EDISON

PDL BioPharma

Building the Noden platform

Outlook

Pharma & biotech

PDL BioPharma is increasingly focused on building Noden Pharma (of which it currently owns 98%) into a lucrative specialty pharmaceutical platform. Currently Noden sells Tekturna, a hypertension drug acquired from Novartis, which had sales of $156m in 2015. It is actively searching for additional products to sell through Noden and is prioritizing these investments over additional royalty and note deals (although current investments in these areas should continue to provide cash flow). We value PDL at $791m or $4.78 per basic share.

Year end	Revenue ($m)	PBT* ($m)	EPS* ($)	DPS ($)	P/E (x)	Yield (%)
12/15	590.4	530.1	2.04	0.60	1.0	30.3
12/16	244.3	175.5	0.78	0.10	2.5	5.1
12/17e	152.2	46.6	0.19	0.00	10.4	N/A
12/18e	142.2	39.0	0.17	0.00	11.6	N/A

Note: *PBT and EPS are normalised, excluding amortisation of acquired intangibles, exceptional items and share-based payments.

Tekturna providing a base

Tekturna (aliskiren) was approved in 2007 for the treatment of high blood pressure. It is unique in that it is the only currently approved renin inhibitor. While Tekturna is a mature product with declining sales (due to stroke and renal concerns, as well as a lack of Novartis detailing), it is highly profitable (we assume 50% margins due to a ~40-person salesforce and a 12.5% tax rate). It also provides Noden with a base to build upon.

Less focus on note and royalty deals

Management has indicated that it will be prioritizing the acquisition of additional products for Noden over additional royalty or note deals (especially the latter). Although it has a history of five successfully concluded investments (not including the expected Ariad closure due to that company being acquired by Takeda) with an internal rate of return of over 18%, other investments have become impaired causing legal bills and management distraction.

$30m stock buyback announced

PDL recently announced its intention to buy back up to $30m (~8%) of its common stock through March 2018. As the company is currently being valued at a greater than 50% discount to the carrying value of the note and royalty assets and net cash, this appears to be an appropriate situation for a stock buyback.

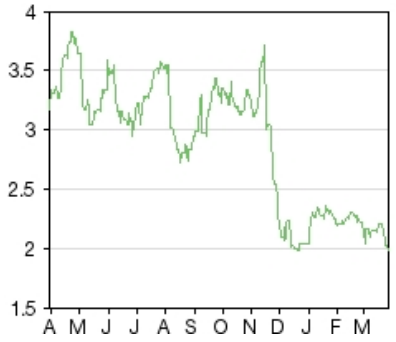
Valuation: $791m or $4.78 per share

We have decreased our valuation of PDL to $791m or $4.78 per basic share from $906m or $5.47 per share, as we have lowered our Tekturna estimates due to prescription data and the write-off of most of its Direct Flow Medical investment. This was mitigated partly by our expectation for a $110m payoff from the Takeda acquisition of Ariad.

28 March 2017

Price	**US$1.98**
Market cap	**US$328m**
Net cash ($m) estimated at 31 March 2017	66.1
Shares in issue	165.5m
Free float	90.8%
Code	PDLI
Primary exchange	NASDAQ
Secondary exchange	N/A

Share price performance



%	1m	3m	12m
Abs	(10.8)	(5.7)	(36.3)
Rel (local)	(9.9)	(8.9)	(44.7)
52-week high/low	US$3.8		US$2.0

Business description

PDL BioPharma is reinventing itself as a healthcare-focused finance company through a three-pronged strategy: investing in royalty streams; providing high-yield financing to life science companies with near-term product launches; and purchasing approved drugs to be sold by Noden Pharma.

Next event

Acquire additional products for Noden platform	2017/18

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Investment summary

PDL, which originated as biotechnology company Protein Design Labs in 1986, has morphed from a standard biotech company with drugs and high R&D expenses to a low-cost specialty pharmaceutical company and a diversified manager of royalty and debt assets. PDL's goal is to build its majority-owned subsidiary, Noden Pharma, into a platform for multiple speciality pharmaceutical products while continuing to collect cash from existing debt and royalty investments. With 11 full-time employees at PDL, an additional eight at Noden and approximately 40 contract sales reps plus four district managers, PDL has a low fixed-cost base, allowing for high operating leverage in the future.

Valuation: $4.78 per basic share

Using an NPV model that values each revenue stream, we value the company at $791m or $4.78 per basic share down from $906m or $5.47 per share previously. The reduction was mainly attributable to lower Tekturna estimates due to recent prescription data and the write-off of most of the company's investment in Direct Flow Medical. This was mitigated partly by our expectation for a $110m payoff from the Takeda acquisition of Ariad. The company is profitable and fully funded currently. However, any additional product acquisitions for the Noden platform will likely require debt or equity financing. Note that Noden acquired Tekturna from Novartis for a total of $294m in upfront and milestone payments, so we would expect additional acquisitions to have a similar magnitude.

Financials: Large cash inflow in Q117

PDL reported $167.1m in cash and short-term investments in Q416. Additionally, Ariad Pharmaceuticals was acquired by Takeda in February 2017, causing PDL to exercise its put option of the synthetic royalty agreement with the company. PDL is due to be paid $110m around the end of Q117. Also in Q117, PDL monetized $7m worth of Direct Flow Medical assets in China. The debt balance includes $276m ($232m in carrying value) of convertible notes, approximately evenly split between February 2018 notes and December 2021 notes.

