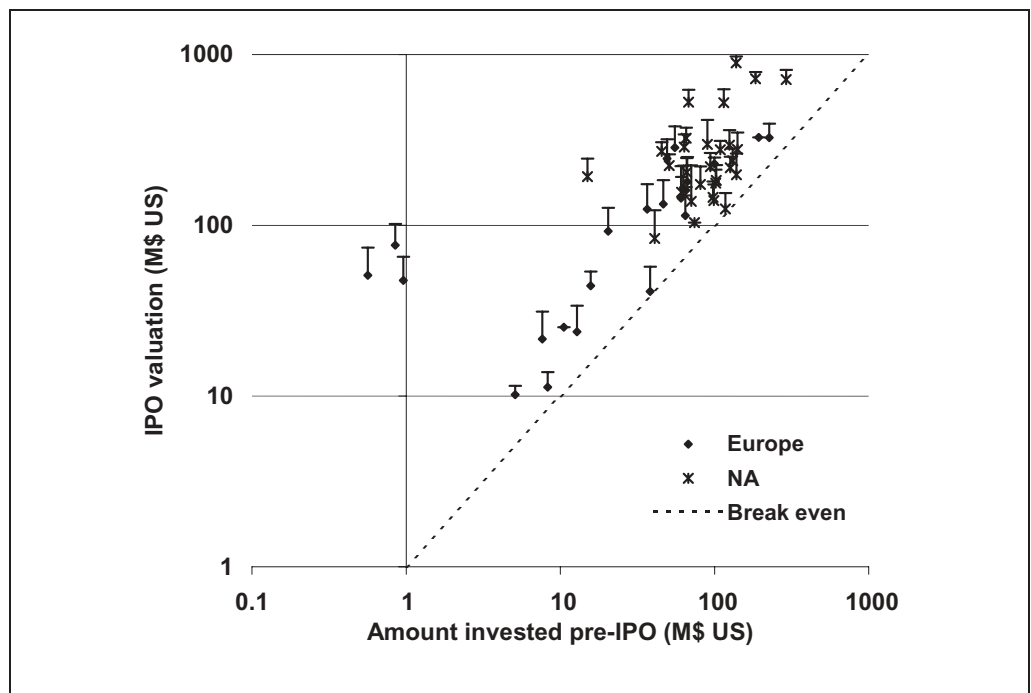


Figure 5: Comparison of amount invested in private investment and IPO valuations for all biotech companies floated 2001 through 2005 for which data are available. X-axis: amount invested in all pre-IPO investment rounds (Note for some companies this information is not publicly available). Y-axis: IPO value. diamonds – European companies' pre-IPO capitalisation ('pre-money value'). Stars – US companies pre-IPO capitalisation. The bars upwards from stars and diamonds show the amount raised at IPO, and hence the post-IPO valuation

IP Group.²⁷ Their business takes established university research groups with very substantial grant-funded research behind them, invests relatively small

amounts of money and then floats them on the AIM stock market. Thus the amount of *commercial* investment involved does not reflect the amount of *total* investment.

Why then do European investors think that their IPOs are poor? It is possible that the same absolute return for European investors is not as valuable to them as for US investors, because Europeans take longer to invest than Americans, so the annualised returns are less even though the absolute return is equivalent. Figure 6 suggests this is not so: the time taken from initial investment to IPO is similar for US (average = 5 years) and European (average = 5.5 years) companies. (I have commented before²⁸ that the average time for *all* biotech companies to IPO is 11 years: however this includes a number of companies that are run for decades as family or self-funded concerns. We are concerned here with the history of companies that receive external investment with the goal of realising investors share value through IPO at the earliest opportunity.) It is also possible that they hope to get US-style IPO valuations for European-style investment. This would be very attractive financially if it could be achieved, but Figure 5 suggests that it rarely can.

CONCLUSIONS

It is clear from the data above and from previous work that European biotechnology companies receive smaller

amounts of funding that comparable US companies. With investment funding so closely linked to the success of high-tech companies of all sorts, it is not surprising that this is associated with lower levels of success of the European biotechnology industry, and specifically to lower IPO valuations. This is line with the careful and realistic evaluation of new IPOs by public analysts in the current market window.²⁹

It is tempting, particularly for this author, to conclude that timid investment in biotechnology companies is the *cause* of the slow growth of the European industry and its relatively poor IPO performance, not the *effect* of it. The evidence shown here suggests this is the case, and that at least some of the other reasons suggested for Europe's secondary place in the global biotechnology industry are effects of our investors' policies, not the reason for them. An alternative view is that low investment in Europe is an *effect* of the lack of success – the absence of a European Genentech or Amgen has made European investors reluctant to invest. But the success of Genentech and Amgen was not why investors in Genentech and Amgen started those companies. They believed that boldly investing in world-class science and management could build a world-class company. Privately owned

