Article

Australian Biotechnology: A 10-Year Study of Investor Performance

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ABSTRACT

A recent study assessed the investor performance of the Australian drug development biotech (DDB) sector over a 15-year period from 2003 to 2018. The current study builds on that research and extends the analysis to 2020, using a 10-year period starting 2010, to exclude the impact of the global financial crisis in 2008/09. Based on a value-weighted portfolio of all 41 DDB firms, the overall sector delivered a negative annualized return of -4.1%. Individual firm performance was also assessed using the compound annual growth rate (CAGR) in share price over the period as a measure of investor outcomes. On this basis 68% of firms produced negative CAGRs over the period, and of the 32% of firms that produced positive CAGRs, six firms produced CAGRs greater than 20% per annum and in three cases of recently-listed firms, the CAGR's were greater than 50%. Overall however, the sector overall delivered very poor investor returns and despite a relatively large number of listed biotech firms, Australian biotechnology continues to be small and weak in terms of its contribution to global biotechnology industrialization. As such it lacks the critical mass to grow a robust bioeconomy based on drug development, which remains the standard-bearer of biotechnology industrialization.

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INTRODUCTION

The Australian biotechnology sector has been characterized by an inflated promissory discourse, such as in this *New Scientist* article in 2002: "Once upon a time, Australia was the Cinderella of the commercial biotech world. But now the continent is set to blossom as the belle of the ball."[1]

Since then, these aspirations have been cheered on by the local biotechnology industry body, AusBiotech, which has consistently proclaimed and lauded Australia's international biotechnology leadership, often referring to the country's high ranking in the *Scientific American* "Worldview Biotechnology Scorecard".[2]

Two studies, summarized in a recent paper on the Australian biotechnology ecosystem[3], have suggested that rather than a biotechnology powerhouse, Australia is a biotech industry backwater with a history of poor performance and little prospect of ever being a world leader. One study took a network/cluster perspective and the other an investor return perspective.[4, 5]

The network/cluster study[5] comprehensively mapped the development of the Australian biotech sector from 2003 to 2014 and examined the performance of the sector

from a network perspective. It concluded that Australia suffered from 'network failure' due to the limitations of public research organizations (PROs) to act as anchor tenants that provide the springboard for international collaborations with Big Pharma[5]. The local collaborations did not translate into the hoped-for virtuous cycles, but rather became dead ends for commercial value creation (p 14):

> In conclusion, our analysis suggests that advocates of the innovation economy – politicians, policymakers, scientists and industry players – have overstated their case for biotechnology as a prospective industry for countries far from the world biotechnology superclusters and Big Pharma.

The investor performance study[4] observed that outside the US, almost all drug development biotech (DDB) firms remained as pre-commercial entities that were consistently loss-making and reliant on ongoing investor funding. This phenomenon made investors powerful stakeholders for DDBs with a substantial captaincy role in the birth and survival of such firms in a country such as Australia. Therefore, the delivery of long-term investor returns was a crucial requirement for the health and sustainability of a country's biotech sector, for which the public DDB sector is a proxy[4,6].

Like the network study, the investor performance study took a long-term longitudinal view and analyzed investor performance of all 40 public DDB firms over a 15-year period from 2003 to 2018. Using an unweighted portfolio approach, a portfolio of the 40 firms lost 51% of the invested value, delivering an internal rate of return (IRR) of -6.2% per annum. At an individual firm level, 78% of firms produced negative IRRs and of the positive performances, the highest IRR was only 8.2%, far below the investor-expected returns for such a high-risk sector. Moreover, the sector had failed to spin out a single 'Big Biotech' firm that could act as an anchor tenant. The study arrived at some scathing conclusions (p 199-200):

> Over the last 15 years, the Australian public DDB sector has destroyed value and delivered extremely poor investor outcomes overall. No individual firm has delivered an attractive investor return and most firms have lost virtually all their investors' funds.
>
> Potentially, Australia has neither the funding ecosystem nor the technology quality to support a globally-competitive DDB sector that can reach the critical mass needed to spin out one or more Big Biotech firms, and on which a bioeconomy could be anchored.

