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Goldman Sachs

Europe: Healthcare: Biotechnology

Equity Research

Reassessing European Biotech – Galapagos, Innate top picks

Galapagos and Innate Pharma our top picks in Europe Biotech

We revisit our estimates and recommendations across European biotech. Our top picks are Galapagos and Innate Pharma, with 12-month target prices of €75 and €17 (30% and 56% upside, respectively). We upgrade Galapagos to Buy from Neutral, given the underappreciated potential we see in rheumatoid arthritis asset filgotinib, cystic fibrosis development and the early-stage pipeline. While we remove Innate Pharma from the Conviction List, we remain Buy-rated as we believe the market undervalues the optionality contained in its three Big Pharma partnerships in immuno-oncology. We believe that both companies are entering into an important period of news flow over the next few months.

We rate Actelion, Genmab and MorphoSys as Neutral

Both Actelion and Genmab have performed strongly YTD (up 15% and 22%, respectively), supported by strong sales performances (of Opsumit and Uptravi for Actelion and Darzalex for Genmab). We rate both companies at Neutral, with 12-month price targets of SFr172 and Dkr1,200 respectively, based on DCF valuations. MorphoSys has undergone a derating this year (-28% YTD), despite positive Phase 3 data for psoriasis asset guselkumab. We increase our DCF-based, 12-month target price to €50 (from €43).

Overview of upcoming catalysts

The next few months will be important for newsflow. Key events that we will be monitoring are the results of Innate Pharma's lirilumab as standalone and combination, Galapagos' progress in cystic fibrosis, Genmab's approvals and results for Darzalex, and MorphoSys' results for MOR-202 and MOR-208.

Factoring M&A into our valuations

In our view, the most attractive potential biotech takeout candidates would have differentiated science and unpartnered assets, at an attractive valuation. Genmab stands out on this basis, and we assign a 30% weight in our 12-month price target to an M&A value (which we estimate at DKr1,400 per share). We do not explicitly factor in the prospect of M&A into our other target prices, but do see it as a downside support to share prices.

Coverage changes

With this update, Tim Woodward assumes coverage of these names.

RATINGS AND 12M PRICE TARGETS

		Rating	12m TP	Upside/ downside
GLPG.AS	**Galapagos NV**	Buy	75	30%
IPH.PA	**Innate Pharma SA***	Buy	17	56%
ATLN.S	**Actelion**	Neutral	172	8%
GEN.CO	**Genmab**	Neutral	1200	7%
MORG.DE	**MorphoSys AG**	Neutral	50	21%

Price targets in local currency; * We remove Innate Pharma from the Conviction List
Source: Goldman Sachs Global Investment Research; FactSet.

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Prices in this report are as of the close of October 17, 2016, unless otherwise noted.

We would like to thank Rebekah Yu for her contribution to this report.

Overview: Reassessing European biotech

We take a deep dive into our European biotech coverage. We prefer Galapagos and Innate Pharma on valuation upside and upcoming catalysts. Exhibit 1 shows our revised 12-month price targets and ratings.

Exhibit 1: Galapagos and Innate Pharma are our two Buys
Summary of revisions to ratings and 12-month price targets*

		NEW Rating	NEW TP (LC)	*OLD TP (LC)*	*OLD Rating*	Upside/ downside
GLPG.AS	**Galapagos NV**	Buy	75	*55*	*Neutral*	30%
IPH.PA	**Innate Pharma SA**	Buy	17	*22*	*Buy**	56%
ATLN.S	**Actelion**	Neutral	172	*121*	*Neutral*	8%
GEN.CO	**Genmab**	Neutral	1200	*950*	*Neutral*	7%
MORG.DE	**MorphoSys AG**	Neutral	50	*43*	*Neutral*	21%

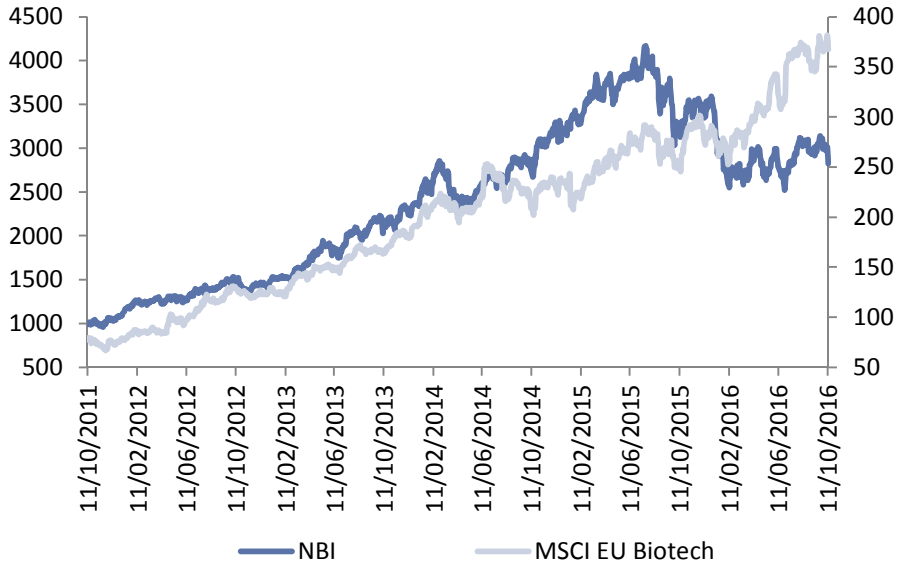
* We remove Innate Pharma from the Conviction List with this note; lc; local currency

Source: Goldman Sachs Global Investment Research.

European biotech has not experienced the derating of the US sector

Exhibit 2 shows the relative performance of European vs. US biotech over the past few years. Clearly, European biotech has not experienced the de-rating seen in the US. In our coverage, for example, Actelion and Genmab are both up year to date, while Galapagos has been approximately flat.

Exhibit 2: European biotech has not experienced the derating of US biotech
US vs. European biotech performance since 2011



Source: Goldman Sachs Global Investment Research. FactSet

Galapagos and Innate most attractive from a valuation perspective

Based on our DCF valuations, there is significant upside to Buy-rated Galapagos and Innate Pharma. We see 30% and 56% upside respectively to these stocks. By contrast, we see Genmab, MorphoSys and Actelion as more fairly valued.

Key catalysts for Innate, Galapagos, MorphoSys and Genmab

We believe that Innate Pharma, Galapagos, MorphoSys and Genmab have important catalyst readouts over the next few months. We view **Innate Pharma** as the most interesting from a catalyst perspective, as we expect efficacy data for lead asset lirilumab as both standalone and in combination therapies by year-end. For **Galapagos**, we await safety data from Phase 1 studies in cystic fibrosis, and the identification and testing of the triple combination. We also await the readout of trials for Galapagos's earlier-stage pipeline assets. For **MorphoSys**, we expect to see FDA filing for psoriasis asset guselkumab this year, and continuing data readouts with more mature MOR202 combination data at ASCO 2017, where we also expect data for MOR-208. For **Genmab**, we await the data from the trials of daratumumab as front-line therapy in multiple myeloma, the first of which we expect next year.

Genmab/Actelion: Strong sales performance from recent launches

In terms of exposure to sales catalysts, Genmab and Actelion both benefit from having drugs in the launch stage (Darzalex and Uptravi, respectively). Strong sales performance has allowed these two stocks to outperform year to date. However, at both of these companies, there are outstanding questions over the trajectory of sales for the next couple of years. At Genmab, the debate is the extent to which Darzalex's impressive launch has been driven by capturing patients in early lines of therapy, and therefore how much upside will exist in the near term from expansion into early treatment lines. At Actelion, we await more quarters of Uptravi sales to get a better view of the market potential.

Assessing the M&A outlook

One key catalyst for biotech investing is the potential for M&A takeout. Across our coverage universe, we examine stocks using an M&A framework. We assign an M&A score as a means of ranking companies under coverage from 1 to 4, with 1 representing high (30%-50%) probability of M&A activity, 2 representing medium (15%-30%) probability, 3 representing low (10%-15%) probability and 4 representing minimal to no probability (0%-10%). For companies ranked 1 or 2, in line with our standard departmental guidelines we incorporate an M&A component into our target price.

In our view, the most attractive potential biotech takeout candidates would have differentiated science and unpartnered assets, at an attractive valuation. The only company for which we include possible M&A in our target price is Genmab.

Genmab's Darzalex is fully partnered with J&J. However, if Darzalex starts to fulfill its sales potential, we believe that there remains a possibility of M&A takeout. We assign an M&A score of 1 to Genmab, and therefore the M&A valuation contributes 30% to our 12-month target price (with the DCF valuation constituting the remainder).