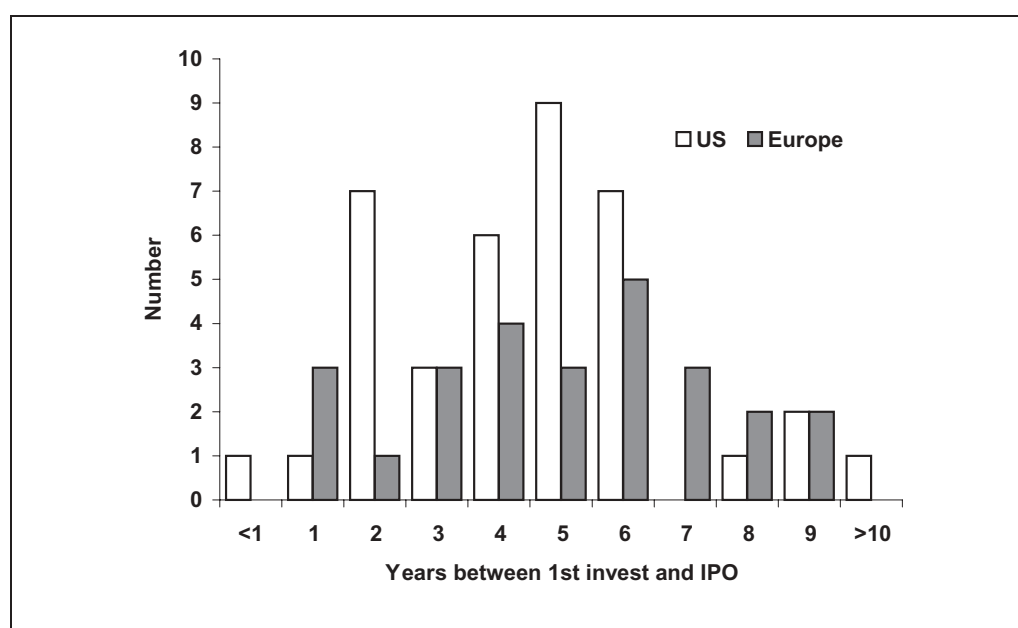


Figure 6: Time between first investment and IPO

biotech companies such as Serono have matched this success in Europe, showing that sustained support and investment can work this side of the Atlantic as well. However, institutional investors have held back.

This does not mean that investing large amounts *guarantees* a good IPO, as the recent history of several companies attests. Poor business ideas and poor management will kill off a good company no matter how much money it receives. But it does show that, in biotech as elsewhere, inadequate capitalisation leads to small, inadequate companies. You get what you give.

Four other potential influences on the lower levels of investment in Europe remain unexplored: that there are more and more flexible investment instruments in the USA; that biotech company ideas in Europe just are not as good as those in the USA from their inception; that state support for biotech companies in the early stage is greater in the USA than in Europe, accelerating their development prior to receiving commercial investment; and that investment mechanisms themselves inhibit investment.

(Many other factors could be cited – fragmented European markets, differing legal systems, variant employment laws and so on. But few of these have an obvious impact on companies that primarily employ ‘exempt’ professionals and whose principal trade is with pharmaceutical multinationals.)

Firstly, there may be more mechanisms for investment in US public companies as compared with UK ones, allowing continued growth after IPO. In particular, PIPEs (private investment in public equity) are an accepted mechanism in the USA. PIPEs mechanisms have not been put in place in Europe, but they could be: when the investment community wished the rules to be changed in the UK so that loss-making biotech companies could be floated, the ‘Chapter 20’ rules allowing the flotation of ‘science research-based companies’ were introduced relatively quickly to allow this to happen. At most,

the lack of PIPEs-like mechanisms in Europe is another reflection of investors’ lack of interest in continuing to support such companies.

There is no objective data on the comparative value of biotech business ideas. Claims from the early days of the industry that investment ideas coming from the USA were superior to those from the UK (at the time the only major generator of VC-fundable start-up companies) do not stand up separately from the observation that those companies received much less finance. But it is testable in principle, using the methodology of the ‘business plan competition’ to compare business ideas, and well-established methods of citation and funding analysis to compare the science base in the two regions.

By contrast, it is well established that the US Government provides substantially more non-investment support for new business ideas than equivalent European institutions. While Europe remains fixated on the number of companies formed, US funding for projects and programmes makes the critical difference between a *company* (a legal entity) and *business* (a commercial activity), and supports the latter. Correspondingly, US research support bodies, and notably the NIH, might be willing to leave research to ‘incubate’ in non-commercial settings for longer before they are forced into a *company*, so that a ‘Series A’ in the USA is a more mature entity than a ‘Series A’ in Europe. The relative role of this greater support for business in the US Government, and the clear superiority of US financial institutions in supporting growing biotechnology companies, remains to be established.

Lastly, the effect of investor policies themselves on investment levels has not been systematically explored, although it is well known among the private investment community. If late stage investors impose punitive preference share structures and anti-dilution provisions on a company as a condition of investment,

this makes it almost impossible for early investors to make a return, no matter how good the IPO.²⁸ This will deter early investors, thus assuring the failure that the anti-dilution provisions are designed to counteract. This 'prisoner's dilemma' problem, where one party's assumption that the other party will act to damage them brings about that damage, has been discussed elsewhere.³⁰ The only solution to it is mutual trust, something long lacking in VC-company relations in Europe.

The conclusion is clear. If investors want to create companies of global standing, they must be ready to invest appropriately, and create or use mechanisms that allow, even encourage, this, rather than block it. Regarding biotechnology companies as entities that can be built on the cheap will just result in small, cheap companies, and the corresponding loss of the potential of the science that they seek to exploit. If European governments want to encourage them, they should similarly put effective resources behind major projects, and not provide an unmanageably diverse and universally small programmes of funds to stimulate *company* creation when their stated aim is to create *business*.

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