However, that study also reported that there appeared to be a turnaround emerging in investor performance in the sector since 2015 and it posited that (p 195): "the Australian DDB sector may be on the cusp of finally creating the long-awaited, virtuous cycle that spins out a couple of Big Biotech anchor tenants and leads to a sustainable sector."

The current study represents a follow-on analysis that examines the investor performance since 2018, to assess whether the post-2015 trends signaled the emergence of a sustainable sector or another false dawn in a sector that has been characterized by a procession of high expectations preceding abrupt failures.

METHODOLOGY

In many respects, the current study followed the methodology of the previous 15-year study. However, we also took the opportunity to make a number of methodological improvements.

Timeframe

The previous study used the 15-year period between 2003 and 2018 for performance assessment, on the basis that most DDBs emerged and all exits occurred after 2003, and 15 years seemed a long enough time for the full potential of the sector to be manifest. However, this timeframe included the global financial crisis of 2008-2009 ('GFC'), which saw the forced exit of several DDBs due to the economic circumstances, potentially introducing a bias in overall performance outcomes. It has also been argued[4] that the GFC may have represented an inflexion point in investor memory and that firms that exited prior to 2010 were not relevant to current investor perceptions of the sector. For these reasons, we selected 2010-2020 as the performance timeframe, with 2010 as the baseline year. A 10-year period also aligned with a typical venture capital (VC) fund life, which was relevant to the approach used in the current study for assessing investor returns.

The Australian DDB sector

Like the previous study, the assessment focused on all DDBs listed on the Australian Securities Exchange (ASX). Public DDB firms account for the vast majority of biotech employment and market value in Australia[5],

and can be considered a proxy for the country's overall biotech sector [5, 6]. We included all DDBs that were listed on the ASX and filed annual reports for at least four years over the 10-year period.

In line with the DDB definition used in the previous study[4], we excluded those firms developing products classified as diagnostics or medical devices from a regulatory perspective, or drugs where the primary therapeutic application was outside human health (e.g., animal health). Also since 2014, a large number of cannabis-related companies have listed on the ASX; these were not considered DDBs and also were excluded. This produced a final dataset of 41 DDB firms for performance assessment as shown in Table 1.

Among the 41 firms, there were six exits prior to December 31 2020. One was due to a sale of the company to a Big Pharma (Viralytics, 2018), three were due to the firms' failing in drug development and moving into another field outside drug development (Progen, Alchemia and Avexa), one firm failed and delisted from ASX (Benitec) and one failed company went into administration (Qrxpharma).

Table 1. ASX-listed DDB dataset

Firm Name	ASX Code	Firm Name	ASX Code
Acrux	ACR	Kazia	KZA
Actinogen	ACW	Living Cell	LCT
Adalta	1AD	Mesoblast	MSB
Alchemia	ACL	Neuren	NEU
Alterity	ATH	Noxopharm	NOX
Amplia	ATX	Opthea	OPT
Antisense	ANP	Paradigm	PAR
Avecho	AVE	Patrys	PAB
Avexa	AVX	Pharmaust	PAA
Benitec	BLT	Pharmaxis	PXS
Bionomics	BNO	PYC	PYC
Biotron	BIT	Prescient	PTX
Cellmid	CDY	Progen	PGL
Clinuvel	CUV	Qrxpharma	QRX
Cynata	CYN	Race	RAC
Dimerix	DXB	Recce	RCE
Factor	FTT	Regeneus	RGS
Immuron	IMC	Starpharma	SPL
Immutep	IMM	Vectus	VBS
Imugene	IMU	Viralytics	VLA
Invion	IVX		

Sector Investor Return Calculation

Like the previous study, we calculated the overall sector return by treating the portfolio of 41 firms as if it were a venture capital (VC) portfolio and calculated the gross pooled internal rate of return (IRR) for that portfolio[7]. This method allowed calculation of the IRR from a pool of concurrent projects by aggregating the cash flows of all firms as if a single project. The calculation was 'gross' in that it ignored VC management fees and carried interest. We set 2010 as the vintage (inception) year of the fund and set the fund life to 10 years, expiring in 2020, at which time, any firms not already exited, were notionally liquidated at market value at the time.