Sensitivities: Noden execution risk dominates

PDL's Noden Pharma subsidiary is an attractive platform that became almost immediately profitable once the Tekturna asset was acquired given its low cost base. However, it remains to be seen whether this new company with a ~40 rep sales force will be able to execute. Tekturna is a mature product with declining sales. While Tekturna had peak sales of $557m in 2011, a trial in the same year showed some evidence of increased stroke and renal complication risk in diabetic patients. Consequently, sales in 2015 were only $156m and continue to decline. The drug also faces generic risk. Tekturna is covered by a composition of matter patent until 2018 in the US and 2020 in the EU. The drug is additionally protected by manufacturing patents until 2026, which are a significant barrier due to the difficulty in synthesizing the drug. We do not expect significant competition from generics because the dwindling market for the drug does not warrant the manufacturing investment. Finally, although there have been a large number of divestitures from pharmaceutical companies, it is unclear at this point the degree to which the company will be able to source additional deals or achieve any degree of synergy within the organization. PDL lacks the capital of other major pharmaceutical acquirers, which will impact the risk of the type of deal that it will be able to source. There is also a risk regarding the current debt portfolio. At present, four of PDL's six debt-backed deals are impaired. Impairment can lead to extensive litigation (as with Wellstat Diagnostics), write-downs (as with Direct Flow Medical) and requirements for additional funding (as with LENSAR).

Company description: Diversified pharma play

PDL's story has been unique in the biopharma space, and has involved a series of reinventions of itself. The company was originally known as Protein Design Labs, but took a radical departure from the traditional R&D-centred biotechnology company when it divested the development side of the company in 2008 (Facet Biotech, which was bought by Abbott in 2010 and then spun off again as part of AbbVie) to focus on the management of its royalty assets. The company owned a suite of patents related to the humanisation of monoclonal antibodies, the so-called 'Queen et al. patents', and this technology has been used in some of the most successful antibody-based drugs that have been developed (Herceptin, Avastin, etc). At its peak in 2014, licenses for the Queen et al. patents generated $487m in revenue (the vast majority of the Queen et al. revenue ended in Q116). The company leveraged this income to finance a series of debt and royalty-backed deals with other healthcare companies, effectively turning PDL into a specialty finance company. Historically, the company has pursued a value-based strategy in its financing deals, identifying underappreciated assets such as royalties from products outside a company's area of expertise (such as the diabetes drugs developed by Depomed, which are now held by other companies). The company has deployed a total of $1.1bn as of the end of 2016 in this strategy, five of which have completed with an average annualized pre-tax return of 18.4%.

The company then recognized that in addition to financing deals, substantial opportunities existed in the direct acquisition of revenue-generating assets divested from other pharmaceutical and biotech companies. Recently, PDL formed the subsidiary Noden Pharma as a vehicle to acquire mature pharmaceutical products. The first asset purchase happened concurrently with the formation of Noden, and the company purchased the Tekturna brand (known as Rasilez in Europe) of hypertension drugs from Novartis and the company has announced that it intends to opportunistically acquire additional drugs using Noden to market and commercialize these products. This is a marked change in strategy for the company, and it has stated that although it will continue to do financial deals (especially royalty deals), the majority of its efforts will be focused on developing the Noden franchise and acquiring more products. We believe that there is significant opportunity for the company to capitalize on the large number of divestitures of established products from larger pharmaceutical companies, and Tekturna is an excellent example of the types of deals to expect in the future.

Noden and Tekturna: the new direction

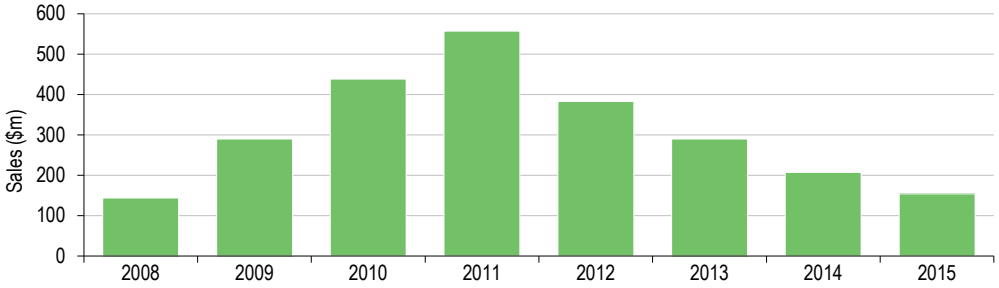
In June 2016, PDL formed Noden Pharma as a majority-owned subsidiary (88% owned by PDL). The first asset purchase happened concurrently with the formation of Noden, as the company acquired the Tekturna brand (known as Rasilez ex-US) of hypertension drugs (aliskiren and Tekturna HCT, a combination of aliskiren and hydrochlorothiazide) from Novartis for up to $294m ($110m upfront, $89m on the first anniversary and $95m in milestones). PDL has invested an additional $40m in working capital in the company.