Exhibit 3: We factor potential M&A into our ratings for Genmab
Overview of M&A contributions to price target

	M&A score	M&A valuation	Premium to current	M&A score rationale	Methodology of target price
Genmab	1	1400 DKR	25%	If Darzalex sales continue to grow, acquisition of the royalties to Genmab could be accretive for an acquirer. It would also be a use of offshore cash for a US domiciled acquirer	Elimination of 90% of R&D and SG&A costs, acquirer recognises DKr 150 incremental platform value
MorphoSys	3	N.A.		MorphoSys has multiple strategic partners	
Galapagos	3	N.A.		Assets partnered with Gilead and Abbvie	
Innate	3	N.A.		Assets partnered with BMS, AZ and Sanofi	
Actelion	3	N.A.		Difficult for acquirer to justify significant premium to current valuation, however we see prospect of M&A as a downside support	

Source: Goldman Sachs Global Investment Research. Price as of October 14th

While MorphoSys' key assets MOR-202 and MOR-208 are unpartnered, the company has a demonstrated commitment to licensing and already has a number of strategic partners. We believe that potential partners for MOR-202 and MOR-208 would be more likely to wait to see more efficacy data from these assets (at ASCO and ASH in June and December 2017), and in the near term a licensing event remains more likely than an acquisition.

We see M&A as relatively unlikely in the near term at Galapagos and Innate Pharma, because their key programs are already partnered. While Actelion is unpartnered, we see relatively little upside to its current valuation for an acquirer. However, we believe that the prospect of M&A is an important support for the share price.

Upcoming catalysts for the sector

Exhibit 4: We expect an important upcoming 12 months of catalysts for our coverage
Summary of key upcoming catalysts

Timing	Compound	Indication	Study	Development status	Event	Company
NACFC (Oct 27-29)	GLPG1837	Cystic Fibrosis	SAPHIRA2	Phase 2	Clinical data	Galapagos
Oct-16	Opsumit	CTEPH	Ongoing	Phase 2	Clinical data	Actelion
SITC (Nov 9-13)	Lirilumab + Nivolumab	Solid tumours		Efficacy data read-out	Clinical data	Innate Pharma
29 Nov - 2 Dec	Monalizumab	Ovarian cancer		Safety and first activity data	Clinical data	Innate Pharma
4Q16	Lirilumab	AML (maintenance)	EffiKIR	Data read-out	Clinical data	Innate Pharma
YE 2016	GLPG1837	Cystic Fibrosis	SAPHIRA1	Phase 2	Clinical data	Galapagos
Dec-16	Opsumit	Eisenmenger syndrome	Ongoing	Phase 3	Clinical data	Actelion
Early 2017	Darzalex (daratumumab)	Multiple Myeloma (MM)		Approval	Potential Approval in second line	Genmab
Jan-17	Darzalex (SC)	Multiple Myeloma (MM)	MMY1004 (Pavo)	Phase 1	Data read-out	Genmab
2017	Daratumumab + VMP	Front line Multiple Myeloma (MM)	MMY3007 (Alcyone)	Phase 3 study ongoing	Potential interim Data read-out	Genmab
2Q17	GLPG1690	IPF	FLORA	Phase 2	Clinical data	Galapagos
ASCO (Jun 2017)	MOR202	Multiple myeloma		Mature combination data	Clinical data	MorphoSys
ASCO (Jun 2017)	MOR208	DLBCL	L-MIND	Phase 2 comb. data	Clinical data	MorphoSys
Mid 2017	Triple combination	Cystic Fibrosis		Phase 2	Clinical trial start	Galapagos
Nov-17	Daratumumab	Smoldering Multiple Myeloma (MM)	SMM2001 (Centaurus)	Phase 2 study ongoing	Clinical data	Genmab
Nov-17	Anetumab Ravtansine	Mesothelioma (MPM)		Phase 2 results	Clinical data	MorphoSys
YE 2017	Filgotinib	Ulcerative Colitis		Phase 2b study readout	Clinical data	Galapagos
ASH (Dec 2017)	MOR208	DLBCL	L-MIND	Phase 2 comb. data	Clinical data	MorphoSys

Source: Company data, Goldman Sachs Global Investment Research.

In a nutshell … Our investment theses

Below we provide a summary of our investment views on each company:

Galapagos

We upgrade Galapagos to Buy (from Neutral). Our DCF-based, 12-month target price of €75 represents 30% upside. We believe that the valuation of Galapagos is fully accounted for by the filgotinib collaboration with Gilead (€45 / share), and the cash in the business (€22 / share), and that investors receive other assets for free. The most important "free" asset is the cystic fibrosis collaboration partnered with AbbVie, which we value at €9 / share. The most exciting asset in the early stage pipeline is GLPG1690, for the rare disease idiopathic pulmonary fibrosis. This disease represents a significant market opportunity. We expect to see Phase 2 data in 2017. If successful, we believe that this asset could generate peak sales of US$850 mn. We value this asset at €6 / share.

Innate Pharma

While we remove Innate Pharma from the Conviction List, we remain Buy-rated with a DCF-based 12-month price target of €17. We believe that Innate offers a unique immuno-oncology pure play opportunity in European biotech, with its science, focusing on the underappreciated role of Natural Killer cells in the immune response to tumors, validated by three Big Pharma partnerships (BMS, AZ and Sanofi). These three programs, along with multiple earlier-stage assets, give investors significant diversification and optionality.

Actelion

We increase Actelion's 12-month price target to SFr172 (from SFr121) and retain our Neutral rating. We believe that the company is fairly valued on a DCF basis. Actelion is entering a new period in its history, as its previous focus on developing new medicines for pulmonary arterial hypertension (PAH) is changing to commercializing the medicines it has developed, and developing new pipeline assets in areas beyond PAH. We see the potential upsides from here as the scope for margin expansion and resulting cash returns to shareholders as key products Opsumit and Uptravi continue to grow (we forecast a 2016-20E core EPS CAGR of 16%).

Genmab

We increase our DCF-based, 12-month target price to Dkr1,200 from Dkr950 following the stronger-than-anticipated launch of Darzalex. We retain our Neutral rating. The investing debate around Genmab centres on the eventual peak sales opportunity for Darzalex, and the likely progress of the Darzalex launch from here. We forecast peak sales of US$7.5 bn for Darzalex. Potential upside to this could be if Darzalex is found to work in more tumor types. There are currently early-stage combination trials with immuno-oncology medicines which will provide part of the answer. For next year, we look to Darzalex's approval in second-line multiple myeloma, positive readouts and likely approval in first-line multiple myeloma, and the inflections to Darzalex's launch trajectory as these new approvals are granted.

MorphoSys

We raise our DCF-based, 12-month target price of €50 from €43, and retain our Neutral rating. MorphoSys has had some good news recently, with positive Phase 3 data for psoriasis asset guselkumab (partnered with JNJ). In terms of upcoming catalysts, we look for more mature data for unpartnered assets MOR202 and MOR208, which we expect at ASH in December 2016 and, more importantly, ASCO in June 2017. We believe that these unpartnered assets are the key value drivers of MorphoSys. If these data are strong, they could lead to a partnering event which would be positive for the stock. However, we believe that both assets are in competitive markets, as Rituxan is the market leader in NHL (where MOR208 seeks to compete) and Darzalex is establishing a dominant position in multiple myeloma (where MOR202 competes).

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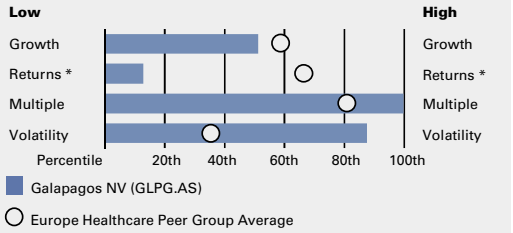
Galapagos (GLPG.AS): Unappreciated market potential for filgotinib and earlier-stage assets for free; up to Buy

Investment Profile

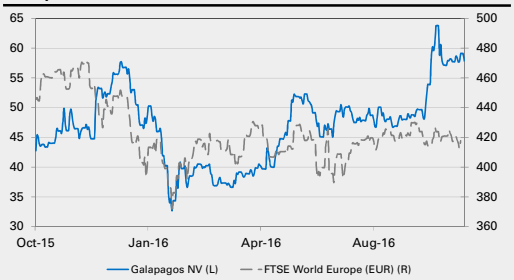


* Returns = Return on Capital

For a complete description of the investment profile measures please refer to the disclosure section of this document.

Key data				Current
Price (€)				57.87
12 month price target (€)				75.00
Upside/(downside) (%)				30
Market cap (€ mn)				2,652.6
Enterprise value (€ mn)				1,615.4
	12/15	12/16E	12/17E	12/18E
Revenue (€ mn) New	**60.6**	**117.7**	**63.4**	**66.4**
Revenue revision (%)	0.0	(7.7)	(19.9)	(16.1)
EBIT (€ mn) New	**(89.4)**	**6.8**	**(88.1)**	**(85.8)**
EBIT revision (%)	0.0	(59.2)	(613.7)	(560.1)
EPS (€) New	**(3.32)**	**1.58**	**(1.57)**	**(1.52)**
EPS (€) Old	(3.32)	1.79	(0.03)	(0.04)
EV/EBITDA (X)	NM	165.3	NM	NM
P/E (X)	NM	36.6	NM	NM
Dividend yield (%)	0.0	0.0	0.0	0.0
FCF yield (%)	(8.6)	11.1	(3.8)	(4.7)
CROCI (%)	(512.1)	4,195.3	2,083.2	1,121.1

Price performance chart



Share price performance (%)	3 month	6 month	12 month
Absolute	21.8	48.8	35.4
Rel. to FTSE World Europe (EUR)	21.3	50.3	41.5

Source: Company data, Goldman Sachs Research estimates, FactSet. Price as of 10/17/2016 close.