As in the previous study, all data were obtained from *DatAnalysis Premium* (Morningstar, Inc.). Unlike the previous study, which used a value-unweighted portfolio approach (it assumed a fixed amount invested in each firm regardless of market value), we formed a value-weighted portfolio of the 41 DDB stocks, which was rebalanced annually, based on market valuation. This was more in line with the financial literature and consistent with other investment analyses in the biotech sector[8]. For this purpose, we used the market valuation (MV) of the stock at the end of December in each year for each firm to rebalance the portfolio for the following year.

For simplicity, we assumed that the portfolio had $100,000 to invest at inception and this was used to acquire a MV-weighted portfolio of shares, among the 27 firms that existed at the end of 2010. This became the baseline portfolio. In 2011, there were no new entrants or exits, so at the end of that year, the aggregate value of the share portfolio was again assessed and the available funds re-invested (fund was rebalanced) among the 27 firms that existed at the end of 2011 based on their December 31 2011 MVs and share prices (SPs). This was repeated for each year through the end of 2017. At the end of 2018, the shares of the remaining firms in the portfolio (36 firms at that time) were liquidated at the December 31 SPs. In all cases, SPs were adjusted for any share consolidations; there were 11 share consolidations (reverse splits) and no share splits over the 10-year period.

There was one trade sale (Viralytics, which was sold to Merck in 2018) and the cash proceeds were deemed to have been received in December of that year and added to the available funds for investment the following year. For all other exists, the last year in which the firm traded on the ASX was used as the terminal year for that firm and the liquidated value of the shares at date of exit from the ASX was deemed to have been received in December of that year. Similarly, any dividends paid during any year were deemed to have been received in December and added to the available funds for investment the following year, or if received in the final year, became part of the liquidated proceeds.

Individual Firm Investor Return Calculation

The previous study used an IRR calculation to assess individual firm performance. However, a more common metric used by investors to assess stock investment performance is the compound annual growth rate (CAGR) in the share price (adjusted for consolidations), which is what was used in our study. While producing a result that is arithmetically very similar to the IRR calculation used in the previous study, the CAGR is more in line with typical financial performance measurement for stocks. The CAGR is calculated as the growth in share price (SP), annualized using the following formula:

$$CAGR = \left(\frac{EB}{BB}\right)^{\frac{1}{n}} - 1$$

Where EB is the ending balance of the investment, including final share price achieved, dividends per share and any adjustments for stock splits (or consolidations); BB is the beginning balance of the investment, which is the original price paid for the shares; and n is the number of years over which the CAGR is measured, which for each firm is the number of years they filed and were operational during the assessment period.

For the CAGR calculations, we applied the same rules as for the portfolio analysis, using end-December MV and SP data, where available. For each firm, its baseline year was the first year on the ASX that it filed an annual report or 2010 for the 27 firms that existed in that year. The terminal year for the CAGR calculation was 2020 for those still listed on ASX in that year, or an earlier year if the firm exited prior to 2020.

For the five exits due to the DDB's ceasing drug development and moving into another field, delisting or going into administration, the exit was deemed to have occurred in the year when the DDB firm announced that that event. However, it should be recognized that all these firms had failed in their drug development mission and the MV and SP had collapsed long before the final exit event; as a result, the precise timing of the terminal SP had no material impact on their CAGR.

RESULTS

Portfolio IRR

At the end of the fund life in 2020, taking into account all exit values and dividends, the original $100,000 portfolio had a liquidated value of $65,896. This represented a loss of 34% over 10 years and translated to an overall portfolio IRR of -4.1%. In other words, the DDB portfolio not only failed to generate an attractive return, it produced a negative annual return overall. The annual value of the portfolio and the number of DDB firms in the dataset, taking into account entrants, exits and dividends, are shown in Figure 1.

Individual Firm CAGR

The individual firm CAGR results are summarized in Figure 2 and Table 2.

DISCUSSION

The results of this study were not substantially different to the results of the previous 15-year study. The DDB portfolio lost 34% of its value over 10 years and generated an IRR of -4.1%; this compared with a portfolio loss of 51% and an IRR of -6.4% in the 15-year study. As a simple but telling comparison, the ASX All Ordinaries Index – an index of major listed companies – grew 41% over the 10-year period of the current study.