Tekturna was approved in 2007 for the treatment of hypertension. It is unlike any other marketed antihypertensive drugs because it is an inhibitor of renin. Renin is the enzyme responsible for the generation of angiotensin I and therefore has a critical role in regulating blood volume and vasoconstriction. The product was evaluated in six double-blind, placebo-controlled studies and demonstrated a reduction in systolic blood pressure of 14.8 mmHg (for a 300mg dose), compared to 5.7 for placebo. Tekturna HCT is a co-formulation of the active drug in Tekturna with hydrochlorothiazide, a diuretic commonly prescribed for hypertension. The addition of the drug to the formulation increased the total change in systolic blood pressure to 21.2 mmHg, compared to 7.5 for placebo in the Phase III trial. For comparison, during a head-to-head study the ACE

inhibitors Norvasc (amlodipine) and Monopril (fosinopril) reduced systolic blood pressure by 19 and 13 mmHg respectively.[1]

The combined Tekturna brand sold $156m in 2015. Sales of the drug have been steadily declining from a peak of $557m in 2011, when a clinical trial of the drug showed a high number of kidney problems and strokes among diabetic patients. The drug was the subject of a number of past and ongoing legal challenges associated with possible stroke and renal complications. Novartis halted promotion of the drug following the clinical result, and we expect residual sales to continue to decline under the new partnership.

Exhibit 1: Tekturna sales



Source: Novartis, PDL BioPharma

Tekturna is covered by a composition of matter patent until 2018 in the US and 2020 in the EU. The drug is additionally protected by manufacturing patents until 2026, which are a significant barrier due to the difficulty in synthesizing the drug. We do not expect significant competition from generics because the dwindling market for the drug does not warrant the manufacturing investment.

PDL has contracted 40 sales representatives and four district managers who began marketing the drug in late February 2017. The company intends to target mainly general practitioners as well as cardiologists, initially focusing on high prescribers. It remains to be seen whether this detailing effort is able to slow or reverse the sales decline, which has accelerated from high single-digits year-on-year when the deal was initially announced to 18.6% in January. We are currently forecasting a decline to $100m in sales in 2017 and $83m in 2018 with sales continuing to decline thereafter. Our NPV for Noden is currently $103.5m, down from $158.2m due to lower Tekturna sales expectations in light of the accelerating sales decline. However, based on a sensitivity analysis of the model, if PDL is able to successfully halt the sales erosion after 2017, our model indicates a value for Noden of $239m.

The Depomed royalties

In October 2013, PDL acquired the royalty and milestone rights related to several products (see Exhibit 2) for the treatment of type 2 diabetes from Depomed for a total of $241.3m, the largest royalty acquisition deal that PDL has made to date. The royalties cover a set of products using extended release (XR) formulations of the diabetes drug metformin, either alone or in combination with other diabetes drugs.

[1] Tatti P, et al. (1998).
Outcome Results of the Fosinopril Versus Amlodipine Cardiovascular Events Randomized Trial (FACET) in Patients With Hypertension and NIDDM. 21(4), 597-603

Exhibit 2: Royalties acquired from Depomed

Product	Company	Royalty rate	2016 sales
Glumetza (extended release metformin)	Santarus/Salix/Valeant	gross margin split (~45%, 32-34.5% previously)	$554m
Janumet XR (Januvia + extended release metformin)	Merck	~2%	$735m
Invokamet XR (Invokana + extended release metformin)	Jannsen	Unknown	$2.9m
Jentadueto XR (Tradjenta + extended release metformin)	Boehringer Ingelheim	Unknown	$1.9m
Synjardy XR (Jardiance + extended release metformin)	Boehringer Ingelheim	Unknown	N/A
Extended release metformin in Korea and Canada	LG Life Sciences and Valeant	Unknown	Unknown

Source: PDL, Wolters Kluwer

The bulk of the Depomed royalties have historically come from Glumetza, an extended-release metformin marketed by Valeant. The drug at its peak was nominally the highest-performing metformin on the market ($298m sales in 2014), but to complicate matters, there has been significant uncertainty regarding the end-user sales of the product. Prior owner Salix reported in 2014 that there was a lot more product in the channel than it had previously thought, and Valeant has been inconsistent in reporting revenue from Glumetza for royalty calculation purposes. As a result, PDL has initiated an independent audit. The drug went off patent as of February 2016, which triggered a provision to adjust the royalty rate to half of the gross margin (estimated at an effective royalty rate of 45%) compared to 32-34.5% of sales previously. The company had to take a $48m write-down on the carrying value for the Depomed royalties (to $143.9m from $191.9m) in Q116 due to higher than expected competition from the first generic launch. This could be attributed to the pre-emptive decision of Express Scripts to exclude Glumetza from its formulary at the beginning of 2016 in advance of the generic launch as a response to Valeant price increases. At least two other generics have subsequently launched, and although the royalty stream was impactful for 2016, we do not expect significant residual sales in 2017.

The Depomed royalties also include a series of other metformin-containing medicines, and although none of the products are expected to provide royalty streams of the scale of Glumetza, we expect each to become a significant product and collectively provide similar revenue. Unfortunately, we have significantly less visibility on the terms of the royalties, although sales should be significant as these medications are additions to well established, multi-billion dollar brands. The Janumet brand had $2.2bn in revenue in 2016 and PDL is entitled to approximately 2% of revenue from the XR formulation. Likewise, the company is entitled to undisclosed royalties from the sale of Invokamet XR, which was launched by Janssen in September 2016 and is an extension of the $1.3bn Invokana/Invokamet brand. Additionally, PDL can expect royalties from the FDA-approved Jentadueto XR in May 2016 and Synjardy XR in January 2017, both extensions of the $909m Tradjenta/Jardiance brand.