Source of opportunity

We upgrade our rating to Buy from Neutral. We believe that filgotinib and the cash alone justify the valuation, with cystic fibrosis and the early pipeline and platform value being free at this price. We value the cystic fibrosis collaboration with AbbVie at €9 / share. Investors also receive a free option on a potential blockbuster asset in idiopathic pulmonary fibrosis (IPF), which we value at €6 / share. The company is further supported by a strong cash position, and we anticipate an upcoming cycle of potentially positive news for the coming 12 months. Our DCF-derived, 12-month target price is €75, which implies 30% upside.

Key assets and estimates

Exhibit 5: We add sales forecasts for filgotinib in ulcerative colitis, and forecast sales for the early-stage IPF asset

Summary of changes to peak sales estimates and probabilities of success

Summary of estimate changes	Current model		Previous model	
	Peak sales (before probability), $ mn	PoS	Peak sales (before probability), $ mn	PoS
Filgotinib - Rheumatoid arthritis	2,414	70%	2,414	70%
Filgotinib - Crohns	987	70%	766	60%
Filgotinib - Ulcerative Colitis	1,286	60%	N.A	N.A
Combination - Cystic fibrosis	3,152	30%	3,152	10%
GLPG 1690 - IPF	850	20%	N.A	N.A

Source: Goldman Sachs Global Investment Research.

Catalyst

Galapagos has been through a period of good news, including the announcement of Phase 3 trials for filgotinib in rheumatoid arthritis, ulcerative colitis and Crohn's, and the increase of milestones under the AbbVie partnership for cystic fibrosis. We believe that this is set to continue over the next 12 months, as Galapagos identifies the components for a triple combination in cystic fibrosis and advances this into Phase 2 trials (slated for mid-2017); multiple new trials are started for filgotinib (we expect continuing news flow through 2017); and the Phase 2b component of the ulcerative colitis trial reads out (late 2017).

Valuation

Our 12-month target price of €75 increases from €55 as a result of factoring in sales of filgotinib in ulcerative colitis, raising the probability of success of filgotinib in Crohn's to 70% from 60% following the latest Phase II FITZROY data, raising the probability of success of the cystic fibrosis program to 30% from 10% due to the expanded AbbVie partnership, and factoring in the potential of the Phase 2 idiopathic pulmonary fibrosis asset GLPG 1690.

Key risks

We view the key risks to Galapagos as being the outcomes of the clinical trials, the ability to recruit patients into the later-stage cystic fibrosis trials (where Galapagos will be competing with Vertex), potential value-destructive acquisitions, and read-across should the launch of Lilly's baricitinib be underwhelming.

Source: Company data, Goldman Sachs Global Investment Research, FactSet.

Value in filgotinib, but cystic fibrosis to be main focus

Portfolio manager summary

Broad market opportunity for filgotinib: We see the main value in Galapagos as being supported by filgotinib, partnered with Gilead, and believe that following the positive data in Phase 2 in Crohn's, the asset has significant market potential in Crohn's and ulcerative colitis. During 2017, we expect the initiation of Phase 2 trials for filgotinib across multiple other indications.

Underappreciated assets beyond filgotinib: We believe that the investing debate is shifting away from this towards the other opportunities in Galapagos' pipeline, in particular cystic fibrosis, idiopathic pulmonary fibrosis and osteoarthritis. In valuation terms, we believe that investors are effectively buying these earlier-stage assets for free. We expect that these assets will have increasing visibility over the next 12 months as clinical trials progress.

Upcoming period of positive catalysts: Galapagos has been through a period of good news, including the announcement of Phase 3 trials for filgotinib in rheumatoid arthritis, ulcerative colitis and Crohn's, and the increase of milestones under the AbbVie partnership for cystic fibrosis. We believe that this is set to continue over the next 12 months as Galapagos identifies the components for a triple combination in cystic fibrosis and advances this into Phase 2 trials (slated for mid-2017); new trials are started for filgotinib both standalone and in combination with pipeline Gilead assets (we expect continuing news flow through 2017); and the Phase 2b component of the ulcerative colitis trial reads out (late 2017).

Filgotinib has significant market potential

Our peak sales projections before probability adjustments for filgotinib of US$4.7 bn across rheumatoid arthritis, Crohn's and ulcerative colitis are driven by US$2.4 bn in rheumatoid arthritis, US$1.0 bn in Crohn's and US$1.3 bn in ulcerative colitis. We now have visibility on the planned design of the FINCH trials in rheumatoid arthritis, the DIVERSITY trial in Crohn's and the SELECTION trial in ulcerative colitis. Galapagos will fund 20% of these trials, and also the rest of the planned clinical development program.

Rheumatoid arthritis

As a reminder, the trials being planned in rheumatoid arthritis are similar to those that were conducted for Lilly's baricitinib, and will recruit 3,200 patients across three studies:

- FINCH 1 is a 1,650-patient study over 52 weeks vs placebo and Humira, with methotrexate, in patients after methotrexate. Primary endpoint is ACR20 at week 12. Clinicaltrials.gov states that primary readout is expected April 2019; however, we believe that given the pace of development there could be some upside to this.
- FINCH 2 is a 423-patient study over 24 weeks on DMARD, vs placebo, in patients who have failed biologicals. Primary endpoint is ACR20 at week 12. Clinicaltrials.gov states that primary readout is expected June 2018.
- FINCH 3 is a 1,200-patient study over 52 weeks, in patients who are methotrexate naïve, to test filgotinib and MTX as well as monotherapy. Primary endpoint is ACR20 at week 24. Clinicaltrials.gov states that primary readout is expected February 2020; however, we believe that there could be some upside to this.

This trial design is quite similar to that followed by Eli Lilly for baricitinib. The other competitor that filgotinib will face is AbbVie's ABT-494.

Lilly (and baricitinib partner, Incyte) have completed four pivotal Phase 3 clinical trials assessing baricitinib in patients with moderately-to-severely active rheumatoid arthritis. This included a comparison of baricitinib efficacy in patients who were treatment naïve, or inadequately controlled on methotrexate or conventional disease modifying anti-rheumatic drugs. A summary of baricitinib's Phase 3 trials can be found in Exhibit 6.

AbbVie has suggested it is targeting a 2019 launch for ABT-494 in the rheumatoid arthritis setting. Similarly, it has a series of clinical trials targeting both the early treatment of rheumatoid arthritis as well as following biologic failure. ABT-494 is also being trialed in Crohn's disease, ulcerative colitis, atopic dermatitis, psoriatic arthritis and ankylosing spondylitis, all currently in Phase 2. In the Phase 2b trial for rheumatoid arthritis, patients on ABT-494 also saw higher infection rates than placebo, which may help filgotinib in competitive positioning.

Exhibit 6: LLY's baricitinib rheumatoid arthritis trial program
Summary of data shown by Lilly's baricitinib

Baricitinib Phase 3 Rheumatoid Arthritis Program										
Trial Name	**RA-BEACON**		**RA-BUILD**		**RA-BEGIN**			**RA-BEAM**		
Prior treatments	Anti-TNF		cDMARD		DMARD naïve			Methotrexate		
Enrolment	527		684		584			1305		
Control	Placebo		Placebo		Methotrexate (MTX)			Placebo, Adalimumab		
12 week results										
	Baricitinib	Placebo	Baricitinib	Placebo	Baricitinib	Baricitinib + MTX	MTX	Baricitinib	Adalimumab	MTX
ACR20	55%	27%	62%	40%	79%	77%	59%	70%	61%	40%
DAS28-hsCRP ≤3.2	32%	9%	40%	17%	47%	56%	30%	44%	35%	14%
CDAI ≤10	28%	11%	35%	21%	43%	51%	30%	40%	33%	17%
HAQ-DI MCID ≥0.22	67%	43%	64%	54%	86%	80%	67%	75%	71%	58%
24 week results										
ACR20	46%	27%	65%	42%	77%	78%	62%	74%	66%	37%
DAS28-hsCRP ≤3.2	33%	11%	52%	24%	57%	60%	38%	52%	48%	19%
CDAI ≤10	31%	15%	52%	28%	60%	59%	39%	50%	48%	20%
HAQ-DI MCID ≥0.22	53%	30%	60%	42%	81%	78%	70%	73%	64%	45%

cDMARD: conventional disease modifying anti-rheumatic drug

Source: Company data, Goldman Sachs Global Investment Research.