At an individual firm level, 68% of firms (28) delivered negative investor returns. Methodological differences aside, this could be interpreted as a slight improvement over the 15-year study where 78% of firms delivered negative returns. Overall, however, the investor performance of the sector and firm success rates continued to be very poor and starting the analysis after the GFC did little to improve the overall performance picture.

Shooting Stars

However, what is quite different in the current study results is the emergence of several stellar, short-term, individual firm performances, none of which was seen in the 2003-2018 study, where the highest individual investor return was 8% pa. In the current study, six DDBs produced CAGRs above 20% pa and three above 50% pa, with the highest at 74%. These returns are more than attractive for this high-risk sector.

On the other hand, the four highest performers (Opthea, Paradigm, Recce and Race) were all firms that listed in the last two years of entry into the portfolio (2015 and 2016), as shown in Table 3. As noted in the 15-year study, the sector had been characterized over the years by a "procession of high-profile failures that built up huge investor expectations and then shattered them (p 160)"[4]. In the current study, the four highest performers in the

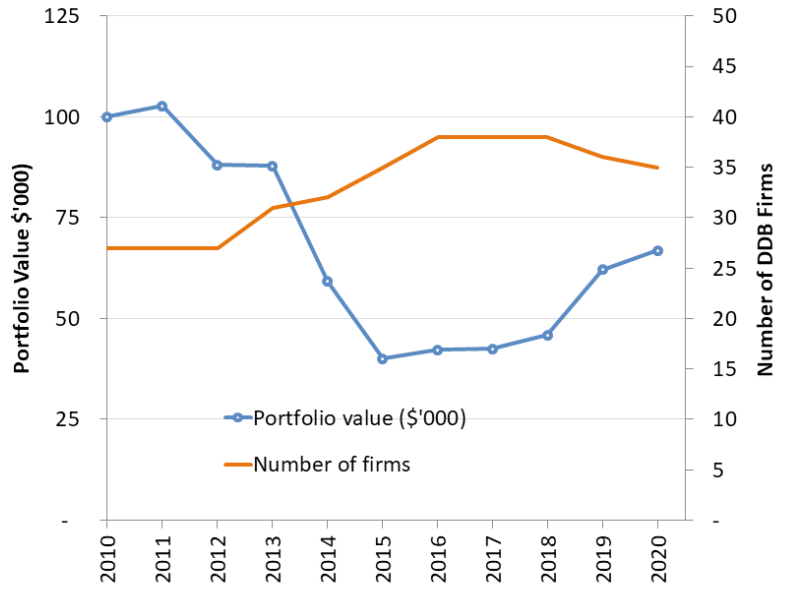

Figure 1. DDB Portfolio Value.