The company reports a carrying value for the royalty suite of $164.1m. Using PDL's exceptionally conservative discount rates (15-25% depending on product, assumed as 22.5% for our calculation), and our sales projections for these products, this valuation is consistent with royalties in the range of approximately 2%. Using our standard discount rate for approved products (10%) we arrive at a valuation of $231.3m for the royalty stream.

University of Michigan royalties

In November 2014, PDL acquired 75% of the royalty payments due to the University of Michigan for Cerdelga, an oral therapy for Gaucher disease, which received US approval in August 2014 and EU approval in January 2015 and is marketed by Genzyme/Sanofi. The deal runs until patent expiration, currently expected in April 2022. Gaucher is an extremely rare disease with an estimated 10,000 sufferers worldwide.

Gaucher is a genetic disorder in which a missing enzyme, glucocerebrosidase, leads to the accumulation of fatty substances, sphingolipids, in organs like the spleen, liver, kidneys, lungs,

brain and bone marrow. It is a serious disorder that can lead to death, even while the patient is still in infancy.

The current standard of care is enzyme replacement therapy, which replace the missing enzyme, although Cerezyme (Genzyme/Sanofi) and Elelyso have one amino acid error in the sequence, and only VPRIV (Shire) has an entirely correct sequence. Cerdelga acts by effectively inhibiting sphingolipid synthesis so that it cannot accumulate in vital organs. While it seems simpler to just replace the enzyme, the enzyme replacement therapies are administered by intravenous infusions that could take 1-2 hours and can be administered up to three times a week, if at a low dose per infusion, or once every two weeks if at a higher dose. Cerdelga is just a twice-a-day pill that has the extra advantage that patients do not need to travel to have it administered.

Based on the data from the ENCORE study, where Cerezyme patients were either switched to Cerdelga or remained on Cerezyme, the vast majority of Cerdelga patients were stable across multiple end points 52 weeks past the switch. Based on the results of the study, Cerdelga met the criteria for non-inferiority to Cerezyme (see Exhibit 3).

Exhibit 3: Cerdelga vs Cerezyme ENCORE data

Variable	Cerdelga (N=99)	Cerezyme (N=47)
Patients meeting hemoglobin criteria	94.9%	100%
Patients meeting platelets criteria	92.9%	100%
Patients meeting spleen volume criteria	94.4%	100%
Patients meeting liver volume criteria	96.0%	93.6%
Percent of patients stable	83.8%	93.6%

Source: FDA, Genzyme

As expected, the initial launch phase of the drug has been relatively slow. Physicians who treat Gaucher patients typically do not like to switch patients to other drugs (even other enzyme replacement therapies) if a patient is stable. Instead they are most likely to start Cerdelga in patients who are naïve to therapy and those that are unable to tolerate enzyme replacement therapy. The launch hit an additional snag in Q216, when Sanofi encountered issues with reimbursement in Europe and Japan (the drug cost $310,250 per year in the US at launch), which slowed down expansion into these markets. Of the €106m in sales in 2016, €85m (80%) was in the US. The growth rate also appears to be slowing. In 2016 as a whole, growth, in constant exchange rate terms, was 59.1%. However, in Q416 growth was only 27.3%.

On this basis, we remain conservative with regards to the value of the asset, and have previously stated that we believe that the company's fair value estimate seems high (and likely still is, despite being lowered from $70.2m at the end of 2015 to $35.4m in Q416). We project that the University of Michigan receives a 3% royalty, of which PDL receives 75%, or 2.25% of Cerdelga sales. To justify the current fair value estimate, those peak sales would need to be almost $1bn globally, roughly equivalent to what Cerezyme sold in 2016, which could be aggressive. Due to the slowing growth we have lowered our peak sales from $643m previously to $264m for an NPV of $12.7m, so there is a risk that PDL will have to continue to take write-down on the fair value of this royalty. Due to the scale of the agreement, this represents a small portion of the company's overall valuation, although it does reflect on the company's ability to source and assess deals.

Kybella royalty

One of the new deals that PDL entered into in 2016 was for royalties on the sale of Kybella (deoxycholic acid), which is marketed by Allergan. It is currently marketed for the cosmetic removal of fat associated with double chins, and was acquired by Allergan in 2015 via the $2.1bn buyout of Kythera. As of yet, the drug has not achieved dramatic sales ($50m in 2016), as there are significant adoption hurdles associated with training new doctors on the injection procedure. Also, despite a direct-to-consumer advertising launch in mid-August, sales in Q416 were roughly equivalent to those in Q216. We have lowered our estimated peak sales from $450m before the

product goes generic in 2028 to $150m. The company purchased the royalties from an individual we presume to be an inventor for $9.5m. Although the precise royalty rate has not been reported, we expect it to be small, in the range of 1%, based on the fact that it was purchased from a single person. The company calculates a carrying value for the asset of $10.1m, based on a discount rate of 14.4%, whereas our sales estimates predict a value of $5.0m using a discount rate of 10%.