Exhibit 7: ABBV's ABT-494 rheumatoid arthritis trial program

ABT-494 SELECT Rheumatoid Arthritis phase 3						
Trial Name	**NEXT**	**BEYOND**	**COMPARE**	**MONOTHERAPY**	**EARLY**	**CHOICE**
Prior treatments	cDMARD	cDMARD	MTX-IR	MTX-IR	MTX-naïve	cDMARD
Enrolment	600	450	1500	600	975	
Control	Placebo	Placebo	Adalimumab	MTX	MTX	Abatacept
Primary Endpoint	ACR20	ACR20	ACR20	ACR20	ACR50	
Primary Completion	June 2017	August 2017	August 2017	October 2017	July 2018	Not yet enrolling

MTX: methotrexate; IR: inadequate response; cDMARD: conventional disease modifying anti-rheumatic drug

Source: Company data, Goldman Sachs Global Investment Research

In the near term, we also expect investors to look across to Lilly's launch of baricitinib as a "test case" of what filgotinib revenues could be. Current expectations are for baricitinib to be launched in 2017, as the FDA PDUFA date of January 19, 2017. Our US analyst projects sales of US$400 mn for baricitinib in 2017, increasing to US$1.2 bn in 2020. The other competitor is Pfizer's Xeljanz, for which our US analyst projects sales of US$885 mn in 2016E and US$1.8 bn in 2020E. We believe that both baricitinib and filgotinib could ultimately establish themselves as superior to Xeljanz, due to Xeljanz's side effect profile (including severe infections and diarrhea). However, the blockbuster status of Xeljanz highlights the significant market opportunity available in rheumatoid arthritis, even to a relatively imperfect drug.

Below, we show the sensitivity of filgotinib and Galapagos' stock valuation to varying peak sales of filgotinib for rheumatoid arthritis. Peak sales of c.US$3 bn would support the current share price, whereas our base case expectation of US$4.7 bn implies a €75/share valuation.

Exhibit 8: Relatively modest filgotinib peak sales expectations support the share price
Sensitivity of filgotinib and Galapagos valuation to changing filgotinib sales estimates

Filgotinib peak sales ($ mn)	3,000	3,500	4,687	5,500	6,500
Value of filgotinib per share (€)	27	32	45	54	65
Value of Galapagos per share (€)	57	63	75	84	95

Source: Goldman Sachs Global Investment Research

Significant opportunity for filgotinib in Crohn's, ulcerative colitis and other indications

The Phase 3 trials for filgotinib in ulcerative colitis and Crohn's are both slated to start in 4Q2016. We view both of these as significant market opportunities. Baricitinib is not being developed in either ulcerative colitis or Crohn's. We believe that the explanation for this may be to do with the anemic side effects of baricitinib, which are due to its effect on JAK-2. Filgotinib is highly selective for JAK-1 and therefore does not have these side effects. ABT-494 is in a Phase 2 study for Crohn's reading out in July 2017 (NCT 02365649), and a Phase 2 in ulcerative colitis, which is not yet recruiting, and reads out in April 2021 (NCT02819635). Therefore, we view filgotinib's potential competitive position among the JAK inhibitors as potentially stronger in Crohn's and ulcerative colitis than in rheumatoid arthritis.

In Crohn's we now have most of the results of the Phase 2 FITZROY trial. At 10 weeks, filgotinib showed a 48% clinical remission rate, vs a remission rate of 23% on placebo. The responses at 20 weeks will be published later this year. The study assessed the effect of giving non-responders in the placebo arm from the first 10 weeks 100mg of filgotinib daily, and investigated continued treatment in the active arm. It was not powered for statistical significance. The FITZROY study was also unusual in including endoscopy examinations. From an average baseline SES-CD score of 14.6 (which indicates moderate to severe Crohn's disease), 25% of filgotinib patients (vs. 13.6% of placebo patients) achieved improvement by at least 50% over 10 weeks. One potential reason for the use of the 50% endpoint could have been a post hoc analysis of the SONIC trial, which evaluated the efficacy of Remicade, azathioprine (generic) and the two drugs combined in patients with moderate-to-severe Crohn's. The primary endpoint of the study was the rate of corticosteroid-free clinical remission (CFREM). Post hoc analysis found that a decrease from baseline in SES-CD or CDEIS (Crohn's Disease Endoscopic Index of Severity) of at least 50% at week 26 of treatment identified those most likely to be in CFREM at week 50.

While Galapagos' FITZROY study was not powered for statistical significance on endoscopy, we believe that the endoscopic and histopathological benefits seen are additional strong indicators highlighting the potential of filgotinib in the Crohn's setting.

Studies using endoscopy for Crohn's disease are relatively unusual, and placebo-controlled studies such as FITZROY more so. As our US analysts have previously published (see

Celgene Corp: Upcoming '301 Ph2 Crohn's data could be inconclusive, September 5, 2016), research has shown that achieving mucosal healing on the first endoscopic assessment is associated with increased rates of long-term clinical remission as well as with lower rates of Crohn's disease-related hospitalization and surgery. Furthermore, there is also literature that suggests that complete mucosal healing (defined as SES-CD score of 0 and/or complete absence of ulcerations) is associated with higher rates of long-term clinical remission and mucosal healing (Shah et al 2015).

At the ongoing UEGW conference, both Celgene and Galapagos are presenting data for their oral Crohn's medications (Celgene are developing '301). Celgene reported clinical response (CDAI decrease ≥100) and remission (CDAI < 150) rates in the 12-week treatment group at 67% and 48% respectively, at week 12. On SES-CD, of the patients with evaluable endoscopies at week 12 (N=52), 37% had a response (defined by CELG as ≥25% reduction in SES-CD score from baseline), and there were no meaningful differences across treatment groups. Celgene reported that for patients with greater endoscopic disease activity at baseline (SES-CD score of >12; n=16), 63% of patients had a reduction of 25% and 31% had a reduction of 50%. However, the Celgene data didn't have a placebo control and the subgroup of patients reported by Celgene with the highest endoscopic disease activity at baseline only contained 16 patients (vs 128 on filgotinib for Galapagos). Also, the Galapagos patient population was slightly sicker, with 60% of patients having failed TNFa, vs. 46% for Celgene's. We therefore remain confident that based on data seen at UEGW, we would expect filgotinib to be competitive in Crohn's.

Exhibit 9 shows our bottom-up estimate of the market potential for Crohn's in the US:

Exhibit 9: Significant opportunity for filgotinib in Crohn's
Summary of Crohn's market model for the US

Crohn's Market Model (Sales in $ Millions)	2018E	2019E	2020E	2021E	2022E	2023E	2024E	2025E	2026E	2027E	2028E	2029E	2030E
US													
US population	329,696,320	332,993,283	336,323,216	339,686,448	343,083,313	346,514,146	349,979,287	353,479,080	357,013,871	360,584,010	364,189,850	367,831,748	371,510,066
Y/Y growth	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
Crohn's Disease Market													
Estimated prevalence of Crohn's Disease	593,453	599,388	605,382	611,436	617,550	623,725	629,963	636,262	642,625	649,051	655,542	662,097	668,718
Y/Y growth	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
Prevalence rate	0.18%	0.18%	0.18%	0.18%	0.18%	0.18%	0.18%	0.18%	0.18%	0.18%	0.18%	0.18%	0.18%
Diagnosed	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%
Number of patients diagnosed	534,108	539,449	544,844	550,292	555,795	561,353	566,966	572,636	578,362	584,146	589,988	595,887	601,846
Mild patients	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%
Moderate-to-severe patients	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%
Biologic Drug Treatment percentage	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%
Number of patients treated with biologics	93,469	94,404	95,348	96,301	97,264	98,237	99,219	100,211	101,213	102,226	103,248	104,280	105,323
1st line patients (biologic treated)	69,167	67,971	66,743	65,485	64,194	62,872	61,516	60,127	58,704	57,246	55,754	54,226	52,662
Percentage	74%	72%	70%	68%	66%	64%	62%	60%	58%	56%	54%	52%	50%
2nd line patients (biologic failure)	24,302	26,433	28,604	30,816	33,070	35,365	37,703	40,085	42,510	44,979	47,494	50,055	52,662
Percentage	26%	28%	30%	32%	34%	36%	38%	40%	42%	44%	46%	48%	50%
Market Share													
Filgotinib in 1st line	0.0%	0.0%	0.8%	1.600%	2.400%	3.200%	4.000%	4.800%	5.600%	6.400%	7.200%	8.000%	8.0%
Filgotinib in 2nd line	0.0%	0.0%	2.00%	4.00%	6.00%	8.00%	10.00%	12.00%	14.00%	16.00%	18.00%	20.00%	20.0%
Patients on Drug													
Filgotinib in 1st line	0	0	534	1,048	1,541	2,012	2,461	2,886	3,287	3,664	4,014	4,338	4,213
Filgotinib in 2nd line	0	0	572	1,233	1,984	2,829	3,770	4,810	5,951	7,197	8,549	10,011	10,532
Total	**0**	**0**	**1,106**	**2,280**	**3,525**	**4,841**	**6,231**	**7,696**	**9,239**	**10,860**	**12,563**	**14,349**	**14,745**
Duration of Therapy													
Duration (months)			10	10	10	10	10	10	10	10	10	10	10
Cost of Therapy													
Monthly cost ($)			$3,500	$3,605	$3,713	$3,825	$3,939	$4,057	$4,179	$4,305	$4,434	$4,567	$4,704
Y/Y growth				3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Gross to net adjustment	12%	12%	12%	12%	12%	12%	12%	12%	12%	12%	12%	12%	12%
US Sales (USD mn, non risk adjusted)	**$0**	**$0**	**$34**	**$72**	**$115**	**$163**	**$216**	**$275**	**$340**	**$411**	**$490**	**$577**	**$610**

Source: Goldman Sachs Global Investment Research

As we think about the opportunity for filgotinib in inflammatory bowel diseases, starting with trials in Crohn's disease appears to be a strategic move as the majority of drugs approved for Crohn's disease are also approved in ulcerative colitis. In addition, Crohn's disease is the harder patient population to treat due to the nature of the disease. Crohn' disease is characterized by inflammation that involves all layers of the bowel (transmural), and can erode through the bowel wall (fistulate). Importantly, Crohn's does not progress continuously throughout the bowel, but instead intervening areas of inflammation are separated by portions of health bowel (known as "skip lesions"). The more severe nature of Crohn's disease makes it a more challenging clinical target than ulcerative colitis. In addition, surgery in Crohn's is not curative, and therefore physicians rely heavily on medical therapies during acute flares or hard to control to disease.