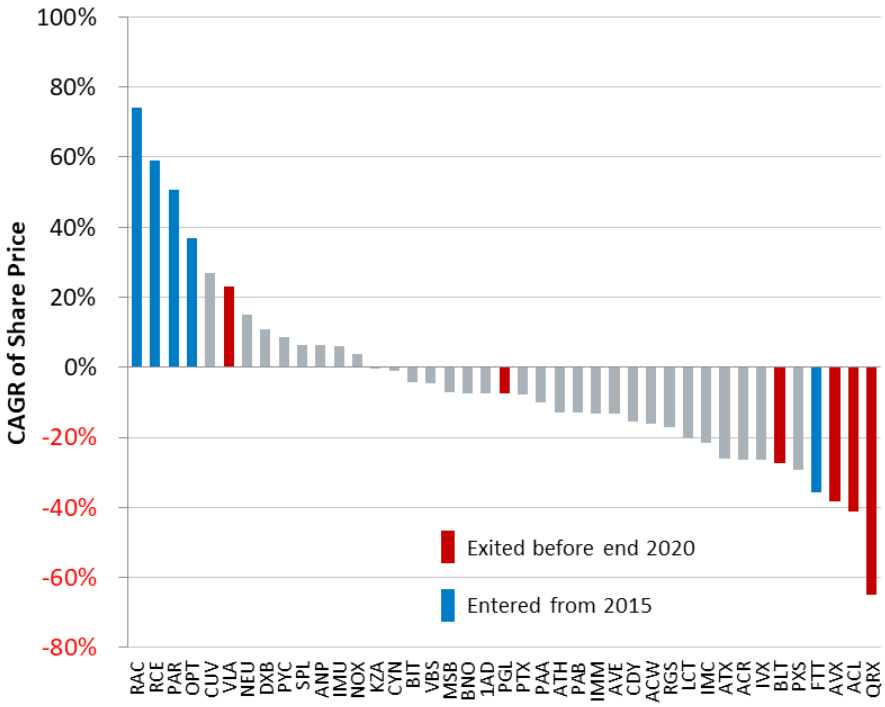

Figure 2. CAGR by DDB firm over 10 years.

Table 2. Individual DDB firm results over 15 years

Firm Name	Entry year	CAGR	Firm Name	Entry year	CAGR
Acrux	2010	-26.4%	Kazia	2010	-0.3%
Actinogen	2010	-16.0%	Living Cell	2010	-20.3%
Adalta	2016	-7.4%	Mesoblast	2010	-7.0%
Alchemia	2010	-41.2%	Neuren	2010	14.9%
Alterity	2010	-13.0%	Noxopharm	2016	3.9%
Amplia	2013	-26.1%	Opthea	2015	36.9%
Antisense	2010	6.4%	Paradigm	2015	50.5%
Avecho	2010	-13.2%	Patrys	2010	-13.0%
Avexa	2010	-38.4%	Pharmaust	2013	-10.0%
Benitec	2010	-27.4%	Pharmaxis	2010	-29.3%
Bionomics	2010	-7.3%	PYC	2010	8.7%
Biotron	2010	-4.2%	Prescient	2014	-7.9%
Cellmid	2010	-15.6%	Progen	2010	-7.5%
Clinuvel	2010	26.8%	Qrxpharma	2010	-65.0%
Cynata	2016	-1.6%	Race	2016	74.2%
Dimerix	2015	10.9%	Recce	2016	59.0%
Factor	2015	-35.6%	Regeneus	2013	-17.0%
Immuron	2010	-21.7%	Starpharma	2010	6.5%
Immutep	2010	-13.2%	Vectus	2016	-4.6%
Imugene	2010	6.2%	Viralytics	2010	23.2%
Invion	2010	-26.4%			

dataset were less than five years old at December 2020, potentially signaling they may be in the 'expectation building' phase.

Figure 3 shows the distribution of investor returns by firm and year, and clearly indicates that – perhaps not surprisingly – more recent listings have produced the highest returns, while more established firms either failed or delivered lower positive returns. The two exceptions were Clinuvel and Viralytics – both well-established firms that delivered CAGRs above 20%.

Either the four new performance stars represent a genuine break-out of sustained high performance in the sector from 2015, or merely reflect investors' elevated expectations around new entrants, before a future setback and share price collapse, as seen so often in the past[4].

As noted in the 15-year study, by 2012, at the height of the biotech rebound following the GFC, there were several high performers, notably Acrux, Alchemia, Qrxpharma, Phosphagenics and Pharmaxis. All five subsequently collapsed. In December 2012, these five firms had a combined MV of $1.24 billion; by December 2015, their combined value had fallen 77% to $0.29 billion, in what has been described as a 'train wreck' in the Australian DDB sector [4]. Acrux's collapse was caused by the firm's drug (Axiron) failing in the marketplace in the hands of its Big Pharma partner, and Phosphagenics' (now Avecho) collapsed after an embezzlement scandal

Table 3. Investor returns by year of entry

Company Name	ASX Code	Listing Year	CAGR
Race	RAC	2016	74.2%
Recce	RCE	2016	59.0%
Paradigm	PAR	2015	50.5%
Opthea	OPT	2015	36.9%
Clinuvel	CUV	2001	26.8%
Viralytics	VLA	2007	23.2%

in the company. However, the other three were all firms that had built high investor expectations based on clinical-stage programs that subsequently failed. The values of the current four high performers – Race, Recce, Paradigm and Opthea – are similarly all based on high expectations around clinical-stage programs that have yet to be commercially endorsed through Big Pharma partnerships. To assess whether these are shooting stars or a genuine new breed of Australian high-performing biotechs, it would be valuable to re-assess their performances in another two or three years.