Viscogliosi Brothers royalty agreement

In June 2014, PDL signed a royalty agreement with Viscogliosi Brothers (VB), a venture capital/private equity and merchant banking firm focused on the musculoskeletal and orthopedics segments of the healthcare industry. PDL paid $15.5m for the royalties due to VB from Paradigm Spine for an FDA-approved spinal implant. Neither the royalty rate nor any information about the product has been disclosed, but PDL does disclose a fair value of $15m for the asset with a 17.5% discount rate. Considering our lack of knowledge regarding the product, we use a 12.5% discount rate (as opposed to 10% for other marketed products), and we estimate the asset is worth $17.7m on this basis.

Avinger royalty

The company entered a royalty-backed debt agreement with Avinger in 2013, which Avinger used to draw $20m. The debt has been repaid, but as per the terms of the agreement, PDL is entitled to a 0.9% royalty on sales (with undisclosed minimums) until April 2018. The company reports a carrying value for the asset of $1.6m, based on a 15% discount rate.

Zalviso for moderate to severe post-operative pain

In September 2015, PDL acquired royalty rights to Zalviso, a drug/device combination product that dispenses a sublingual formulation of sufentanil, from AcelRx for $65m. AcelRx has partnered with Grunenthal in the EU, Switzerland and Australia and so PDL now has the right to 75% of the royalties received from Grunenthal (AcelRx is eligible for mid-teen to mid-20% royalties) and 80% of the first four commercial milestones. The drug was approved shortly after the deal was signed and was launched progressively throughout 2016.

Zalviso treats moderate to severe post-operative pain in the hospital setting for up to 72 hours and is meant to be used instead of intravenous patient-controlled analgesia. As delivery of the sufentanil is sublingual, it eliminates IV infection risk and the risk that the PCA pump is misprogrammed, which can cause either too much or too little medication going to the patient. Also, the costs of IV PCA are not trivial as besides the drug itself, there needs to be a pump for the analgesic and a separate pump for saline to keep the catheter open; there is also the cost of tubing, as well as rescue opioids, as often IV PCA is not enough for the patient's pain (see Exhibit 3).

Exhibit 4: Average IV PCA costs per patient in knee, abdominal and hip surgeries (in $)

	Knee	Abdominal	Hip
PCA pump	47.71	46.18	46.6
PCA IV extension	19.87	20.86	21.86
IV PCA opioids	34.54	45.78	33.05
Non-PCA IV infusion pump	8.86	12.91	9.21
Non-PCA IV tubing	7.93	8.61	8.92
Saline	21.40	22.18	20.08
Supplemental opioids	62.58	86.58	58.32
Total	202.89	243.10	198.04

Source: ISPOR 2014 (poster presentation PSY24)

According to AcelRx, there are approximately 19.4m inpatient procedures in the EU5, with about half eligible for Zalviso due to the severity of the pain. Assuming a price of $40 per dose, 4.5 doses per patient (the median in the pivotal trial) and 7% peak market share, we arrive at peak sales of

$190m in 2027, which is when the current patent protection ends. Based on our estimates and the use of a10% discount rate, we calculate an NPV of $67.5m for these royalties, although it is important to note that we have placed no value on the portion of the commercial milestones that PDL is owed as we know neither the amount nor the timing of these payments.

Debt deals

PDL has engaged in a series of debt-based deals with companies in the diagnostics and medical device space (Exhibit 4). These are typically high yield deals, some backed by royalties, in the range of $20m-$150m.

Exhibit 5: PDL income-generating assets

Note	Types	Principal ($m)	Interest	End date	Comments
Wellstat Diagnostics	Note receivable and credit agreement	$50.19	Impaired		In litigation in the Supreme Court of New York
Hyperion	Royalty-backed debt	$1.20	Impaired		
LENSAR	Credit agreement	$49	15.50%, Impaired	Dec-20	Filed for Chapter 11 bankruptcy in December 2016. Expected to become an operating subsidiary of PDL in Q217. Has $135m in available net operating losses, which may be used to reduce PDL's taxes.
Direct Flow Medical	Credit agreement	$56.5	13.50%, Impaired	Nov-18	After potential lead investor withdrew term sheet for $65m investment, company shut down operations in December. PDL now owns the assets as of January. Recently monetized $7m of assets in China and will further monetize assets. Wrote off $51.1m in Q416.
Kaléo	Note purchase	$145	13%	Jun-29	PDL expects notes will be repaid by 2020.
CareView	Credit agreement	$40	13-13.5%	Five year	First tranche of $20m was made available in October 2015, second tranche of $20m to be made available upon attainment of certain milestones no later than the end of Q217.

Source: PDL

There are currently four impaired assets: a note receivable and credit agreement with Wellstat Diagnostics and a royalty-backed debt agreement with Hyperion, a credit agreement with Direct Flow Medical, and a credit agreement with LENSAR.

Wellstat, a former diagnostics company, was served a notice of default after violating their debt covenants in 2013 and subsequently defaulted again on a renegotiated agreement in 2014. The company went into receivership in 2015; however, liquidation of the company was delayed in April 2016 when it filed for chapter 11 bankruptcy. Litigation is ongoing and is currently before the Supreme Court of New York. PDL has also commenced a non-judicial foreclosure process to collect on the sale of certain real estate assets in Virginia owned by guarantors of the loan. PDL has consistently stated that the company assets exceed the $50.2m carrying value for the debt.

PDL entered into its smallest deal with Hyperion Catalysis International for $2.3m in 2012. Hyperion is focused on commercializing carbon nanotubes, and the company was able to repay $1.2m of the debt as of March 2014. The company is exploring strategic alternatives including financing and selling the company to pay the $1.2m debt to PDL, and PDL concluded as part of an impairment analysis that Hyperion's assets exceeded the value of the debt.