While we do not have early-stage trial data for filgotinib in ulcerative colitis, many compounds that work in Crohn's are also indicated for ulcerative colitis, as per Exhibit 10. There are relatively few targeted immune suppressing drugs beyond the TNFa's, highlighting the market opportunity for filgotinib.

Exhibit 10: Substantial overlap between drugs approved for Crohn's and ulcerative colitis
Approved medicines in Crohn's and ulcerative colitis

Drugs used to treat	
Crohn's disease	Ulcerative colitis
5-ASA's	
Azulfidine	Azulfidine
Asacol	Asacol
Pentasa	Pentasa
Lialda	Lialda
Steroid-sparing immune suppression	
Methotrexate	Methotrexate
Cyclosporine	Cyclosporine
Imuran	Imuran
Remicade	Remicade
Humira	Humira
Cimzia	Simponi
Tysabri	Entyvio
Entyvio	
Stelara	

Source: Goldman Sachs Global Investment Research.

Ulcerative colitis also represents a substantial market opportunity as we estimate that there are 1.5 mn patients between the US and EU with the disease.

Exhibit 11: Opportunity for filgotinib in ulcerative colitis
Ulcerative colitis US market model

Ulcerative Colitis Market Model (Sales in $ Millions)	2020E	2021E	2022E	2023E	2024E	2025E	2026E	2027E	2028E	2029E	2030E
US											
US population	336,323,216	339,686,448	343,083,313	346,514,146	349,979,287	353,479,080	357,013,871	360,584,010	364,189,850	367,831,748	371,510,066
Y/Y growth	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
Ulcerative Colitis Disease Market											
Estimated prevalence of Ulcerative Colitis	800,449	808,454	816,538	824,704	832,951	841,280	849,693	858,190	866,772	875,440	884,194
Y/Y growth	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
Prevalence rate	0.24%	0.24%	0.24%	0.24%	0.24%	0.24%	0.24%	0.24%	0.24%	0.24%	0.24%
Diagnosed	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%
Number of patients diagnosed	760,427	768,031	775,711	783,468	791,303	799,216	807,208	815,280	823,433	831,668	839,984
Patients in remission	48%	48%	48%	48%	48%	48%	48%	48%	48%	48%	48%
Mild patients	54%	54%	54%	54%	54%	54%	54%	54%	54%	54%	54%
Moderate-to-severe patients	46%	46%	46%	46%	46%	46%	46%	46%	46%	46%	46%
Moderate to Severe patients											
Moderate to severe patients on corticosteroids	227,368	229,641	231,938	234,257	236,600	238,966	241,355	243,769	246,207	248,669	251,155
% of moderate to severe patients	65%	65%	65%	65%	65%	65%	65%	65%	65%	65%	65%
Moderate to severe patients failing corticosteroids	90,947	91,857	92,775	93,703	94,640	95,586	96,542	97,508	98,483	99,467	100,462
% of moderate-to-severe on corticosteroids	40%	40%	40%	40%	40%	40%	40%	40%	40%	40%	40%
Filgotinib penetration	0%	1%	2%	4%	6%	8%	10%	13%	16%	18%	20%
Total	**0**	**919**	**1,856**	**3,748**	**5,678**	**7,647**	**9,654**	**12,676**	**15,757**	**17,904**	**20,092**
Duration of Therapy											
Duration (months)	10	10	10	10	10	10	10	10	10	10	10
Cost of Therapy											
Monthly cost ($)	$3,500	$3,605	$3,713	$3,825	$3,939	$4,057	$4,179	$4,305	$4,434	$4,567	$4,704
Y/Y growth		3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Gross to net adjustment	12%	12%	12%	12%	12%	12%	12%	12%	12%	12%	12%
US Sales (USD mn, non risk adjusted)	**$0**	**$29**	**$61**	**$126**	**$197**	**$273**	**$355**	**$480**	**$615**	**$720**	**$832**

Source: Goldman Sachs Global Investment Research.

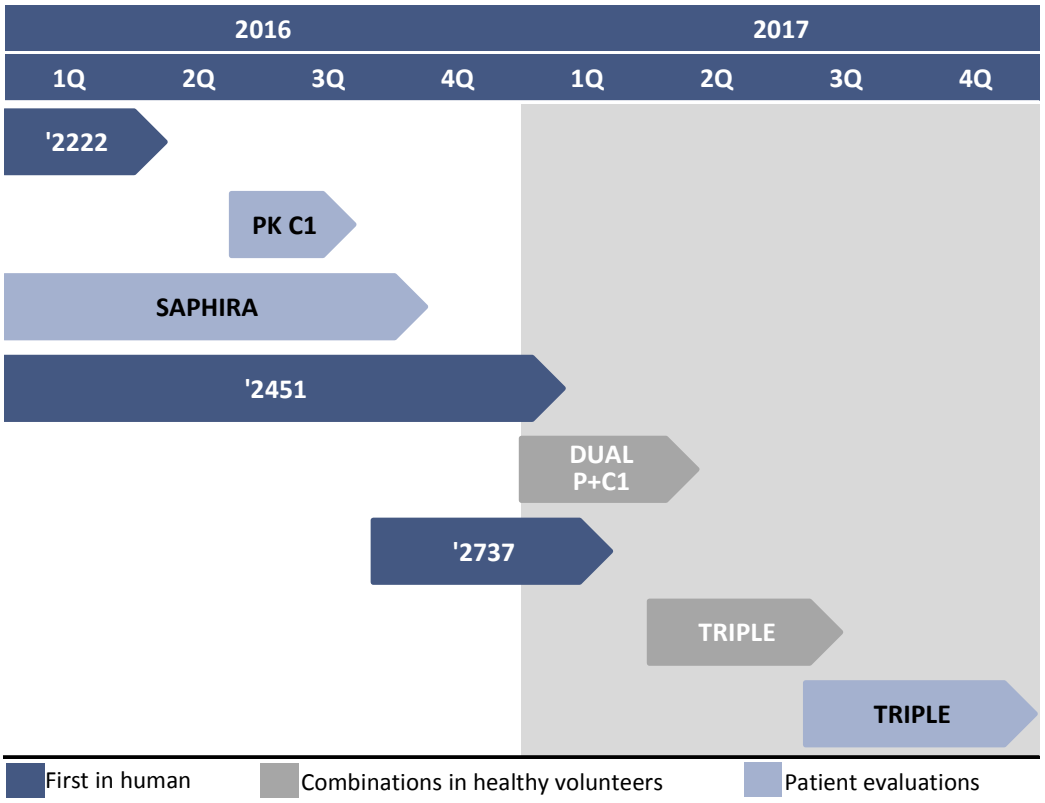
Gilead and Galapagos also expect to announce Phase 2 trials to assess filgotinib in combination with other Gilead molecules during 2017. We expect that these trials could include both combination approaches to rheumatoid arthritis, and indications beyond rheumatoid arthritis. Gilead recently started a trial for its Syk inhibitor GS-9876 vs. filgotinib in rheumatoid arthritis. Gilead is also trialing its MMP9 mAb inhibitor GS-5745 in rheumatoid arthritis (Phase 1). We view both of these as potential candidates for trials for combination therapy with filgotinib.

As new potential indications are announced for filgotinib, we believe that this could drive upside to the stock. While Gilead and Galapagos have not provided detail on what these indications could be, one clue could be the additional indications that baricitinib is being trialled in: these include atopic dermatitis, diabetic nephropathy, psoriasis and SLE (baricitinib is in Phase 2 in all of these). Another could be the indications that Humira is approved for: rheumatoid arthritis, psoriatic arthritis, ankylosing spondylitis, Crohn's disease and plaque psoriasis. All of these would be significant blockbuster opportunities for filgotinib or a combination.

Cystic fibrosis

Galapagos remains on track to get into the clinic with the triple combination therapy for cystic fibrosis in 2017 (we estimate around six months behind Vertex, which guides to Phase 2 trial with the triple combination in 2H2016). We expect Phase I for GLPG's triple combination in healthy volunteers to start in 1Q17, and Phase II in mid-2017. There has been a slight delay on the progress of one of the potential constituent potentiators, GLPG 2451, where the Phase 1 trial is expected to read out in 1Q17, rather than year-end. However, we do not expect this to delay the overall progress of the development. Exhibit 12 shows the plan for development.

Exhibit 12: Galapagos' cystic fibrosis program



Source: Company data.