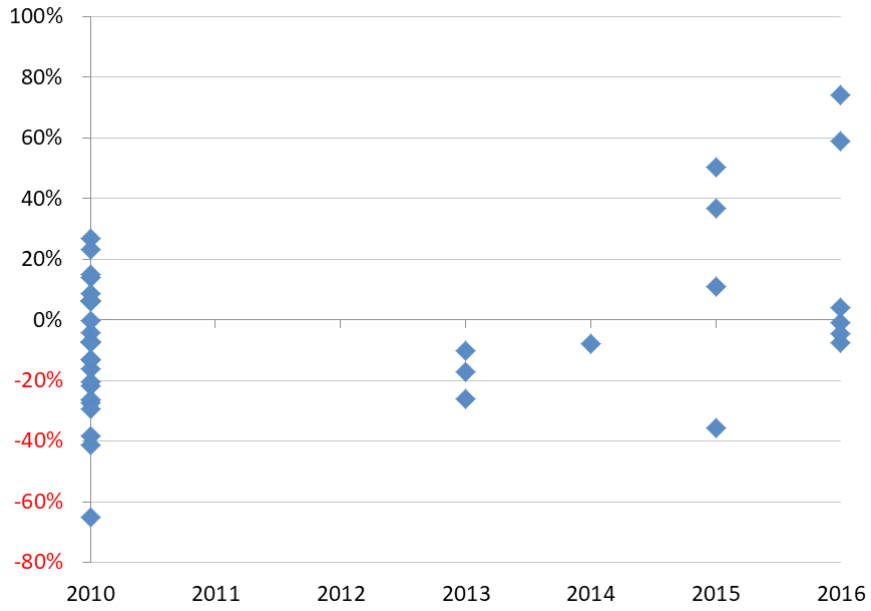

Figure 3. CAGR by Year of Entry into Portfolio.

Size Matters

Since 1998, *Nature Biotechnology* (NBT) has published an annual report on the international biotech industry based on public firm data. We reviewed the 2019 dataset[9] (none was published in 2020) which reviewed 2018 data across 30 countries for 673 public firms that were designated as 'biotech' firms by the authors. Table 4 lists the top 15 countries, based on the number of public firms, and shows reported total market value in each case. Overall however, the NBT numbers for Australia were consistent with the data in our study. The constitution of the 41 Australian firms reported by NBT closely approximated our dataset (differences were not significant) and the overall reported MV of $3.44 billion was very close to the overall sector value reported in this study in 2018 (US$3.50 billion at 2018 exchange rates).

The table shows the complete dominance of the US, accounting for more than half of all public biotech firms and 81% of global biotech value. In Australia, despite a relatively large number of public biotech firms due to the low listing hurdles for the ASX[3], the public biotech sector is very small, based on valuation. Using the NBT figures, the aggregate MV of Australian biotech firms is around 5% of what would be predicted on a pro-rata population basis.

Since 2018, and driven largely by the successes of new entrants after 2015, the Australian DDB sector has grown substantially in value. Based on prevailing exchange rates, over the two years, the sector has grown 44% from $3.5 billion to $5.0 billion (USD). However, even this increase would only change Australia's ranking on a market value basis from 16th to 14th on the NBT global list, if all other countries' biotech valuations remained unchanged since 2018.

The other observation is that despite the growth since 2018, no Big Biotech has yet emerged in Australia, nor looks like emerging in the foreseeable future. Mesoblast and Clinuvel have current valuations above $1 billion and modest revenues, but neither currently has the potential to become a Big Biotech by US standards – the threshold for which is annual sales greater US$1 billion[4].