PDL has also set up a credit agreement in 2013 with Direct Flow Medical, a developer of transcatheter heart valves. Direct Flow drew a total of $56.5m, but subsequently underwent six amendments to the agreement and 10 waivers delaying interest and principal payments, beginning in December 2015. The company had been seeking additional financing, and had been advancing $65m term sheet to out-license the ex-US rights for its products, but this deal fell through in late 2016. Consequently, the company shut down operations in December 2016 and PDL obtained ownership of substantially all of Direct Flow's assets in January. PDL was able to monetize assets in China for $7m and is seeking to monetize further assets, which will likely take the form of licensure of intellectual property related to mitral and aortic valve replacement, an important area

for large medical device companies such as Edwards and Medtronic. PDL wrote off $51.1m of their investment in Direct Flow in Q416, leaving a carrying value of $10m at December 31, 2016.

LENSAR is commercializing its laser cataract surgery system in both the US and EU. This is a competitive area where the systems are expensive (~$400,000 per machine) and, based on comments from refractive surgeons, it remains unclear whether it improves outcomes. They drew $40m from a credit agreement with PDL in 2013, but entered into a forbearance agreement in 2015 when it was unable to make interest payments. LENSAR was subsequently restructured into a subsidiary of Alphaeon, a private healthcare cosmetic company, which renegotiated the debt to an interest rate of 15.5% and 2020 maturity. PDL was gifted 1.7m shares of Alphaeon (estimated at $6.5m) as part of the deal. However, Alphaeon subsequently decided to divest all of its ophthalmology business. In December 2016, LENSAR filed chapter 11 bankruptcy after consulting PDL and entered into an amended credit agreement as a means to independently reacquire its assets from Alphaeon. Part of the amended agreement grants PDL an undisclosed amount of equity in the company, but PDL has stated that it expects for LENSAR to operate as a subsidiary after the proceeding is complete. The bankruptcy case is expect to conclude in Q217, and PDL has agreed to provide up to $2.8m in funding to operate the business for the remainder of the bankruptcy proceeding. Importantly, LENSAR has $135m in net operating losses available for use by PDL to reduce their tax rate. Assuming a 35% tax rate, these could be worth $47m to PDL. Besides this, LENSAR continues to operate as a business with revenue-generating femtosecond lasers installed in high volume surgical settings. PDL believes that with some restructuring of the business, LENSAR may potentially become profitable.

PDL also entered into a debt agreement with Kaléo for $150m in 2014. Kaléo is a drug-device company that develops autoinjectors. There was a degree of uncertainty regarding the company's ability to pay its debt when in October 2015, its partner Sanofi voluntarily recalled and returned the rights to the Auvi-Q epinephrine autoinjector due to problems with precise dose delivery. The recall gained national attention when Mylan, manufacture of the competing EpiPen autoinjector, was scrutinized for its pricing practices. The Auvi-Q was relaunched by Kaléo without a partner in February 2017 with an even more aggressive pricing scheme: a $4,500 sticker price, with rebates to keep end user costs to $0 for insured patients and patients with household income under $100,000 per year and $360 for other cash-pay patients. Although we expect little insurance coverage, this strategy has worked for other companies such as Horizon Pharmaceuticals, with revenue driven by deluxe insurance plans. Moreover, Kaléo has been able to meet all its debt obligations via stronger than expected sales of its other product Evzio (naloxone autoinjector) even without Auvi-Q on the market. PDL expects the note to be repaid by 2020, which we also envision.

In June 2015, PDL announced a new credit agreement with CareView, a company focused on patient care monitoring. The agreement includedtwo tranches of $20m, each based upon the achievement of milestones. The first tranche was paid in October 2015 and has a 13.5% coupon. The second tranche has not been paid yet and will be based upon a milestone attained on or before the end of June 2017 and will have a 13% coupon. Each tranche will last for five years. PDL also received a warrant to purchase 4.4 million shares of stock at $0.45 per share (approximately 5% warrant coverage) that expires on June 26, 2025. We do see some financial risk associated with this transaction as the company is annualizing $4m worth of revenue, burning around $4m a year and currently has $44.3m in convertible debt (although that is subordinate to any debt incurred to PDLI).

Sensitivities

PDL's Noden Pharma subsidiary is an attractive platform that became almost immediately profitable once the Tekturna asset was acquired given its low cost base. However, it remains to be seen

whether this new company with a ~40-rep sales force will be able to execute. Tekturna is a mature product with declining sales. Tekturna had peak sales of $557m in 2011; however, a trial in the same year showed some evidence of increased stroke and renal complication risk in diabetic patients. Consequently, sales in 2015 were only $156m and continue to decline. Tekturna also faces generic risk. Tekturna is covered by a composition of matter patent until 2018 in the US and 2020 in the EU. The drug is additionally protected by manufacturing patents until 2026, which are a significant barrier due to the difficulty in synthesizing the drug. We do not expect significant competition from generics because the dwindling market for the drug does not warrant the manufacturing investment. Finally, although there have been a large number of divestitures from pharmaceutical companies, it is unclear at this point the degree to which the company will be able to source additional deals or achieve any degree of synergy within the organization. PDL lacks the capital of other major pharmaceutical acquirers, which will impact the risk of deal that it will be able to source. There is also a risk regarding their current debt portfolio. Currently, four of their six debt-backed deals are impaired. Impairment can lead to extensive litigation (as with Wellstat Diagnostics), write-downs (as with Direct Flow Medical) and requirements for additional funding (as with LENSAR).