The next catalyst for the cystic fibrosis program will be at NACFC (October 27-29) in Orlando. We expect to see initial topline Ph2a data for GLPG1837 (CFTR potentiator) in patients with the S1251N mutation this month (Abstract 253, data from seven patients). The S1251 mutation is relatively rare, compared to the G551D mutation that is also being tested by this study. Preliminary Ph1 data in a healthy volunteer study shows GLPG2222 (CFTR corrector) to be safe and well tolerated over 14 days. Full safety and PK data for '2222 will be presented at the conference (Abstract 252). We expect to see data from SAPHIRA1 for patients with the G551D mutation by the end of 2016. We would expect to see first efficacy data for the triple combination towards the end of 2017.

We are also encouraged by the expansion of the cystic fibrosis partnership with AbbVie in May 2016, from US$350 mn in milestones to US$600 mn in milestones. The increase was driven by an increase in development milestones for Phase 1 and 2 trials, and reflects the increased ambition of the partnership (more trials of more assets). Based on management comments, we understand that the increase in milestones is expected to offset what Galapagos would be spending on clinical trials in cystic fibrosis.

On the Vertex side, the recent sales of Orkambi, with single center Orkambi data indicating meaningful discontinuation rates highlight the opportunity for a triple combination showing superior efficacy. Vertex has commented that of the patients who have started on treatment, approximately 15% discontinued treatment within the first three months of initiation. Vertex projects that the proportion of all patients who initiate and remain on treatment will stabilize at approximately 70% to 80%. We are also encouraged by the observation that the SAPHIRA trial for Galapagos' potential GLPG1837 is recruiting both Kalydeco naïve and treated patients (suggesting that patients already on Kalydeco could be willing to enter into a clinical trial). We await the update on Vertex's progress in cystic fibrosis at NACFC in October.

IPF

Galapagos is developing GLPG1690 for idiopathic pulmonary fibrosis (IPF). This drug is a once or twice daily oral agent. The Phase 2a trial is fully recruited, and we expect topline data to read out in 1H2017. GLPG1690 inhibits autotaxin, which Galapagos believes is central to lysophosphatidic acid (LPA) and resultantly a number of fibrotic pathways. GLPG1690 showed target engagement, favourable safety and PK in Phase 1. The Phase 2a study will be testing biomarkers.

GLPG1690 is a selective autotaxin inhibitor which has recently entered Phase 2 testing in patients with IPF. Autotaxin (ATX) is a secreted enzyme which plays a key role in the generation of biologically active LPA – a signalling molecule that stimulates cell proliferation. The ATX-LPA pathway has been implicated in several diseases including cancer, autoimmune diseases and fibrotic diseases, among others. In the context of chronic fibrotic diseases, overexpression of LPA has been implicated in driving proliferation of cellular components that lead to permanent scarring of the lung (e.g. inflammatory macrophages, fibroblasts etc), irreversible loss of tissue architecture and a reduction in lung function. Human IPF studies have shown increased levels of LPA in bronchoalveolar lavage fluid (BALF), raised LPA concentrations in exhaled breath, and elevated ATX levels in lung tissue. GLPG1690 is a selective autotaxin inhibitor which has demonstrated concentration-dependent reductions in LPA levels. This forms the basis for LPA biomarker analysis (from blood serum, or BALF) in the ongoing Phase 2 FLORA trial of GLPG1690 for IPF.

The Phase 2a Flora trial tests GLPG1690 at a dose of 600mg once daily for 12 weeks (18 patients) vs placebo (6 patients), for safety tolerability and PK/PD. Secondary endpoints include FVC, quality of life, FRI, serum and BALF biomarkers.

Galapagos is also investigating a second compound in Phase 1, GLPG2938. This is expected to start Phase 1 in 2H2017.

Idiopathic pulmonary fibrosis (IPF) refers to scaring of the lung tissue (fibrosis) which causes it to become thickened and stiff. As the lung become less pliable it becomes less capable of oxygenating blood, which reduces the amount of oxygen available for the brain and other organs. In cases where doctors are unable to find the cause of fibrosis, these cases are labelled as idiopathic. IPF is a rare, chronic, progressive disease that predominantly affects adults over the age of 50 years. Patients will notice worsening shortness of breath, decreased exercise tolerance, tiredness, persistent dry cough and as the condition becomes more severe, heart failure can develop.

The pathogenesis of IPF is incompletely understood, but a recent transition in thinking about IPF as a fibrotic disease rather than an inflammatory disease has led to a change in the direction of drug development to target pathways involved in fibrosis. Prognosis for IPF patients is very poor with a median survival time ranging from 3 to 5 years. Currently, other than lung transplantation, there are no fully curative therapies for IPF. Management of IPF is based on treating the symptoms of disease rather than trying to reverse the disease process

There are two drugs currently licensed for use in IPF – Esbriet (Roche) and Ofev (Boehringer Ingelheim). Esbriet is a dual anti-fibrotic and anti-inflammatory tablet taken three times per day, while Ofev is a tyrosine kinase inhibitor (fibrosis pathway) and is taken twice per day. However, neither drug is capable of reversing fibrosis, and only act to slow progression of disease. The market potential in IPF is substantial for a therapy, as demonstrated by Roche's acquisition of Intermune for US$8.3 bn in 2014. There are estimated to be 75,000 patients in the US and Europe, and Roche's Esbriet and Boehringer Ingelheim's Ofev are currently the only drugs approved. However, these drugs display relatively modest efficacy, with for example neither demonstrating a survival benefit in this normally fatal disease, and so we believe that a new, more efficacious drug would enjoy a significant market opportunity.

We forecast potential peak sales of US$850 mn for GLPG1690, before adjustment for probability of success. Below we show our market model for IPF for the US, where we see the bulk of the market opportunity. We apply a 20% probability of success to this, which results in a DCF value of €6/share. One reason why the valuation is relatively high for the level of peak sales and the probability of success is that the compound is unpartnered. Because IPF is an orphan indication, the drug could be commercialized with a relatively small salesforce, preserving high profit margins.

Exhibit 13: There remains a significant unmet need in IPF
IPF market model for the US and example P&L if Galapagos were to market the asset on a standalone basis

IPF - US ($ mn)		2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Prevalence (mild/mod)		40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000
Market share		10%	15%	20%	20%	20%	20%	20%	20%	20%	20%	20%	4%	1%
Pricing	2%	$ 93,405	$ 95,273	$ 97,179	$ 99,122	$ 101,105	$ 103,127	$ 105,189	$ 107,293	$ 109,439	$ 111,628	$ 113,860	$ 116,138	$ 118,460
Sales before probability adjustment		**$ 262**	**$ 400**	**$ 544**	**$ 555**	**$ 566**	**$ 578**	**$ 589**	**$ 601**	**$ 613**	**$ 625**	**$ 638**	**$ 130**	**$ 27**
Compliance / discontinuation	70%													
Sales after probability adjustment	**20%**	**$ 52**	**$ 80**	**$ 109**	**$ 111**	**$ 113**	**$ 116**	**$ 118**	**$ 120**	**$ 123**	**$ 125**	**$ 128**	**$ 26**	**$ 5**
COGS	5%	$ 3	$ 4	$ 5	$ 6	$ 6	$ 6	$ 6	$ 6	$ 6	$ 6	$ 6	$ 1	$ 0
SG&A	20%	$ 100	$ 100	$ 22	$ 22	$ 23	$ 23	$ 24	$ 24	$ 25	$ 25	$ 26	$ 5	$ 1
Oper income		$ (50)	$ (24)	$ 82	$ 83	$ 85	$ 87	$ 88	$ 90	$ 92	$ 94	$ 96	$ 20	$ 4
EBIT margin		*-19%*	*-6%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*
Taxes	35%	$ 3	$ 2	$ (6)	$ (6)	$ (6)	$ (6)	$ (6)	$ (6)	$ (6)	$ (6)	$ (7)	$ (1)	$ (0)
Tax rate		-7%	-7%	-7%	-7%	-7%	-7%	-7%	-7%	-7%	-7%	-7%	-7%	-7%
Net income		$ (47)	$ (22)	$ 76	$ 78	$ 79	$ 81	$ 82	$ 84	$ 86	$ 87	$ 89	$ 18	$ 4

Source: Goldman Sachs Global Investment Research.

Osteoarthritis

Galapagos' GLPG1972 is a potential disease modifying drug for osteoarthritis which could address a significant unmet need in a large indication (up to 118 mn patients in the US and Europe). No disease modifying drugs are approved today. Galapagos is developing this in collaboration with Servier, but retains full US rights to the compound. In Phase 1, GLPG1972 showed target engagement, favourable safety and PK (10-hour half-life and steady state after three days). The drug inhibits cartilage breakdown in healthy volunteers. However, because the mechanism of action of the drug is undisclosed, and the drug is at an early stage, we do not include estimates for this drug in our projections. We see it as a potential source of upside to our projections. Galapagos intend to file an IND for a patient study by year-end 2016.