Value Extraction

In cases where firms have been relatively successful in clinical development, such as Viralytics, they have tended to be sold to international pharmaceutical companies before they could ever have the opportunity to evolve to Big Biotech status. Viralytics advanced its clinical program (CAVATAK) to positive outcomes in Phase II clinical trials and then sold the company to Merck in 2018 for around $500 million. Another example is the Australian company, Sirtex, which was not included in the sector analysis because its cancer therapy (SIR-Spheres) was classified as a medical device, not a drug,

Table 4. NBT 2018 data for global biotech industry

Country	Number of firms	Total MV US$ millions
United States	366	767,094
Australia	41	3,436
France	38	13,334
Sweden	30	12,448
UK	29	6,679
Canada	26	2,727
Israel	18	2,219
South Korea	17	8,936
Germany	17	9,599
Switzerland	12	4,229
China	11	36,590
Japan	11	5,446
Denmark	10	31,078
Taiwan	9	3,173
Belgium	7	6,182
Other countries (15)	31	30,955
Total	673	944,128

Source: Morrison, C. and Lähteenmäki, R. (2018) Public biotech in 2018–the numbers. Nature Biotechnology 37(7):714-21 (supplementary table).

from a regulatory perspective. After successfully commercializing its therapy internationally, Sirtex was acquired in 2018 by a Chinese pharmaceutical firm for $1.9 billion. The same fate may await Clinuvel, which has started commercializing its Scenesse drug treatment in US and Europe.

The reality seems to be that since its inception, Australia has failed to create a robust, valuable and sustainable drug development biotech sector. Going forward, it will be difficult to do so in the face of value leakage due to early value extraction behaviour by biotech firm boards, in the form of trade sales. As noted in the ecosystem study (Molloy 2021, p 58):

> The ultimate culprit is the financialized model of biotech funding.[33,34] This model promotes 'value extraction' rather than 'value creation' and the early monetization of drug development programs – typically in trade sales – rather than building a sustainable biotechnology sector…The urgency to extract value at the earliest opportunity is a constant brake on growth and leads to leakage of value creation and depletion of the assets needed to reach ecosystem critical mass.

Other value extraction events, outside the control of biotech firm boards, have also contributed to value leakage from the sector. One example, referred to as the 'venetoclax syndrome'[3], is where a preclinical-stage cancer drug breakthrough at an Australian PRO was licensed directly to a Big Pharma at a very early stage, circumventing the local DDB sector. Ultimately, the PRO sold off its royalty rights to its Big Pharma partners for a relatively modest $325 million, but the lost opportunity value for the sector may have been in the tens of billions of dollars. Moreover, it could have given Australia its first home grown Big Biotech firm.[3]

Another identified cause of value leakage has been the premature value extraction by Australian VC firms[3]. During the early 2000s, Australian VCs invested in three DDBs, which all progressed to listing on the ASX: Pharmaxis, Alchemia and Qrxpharma. Unfortunately all three later failed and since 2010, not a single VC-backed DDB has progressed to listing on the ASX. Instead, Australian VCs have sought to cherry-pick high-potential spinouts from PROs and then sell them as private firms to pharmaceutical partners at an early stage [3]. The overall sale values were in the hundreds of millions of dollars, which accrued to the benefit of the limited partners in the VC funds (and to some extent the PROs), but like the venetoclax syndrome, the opportunity to contribute to the development of the DDB sector was squandered.

A sustainable biotech sector outside the US needs to generate a home-grown Big Biotech firm, not only to act as anchor tenant, but to show investors that the model is even possible in Australia. No country outside the US has succeeded in doing so, apart from Switzerland, which gave birth to Actelion; however, that company was sold to Johnson & Johnson in 2017, leaving no genuine Big Biotech firms outside the US[4].

To reach the critical mass needed for the creation of a DDB-born Big Biotech, the sector requires rapid, substantial and sustained value growth, without high-profile collapses to dent investor belief and without value leakage due to early value extraction events. These issues and the opportunities to reset the ecosystem in a way that might achieve this have been recently identified[3].

First there needs to be recognition that the public DDB sector is the standard bearer of the biotech ecosystem in Australia and its value growth and investor performance are the key metrics of ecosystem health and growth towards the critical mass needed for spinning out a Big Biotech anchor tenant. Apart from direct critical mass considerations, ASX listing by DDB firms brings with it a public profile that drives public aspirations for drug breakthroughs, determines investor sentiment, and shapes the country's overall perception of the efficacy of its biotechnology output. If the public biotech sector fails then the ecosystem fails and for the last 20 years, it has failed, but it can be salvaged by removing the drivers of value leakage and pushing value creation opportunities into the hands of ASX-listed biotech firms.