Valuation

Using an NPV model that values each revenue stream, we value the company at $791m or $4.78 per basic share, down from $906m or $5.47 per share previously. The reduction was mainly attributable to lower Tekturna estimates (which reduced the value for Noden from $158.2m to $103.5m) due to recent prescription data and the write-off of most of $51.1m worth of their investment in Direct Flow Medical. Our estimated value for the University of Michigan and Kybella assets have also been reduced by $12.1m and $7.7m, respectively, due to lower than expected results for the underlying assets. This was mitigated partly by our expectation for a $110m payoff from the Takeda acquisition of Ariad (we had previously included an $87.1m value for the Ariad royalty). The company is profitable and fully funded currently. However, any additional product acquisitions for the Noden platform will likely require debt or equity financing. Note that Noden acquired Tekturna from Novartis for a total of $294m in upfront and milestone payments so we would expect additional acquisitions to have a similar magnitude.

Exhibit 6: PDL valuation table

Royalty/Note	Type	Expiration Year	PDL Balance Sheet Carrying Value	NPV
Queen et al	Royalty	2015	N/A	N/A
Depomed	Royalty on Glumetza and other products	Varies	$164.1	$231.3
VB	Royalty on Spine Implant	Undisclosed	$15.0	$17.7
University of Michigan	Royalty on Cerdelga	2022	$35.4	$12.7
DirectFlow	Note (Impaired)	2018	$10.0	$10.0
Wellstat	Note (Impaired)	Unknown	$50.2	$50.2
Hyperion	Note (Impaired)	Unknown	$1.2	$1.2
Avinger	Royalty	2018	$1.6	$2.2
Lensar	Note (Impaired)	2018	$43.9	$43.9
Kaleo	Note	2029	$146.7	$153.6
Acelrx	Royalty on Zalviso	2027	$67.5	$72.5
Careview	Note	2022	$19.0	$20.7
Noden	Equity	N/A	N/A	$103.5
Kybella	Royalty	Unknown	$10.1	$5.0
Total				$725
Net Cash (Q117e) ($m)				$66.1
Total firm value ($m)				$791
Total basic shares (m)				165.5
Value per basic share ($)				$4.78
Total options				0.2
Total number of shares				165.8
Diluted value per share ($)				$4.77

Source: Edison Investment Research, company reports

Financials

PDL reported $167.1m in cash and short-term investments in Q416. Additionally, Ariad Pharmaceuticals was acquired by Takeda in February 2017, causing PDL to exercise its put option of the synthetic royalty agreement with the company. PDL is due to be paid $110m around the end of Q1. Also in Q117, PDL monetized $7m worth of Direct Flow Medical assets in China. Their debt balance includes $276m ($232m in carrying value) of convertible notes, approximately evenly split between February 2018 notes and December 2021 notes. PDL also recently announced their intention to buy back up to $30m (~8%) of their common stock through March 2018, which is not a surprise given the company is currently being valued at a greater than 50% discount to the carrying value of their note and royalty assets and net cash.