Osteoarthritis is the most common type of joint disease, and affects over 20 million individuals in the US alone. It is a leading cause of chronic disability, and costs the US over US$100 bn each year. It is a chronic, degenerative disorder that results from the breakdown of the (hyaline) cartilage covering of joints, leading to erosion of underlying bone and results in joint pain, stiffness and limitation of function. Osteoarthritis can affect any joint in the body, but commonly affects the knee, hip, hands and spine. Current treatments for patients with osteoarthritis are directed at symptom control e.g. analgesics or intra-joint steroid injections for pain and physiotherapy or joint replacement surgery for loss of function.

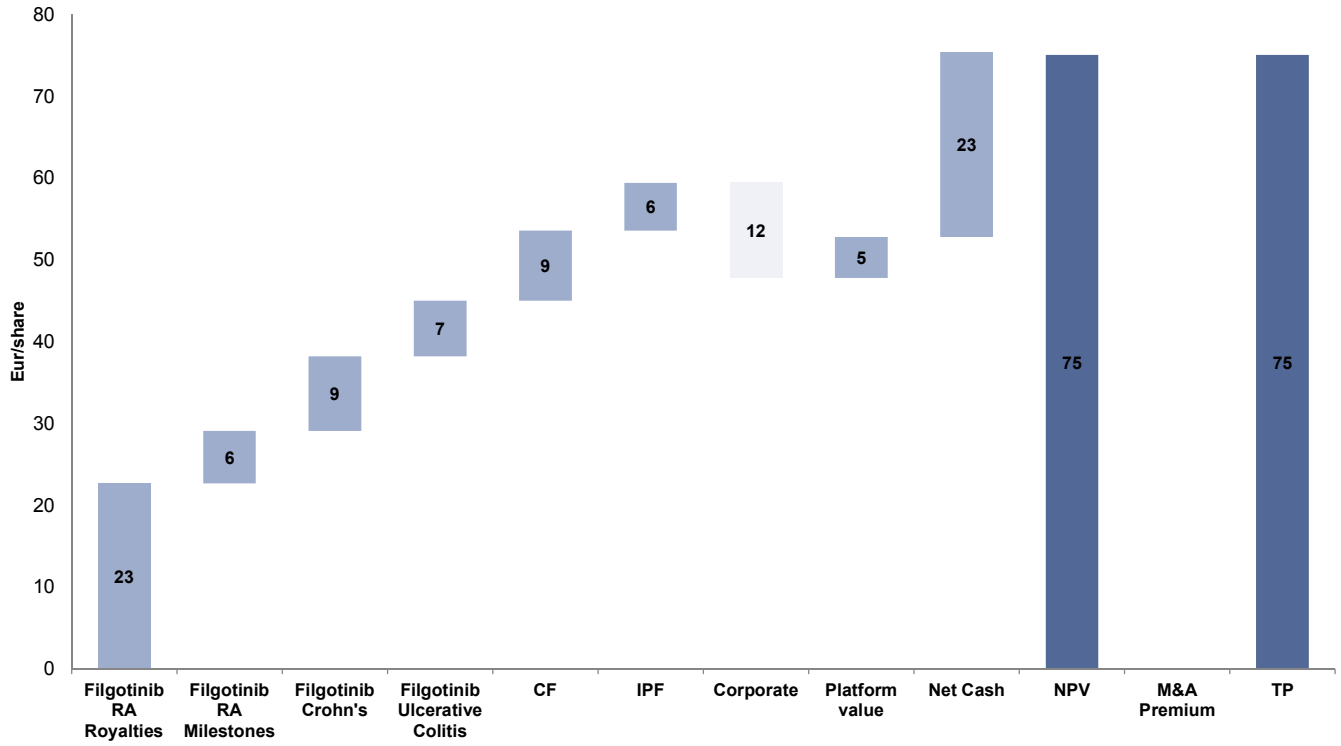
MOR-106, partnered with MorphoSys

Galapagos and MorphoSys recently announced that the ongoing Phase 1 study for their 50:50 partnered asset MOR-106 will be trialed in atopic dermatitis patients. The asset is unusual because it is the first publicly disclosed antibody to target IL-17C in clinical studies. IL-17C is a cytokine related to dermal inflammation. We do not currently forecast sales for MOR106, but note that atopic dermatitis is a significant market opportunity.

Valuation

We increase our 12-month target price of €75 (from €55). This is derived from a DCF sum of the parts valuation. We apply a discount rate of 10% in line with the other pre-approval stage biotechs that we cover. The components of value are shown below.

Exhibit 14: We believe that Galapagos is worth €75/share on a sum of the parts DCF basis
Summary of sum of the parts DCF valuation; price target has 12-month time horizon



Source: Goldman Sachs Global Investment Research.

We do not include an M&A premium in our valuation because the two key assets are partnered with Gilead and AbbVie. As part of Gilead's investment into Galapagos, the two companies agreed to a standstill. We believe that if GLPG1690 shows positive data in IPF, this asset would be attractive to potential partners, which could drive near-term upside in the event of a partnering. However, Galapagos would also have sufficient cash to develop this asset standalone. In our near-term projections, we also increase our near-term R&D forecasts for 2017E and 2018E to €130 mn each year from €70 mn, to reflect Galapagos' increased ambition to develop its in-house pipeline.

Upcoming catalysts

Exhibit 15: Upcoming Galapagos catalysts

Timing	Compound	Indication	Study	Partner	Development status	Event	Type of Event
NACFC (Oct 27-29)	GLPG1837	Cystic Fibrosis	SAPHIRA2	AbbVie	Phase 2	Phase 2 results for S1251n mutation	Clinical data
NACFC (Oct 27-29)	GLPG2851	Cystic Fibrosis		AbbVie	Phase 1	Preclinical results, supporting P1 development	Preclinical
NACFC (Oct 27-29)	GLPG2737	Cystic Fibrosis		AbbVie	Phase 1	Preclinical results, supporting P1 development	Preclinical
ACR (Nov 11-16)	Filgotinib	Rheumatoid Arthritis	DARWIN 2	Gilead	Phase 2	More DARWIN information	Clinical data
AIBD (Dec 8-10)	Filgotinib	Crohn's Disease	FITZROY	Gilead	Phase 3	FITZROY patient reported outcomes	Clinical data
YE 2016	GLPG1837	Cystic Fibrosis	SAPHIRA1	AbbVie	Phase 2	Phase 2 results for G551D mutation	Clinical data
YE 2016	GLPG1972	Osteoarthritis		Servier	Phase 2	GLPG files US IND	Clinical trials
Mar-17						FY17 Guidance	
2017	Filgotinib	Multiple		Gilead	Phase 2	Start of trials in new indications	Clinical trials
2Q17	GLPG1690	IPF	FLORA	AbbVie	Phase 2	Topline results phase 2a	Clinical data
Mid 2017	Triple combination	Cystic Fibrosis		AbbVie	Phase 2	Start of triple combination trial	Clinical trials
YE 2017	Filgotinib	Ulcerative Colitis		Gilead	Phase 3	Phase 2b study readout	Clinical data
Jun-18	Filgotinib	Rheumatoid Arthritis	FINCH 2	Gilead	Phase 3	Data read-out	Clinical data
Apr-19	Filgotinib	Rheumatoid Arthritis	FINCH 1	Gilead	Phase 3	Data read-out	Clinical data
Feb-20	Filgotinib	Rheumatoid Arthritis	FINCH 3	Gilead	Phase 3	Data read-out	Clinical data

Source: Company data.

Key risks

We view the key risks to Galapagos as being the outcomes of the clinical trials, the ability to recruit patients into the later-stage cystic fibrosis trials (where Galapagos will be competing with Vertex), potential value-destructive acquisitions, and read-across should the launch of Lilly's baricitinib be underwhelming.

Outcome of the clinical trials: While the key efficacy data for filgotinib will not read out until 2018/2019, one risk would be if there were an earlier-stage safety signal, for example regarding testicular toxicity in males. We are comforted here by the extensive patient safety data that has already been built up, and that the European regulator has allowed Gilead/Galapagos to proceed with the 200 mg once daily dose in males.

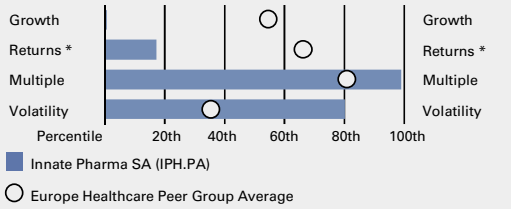
Ability to recruit patients into later-stage cystic fibrosis trials: We expect AbbVie/ Galapagos and Vertex to be competing to recruit cystic fibrosis patients into their clinical trials. We would see the potential downside risk as greater for AbbVie/Galapagos if they are unable to finish recruiting their clinical trial before Vertex's triple combination is approved. However, given that Vertex's clinical trial is only slated to start towards the end of 2016, we believe that there is scope for some slippage in Galapagos' cystic fibrosis timeline before this becomes a risk. If the two trials recruit simultaneously, we believe that there are enough cystic fibrosis patients with the heterozygous F508del mutation (we estimate 11,000 in the US alone) for both programs to recruit patients.

Potential value-destructive acquisitions: Galapagos currently hold €968.5 mn of cash (as of June 30, 2016). We understand that Galapagos continues to evaluate business development opportunities. However, we would expect the majority of business development to be in the form of partnerships, with a relatively low upfront cash outlay, and view a large acquisition as comparatively less likely.