It is proposed that stemming value leakage requires government policies aimed at ensuring that any drug discovery generated by PROs is offered to Australian DDBs (or used to spinout a new Australian DDB) to avoid a repetition of the venetoclax syndrome. It would also require policies to dissuade Australian VCs from exiting private DDB programs through trade sales, at the same time incentivizing VCs to exit only through ASX listing. In the same vein, ASX and government policies could be introduced to incentivize biotech company boards not to seek early trade sales, as occurred recently with Sirtex and Viralytics. Without stemming the value leakage, the Australia DDB sector will never be able to reach the critical mass needed for sustained value growth, positive investor performance and spinning out a Big Biotech.

Finally, it is recommended that ASX listing of foreign technology should be dissuaded by ASX rules aimed at promoting local technologies and government policies that disqualify companies that list based principally on foreign technology from participation in RDTI.

CONCLUSIONS

A study of the performance of the Australian DDB sector from 2003 to 2018 revealed that the sector failed to create value and delivered very poor investor performance, the latter a critical consideration given the pre-commercial status of all DDB firms. An updated analysis of the performance of the Australian DDB sector was conducted, using the period 2010 to 2020, principally to exclude the impact of the global financial crisis of 2008/09. This new analysis incorporated both sector and individual firm performance analysis, and showed that the Australian drug development biotech sector remains a very poor investment overall.

It does, however, offer the opportunity for dramatic short-term gains around recently-listed stocks that are able to capture the enthusiasm of investors. Given that the market for DDBs is the demand from pharmaceutical companies for acquisition of drug pipeline[4], sustained value creation requires a valuable Big Pharma deal to affirm the commercial value of a drug development program. Based on the absence of any pharmaceutical deals underpinning the market values of the current spate of high-flyers, one might speculate that the gains and enthusiasm may not be sustained in the long-term. However, they do provide short-term opportunities for some investors to make attractive capital gains.

The sector remains small and weak by US standards and is only boosted on the world stage by its large number of publicly-traded firms; however, this is an artifact of the relatively low listing hurdles that exist in Australia and not indicative of the country's biotech prowess. The country continues to lack the value creation capacity to spin out a Big Biotech firm at any time in the foreseeable future. The notion expressed in 2002 that Australia was a biotech 'Cinderella' about to 'blossom as the belle of the ball' and other ongoing rhetoric promoting Australia's global leadership in biotechnology is without any foundation in fact based on the performance and global standing of the sector.

As noted in a recent paper focused on the biotechnology ecosystem in Australia[3], the country appears to have some advantages as a place to build a bioeconomy. Firstly, it has a Federal government with an expressed commitment to growing a world-class biotechnology ecosystem, and the R&D tax incentive, which offers a cash rebate of 43.5% on R&D, is extremely attractive. Australia is a favorable location for conducting Phase I human trials, because of its expedited CTN (clinical trial notification) system, although the impact for the local biotech sector is debatable. Another feature of Australia as a location for biotechnology firms is the low barrier to public listing on the ASX, providing an attractive mechanism for early-stage funding of technologies that might otherwise not receive VC funding. However, rather than exclusively supporting home-grown technologies, ASX listing is often used to fund foreign technologies that have been unable to secure funding in their home countries.

Against these advantages, the ecosystem study revealed the poor performance of Australia's PROs as a springboard for biotech firms[5]. In addition, the constant value leakage arising from value extraction behavior by PROs, VCs and biotech company boards, makes sustainable value creation in the sector unlikely, at least to the extent needed to spin out a Big Biotech. Meanwhile, the sector will remain attractive to the investors who believe the rhetoric or simply see opportunities in short-term value growth.

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None

Conflict of Interest

The corresponding author, Peter Molloy, was a director of two of the firms referred to in the study: Viralytics (non-executive director from 2008 to 2014) and Race Oncology (managing director and CEO from 2015-2020).

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