Exhibit 7: Financial summary

$,000	2014	2015	2016	2017e	2018e
Year end 31 December	US GAAP	US GAAP	US GAAP	US GAAP	US GAAP
PROFIT & LOSS					
Revenue	581,225	590,448	244,301	152,231	142,231
Cost of Sales	0	0	(4,065)	(14,984)	(12,542)
Gross Profit	581,225	590,448	240,236	137,247	129,689
General & Administrative	(34,914)	(36,090)	(43,287)	(65,398)	(65,530)
EBITDA	546,311	550,379	193,129	64,302	56,611
Operating Profit (before GW and except.)	546,311	550,379	193,129	64,302	56,611
Intangible Amortisation	0	0	(12,028)	(24,056)	(24,056)
Other	0	(3,979)	0	0	0
Exceptionals	0	0	(51,699)	0	0
Operating Profit	546,311	550,379	129,402	40,246	32,555
Net Interest	(38,896)	(26,691)	(17,679)	(17,711)	(17,634)
Other	(6,143)	6,450	(2,353)	0	0
Profit Before Tax (norm)	501,272	530,138	175,450	46,590	38,976
Profit Before Tax (FRS 3)	501,272	530,138	109,370	22,534	14,920
Tax	(179,028)	(197,343)	(45,711)	(9,239)	(6,117)
Deferred tax	(0)	(0)	(0)	(0)	(0)
Profit After Tax (norm)	322,244	332,795	129,739	37,351	32,859
Profit After Tax (FRS 3)	322,244	332,795	63,659	13,295	8,803
Minority interest	0	0	(53)	(6,398)	(5,356)
Profit After Tax less Minority Interest (FRS 3)	322,244	332,795	63,606	6,897	3,448
Average Number of Shares Outstanding (m)	158.2	163.4	163.8	164.1	165.8
EPS - normalized ($)	2.04	2.04	0.78	0.19	0.17
EPS - FRS 3 ($)	2.04	2.04	0.39	0.04	0.02
Dividend per share ($)	0.61	0.60	0.10	0.0	0.0
Gross Margin (%)	100.0	100.0	98.3	90.2	91.2
EBITDA Margin (%)	94.0	93.2	79.1	42.2	39.8
Operating Margin (before GW and except.) (%)	94.0	93.2	79.1	42.2	39.8
BALANCE SHEET					
Fixed Assets	606,453	733,468	818,949	775,245	679,748
Intangible Assets	0	0	228,542	204,486	180,430
Tangible Assets	62	31	1,631	2,904	4,308
Royalty rights	259,244	399,204	402,318	271,470	232,353
Other	347,147	334,233	186,458	296,385	262,657
Current Assets	355,897	279,731	395,147	385,790	362,077
Stocks	0	0	0	0	0
Debtors	300	0	40,120	40,120	40,120
Cash	291,377	218,883	147,154	323,479	300,266
Other	64,220	60,848	207,873	22,191	21,691
Current Liabilities	(187,983)	(36,662)	(130,315)	(168,714)	(42,314)
Creditors	(318)	(394)	(7,016)	(7,016)	(7,016)
Short term borrowings	(175,496)	(24,966)	0	(126,400)	0
Other	(12,169)	(11,302)	(123,299)	(35,298)	(35,298)
Long Term Liabilities	(313,930)	(283,485)	(329,649)	(213,258)	(213,258)
Long term borrowings	(276,228)	(232,835)	(232,443)	(116,052)	(116,052)
Other long term liabilities	(37,702)	(50,650)	(97,206)	(97,206)	(97,206)
Net Assets	460,437	693,052	754,132	779,063	786,253
Minority Interests	0	0	0	(12,840)	(12,840)
Shareholder equity	460,437	693,052	754,132	766,223	773,413
CASH FLOW					
Operating Cash Flow	292,281	301,465	101,718	3,637	25,875
Net Interest	0	0	0	0	0
Tax	0	0	0	0	0
Capex	(49)	(9)	(109,963)	0	(1,422)
Acquisitions/disposals	21,360	(71,593)	13,082	163,688	78,234
Financing	0	0	0	0	0
Dividends	(96,557)	(98,307)	(16,583)	0	0
Other	(159,420)	(8,046)	(47,629)	9,000	500
Net Cash Flow	57,615	123,510	(59,375)	176,325	103,186
Opening net debt/(cash)	300,978	160,347	38,918	85,289	(81,027)
HP finance leases initiated	0	0	0	0	0
Exchange rate movements	0	0	0	0	0
Other	83,016	(2,081)	13,004	(10,009)	0
Closing net debt/(cash)	160,347	38,918	85,289	(81,027)	(184,214)

Source: Edison Investment Research, company reports

Contact details	Revenue by geography
PDL BioPharma, inc. 932 Southwood Blvd. Incline Village, NV 89451 US 775-832-8500 www.pdl.com	64.4% US 33.8% Europe 1.8% Other

Management team

CEO: John McLaughlin	CFO: Peter Garcia
John McLaughlin has been president and CEO since December 2008 after the company spun off Facet Biotech Corporation (Facet Biotech). From 6 November 2008 until the spin-off, he served as a senior advisor to the company. He was the CEO and a director of Anesiva, formerly known as Corgentech, from January 2000 to June 2008. He received a BA from the University of Notre Dame and a J.D. from the Catholic University of America.	Peter Garcia, VP and CFO, joined the company in May 2013. Before joining PDL, he served as CFO of BioTime, which he joined in 2011. From 1996 to 2011, he was CFO of six biotech and high-tech companies, including Marina Biotech, Nanosys, Nuvelo, Novacept, IntraBiotics Pharmaceuticals and Dendreon Corporation. Mr Garcia holds a BA in economics and sociology with honors from Stanford University and an MBA with an emphasis in finance and accounting from UCLA.
General Counsel: Christopher Stone	**VP Business Development: Danny Hart**
Christopher Stone, VP, general counsel and secretary, joined the company in February 2009. He brings more than 25 years' legal experience to the role. Before joining PDL, he served as VP of legal affairs and corporate secretary at LS9, an advanced biofuels development company, where his work included a focus on intellectual property protection and licensing. Previously, he was VP of US intellectual assets at Danisco, a global producer of food ingredients, enzymes and bio-based solutions. He received a J.D. from George Washington University and a B.S. in biochemistry from the University of Massachusetts.	Danny Hart joined PDL BioPharma in January 2010 as corporate counsel. In September 2014, he was promoted to VP of business development, a non-legal role evaluating and structuring PDL's investment transactions. From 2006 until he joined PDL, he worked as an associate with Hogan & Hartson LLP (now Hogan Lovells US LLP), a leading international law firm, where his practice focused on securities, corporate governance and mergers and acquisitions. He received a J.D. from Vanderbilt University Law School and a B.A. from the University of Washington in Seattle.

Principal shareholders	(%)
Vanguard Group	8.1%
Renaissance Technologies	7.8%
BlackRock Fund Advisors	4.5%
BlackRock Institutional Trust	3.5%
Acadian Asset Management	3.3%
Mackenzie Financial	2.8%
Dimensional Fund Advisors	2.6%

Companies named in this report

DepoMed (DEPO); Abbott (ABT); Abbvie (ABBV); Takeda (4502:JP); Valeant (VRX); Merck (MRK); LG Life Sciences (068870:KS); Sanofi (SNY); Shire (SHPG)

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