Read across from baricitinib: Our US analyst projects sales of US$400 mn for baricitinib in 2017, increasing to US$1.2 bn in 2020. We believe that sales of Pfizer's Xeljanz, for which our US analyst projects sales of US$885 mn in 2016E, demonstrate the market opportunity for the JAK inhibitors in rheumatoid arthritis.

Innate Pharma (IPH.PA): Off Conviction List; remains Buy with several catalysts ahead

Investment Profile



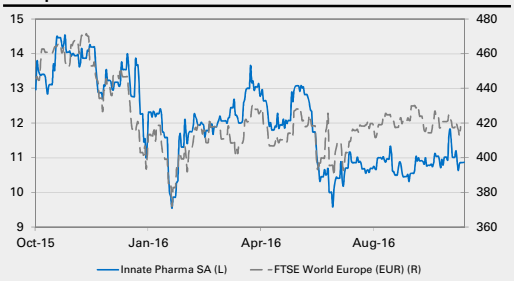
* Returns = Return on Capital

For a complete description of the investment profile measures please refer to the disclosure section of this document.

Key data	Current
Price (€)	10.87
12 month price target (€)	17.00
Upside/(downside) (%)	56
Market cap (€ mn)	549.1
Enterprise value (€ mn)	395.0

	12/15	12/16E	12/17E	12/18E
Revenue (€ mn) New	**25.1**	**42.0**	**64.4**	**58.2**
Revenue revision (%)	32.3	228.1	26.8	45.4
EBIT (€ mn) New	**(10.8)**	**(5.5)**	**17.9**	**11.7**
EBIT revision (%)	40.2	81.8	23.7	(38.6)
EPS (€) New	**(0.13)**	**(0.08)**	**0.24**	**0.16**
EPS (€) Old	(0.33)	(0.55)	0.20	0.26
EV/EBITDA (X)	NM	NM	20.8	30.3
P/E (X)	NM	NM	45.6	67.4
Dividend yield (%)	0.0	0.0	0.0	0.0
FCF yield (%)	29.9	(8.0)	0.5	2.5
CROCI (%)	(21.4)	(2.9)	13.8	9.4

Price performance chart



Share price performance (%)	3 month	6 month	12 month
Absolute	0.1	(16.4)	(16.1)
Rel. to FTSE World Europe (EUR)	(0.3)	(15.5)	(12.4)

Source: Company data, Goldman Sachs Research estimates, FactSet. Price as of 10/17/2016 close.

Source of the opportunity

We continue to rate Innate Pharma as a Buy given its immuno-oncology collaborations with BMS, AstraZeneca and Sanofi, strong cash position and multiple additional pre-clinical assets. Based on our DCF, we see significant upside to Innate Pharma (56%), and view the stock as the most interesting in the biotech group from a catalyst perspective, as we expect efficacy data for lead asset lirilumab as both standalone and in combination therapies by year-end. We remove the shares from the Conviction List as the progress of lirilumab has been slower than originally expected. Since being added to the Conviction List on February 4, 2014, the stock is +7% vs +6% for the FTSE World Europe.

Key assets and estimates

Exhibit 16: Key assets and estimates
Summary of changes to peak sales estimates and probabilities of success

	New		Old	
Asset	**Probability of success**	**Peak sales ($ mn)**	**Probability of success**	**Peak sales ($ mn)**
Lirilumab (standalone)	40%	1,065	75%	1,065
Lirilumab (combination)	20%	6,558	20%	6,558
Monalizumab (combination)	15%	1,783	20%	1,834

Source: Goldman Sachs Global Investment Research.

Catalysts

Innate is entering into an important period of clinical news flow, as we expect standalone data for lirilumab (EffiKIR trial for lirilumab as standalone in acute myeloid leukemia, AML) before year-end, and efficacy data from the combination studies with Opdivo and Yervoy in solid tumors is to be presented at the SITC conference, November 9-13. For monalizumab, we expect safety and first activity data in dose ranging for ovarian cancer in a poster at the EORTC-NCI-AACR congress on Nov 29-Dec 2.

Valuation

We revise our projections for Innate Pharma. Given the slower progress of lirilumab in terms of trial readouts than we had originally anticipated, we revise our probability of success to 40% for lirilumab in AML (from 75%). We revise the probability of success for monalizumab to 15% from 20%, because the recent immuno-oncology data from ESMO shows that trial results in immuno-oncology are not as certain as previously believed. Despite this, our DCF valuation still shows significant potential value upside for Innate, as our revised DCF based valuation is €17. Innate Pharma's key development programs are now partnered. While we view these as important validations of the group's science and technology, we also believe that this could make M&A less likely in the near term. We lower our M&A score to a 3 and therefore remove the M&A component of our valuation and assign a 12-month price target of €17 based on our DCF (down from €22).

Key risks

Key downside risks include adverse clinical data for lirilumab and portfolio reprioritization for development partners BMS, AstraZeneca and Sanofi.

Source: Company data, Goldman Sachs Global Investment Research, FactSet.

Trimming projections ahead of EffiKIR readout

Lirilumab standalone data

The clinical readout that investors are perhaps most focused on is the readout from the EffiKIR study. This is testing lirilumab vs placebo as maintenance therapy for two years in elderly patients with AML, post induction chemotherapy. The primary endpoint is leukemia free survival. The trial is event-driven, and is set to read out later than previously expected, but most likely by year-end.

While we would expect investors to view this trial as an indicator of the potential efficacy of lirilumab across other indications, we would be cautious on significant read-across to the potential of lirilumab in combinations. Not all tumors are the same and we have seen varying responses for other immuno-oncology drugs across combinations. Even if lirilumab fails in AML, we believe there could be a significant market opportunity in combination therapy.

Lirilumab combinations with BMY assets

BMY, partnered with Innate on its lead asset, lirilumab, has recently presented safety data from two Phase 1 studies assessing lirilumab in combination with Opdivo (NCT01714739) and Yervoy (NCT01750580) as a poster at the ESMO meeting.

In both Phase 1 studies, escalating doses of lirilumab (0.1-3.0mg/kg every 4 weeks) was evaluated. Treatment-related adverse events occurred in 71.3% of patients treated with lirilumab and Opdivo, and 68.2% of patients treated with lirilumab and Yervoy.

There were no treatment-related deaths in either study, and lirilumab in combination with Opdivo or Yervoy was well tolerated. The most commonly observed adverse events were fatigue, pruritis (itching), rash, diarrhea and infusion-related reactions. Grade 3-4 adverse events occurred in 13.2% of patients in the lirilumab/Opdivo study and 9.1% of patients in the lirilumab/Yervoy study.

We view these side effects as similar to Opdivo as a standalone therapy. For comparison, Opdivo, given as monotherapy in melanoma, showed a treatment discontinuation rate of 9%. Grade 3 and 4 adverse reactions occurred in 42% of patients. The key side effects for Opdivo standalone seem quite similar to the lirilumab/Opdivo combination, and included rash (21% of Opdivo patients) and pruritus (19%).

We await the efficacy data for these lirilumab combination studies at the SITC conference, November 9-13, and subsequent decisions around Phase 3 trials.

Revised projections and valuation

We revise our projections to reflect the most recent company earnings and to reflect fully the AstraZeneca partnership. We adjust our probabilities of success to 40% for AML (from 75%) given the slower pace of trial readouts and clinical progress than we had expected. Our probability of success for lirilumab in solid tumors is unchanged at 20%, although we are encouraged that the data presented at ESMO shows that the combinations with Opdivo and Yervoy seem safe. We apply a 15% probability of success to monalizumab, reducing this slightly from the previous 20% due to a greater uncertainty regarding immuno-oncology clinical trials after the failure of Checkmate-026 from BMY. We apply a discount rate of 10%. We do not explicitly value the earlier stage assets or the collaboration with Sanofi, although these clearly represent sources of additional upside. We remove the M&A component of the valuation as we believe that Innate Pharma has become a less likely acquisition candidate with its three Big Pharma partnerships. Our 12-month target price of €17 is based on our DCF value.

We believe that the significant market potential for lirilumab and monalizumab if they are found to be widely applicable across tumors in immuno-oncology combination therapy is quite clear. Therefore, we see the main sensitivities to valuation as the probabilities of success that are applied to lirilumab and monalizumab in combination therapies. Exhibit 17 highlights the significant impact on our DCF valuation from relatively small tweaks to probability of success for lirilumab and monalizumab.

Exhibit 17: Innate Pharma DCF value is very sensitive to assumed probability of success
Upside sensitivity of Innate Pharma DCF valuation to probability of success of lirilumab in solid tumours and monalizumab

Innate Pharma target price (Eur)		Probability of Success of lirilumab in solid tumours					
		20%	30%	40%	50%	60%	70%
Probability of success of monalizumab	15%	17.3	22.5	27.7	32.9	38.1	43.2
	20%	17.9	23.1	28.3	33.5	38.7	43.8
	30%	19.1	24.3	29.5	34.7	39.9	45.1
	40%	20.3	25.5	30.7	35.9	41.1	46.3
	50%	21.6	26.8	32.0	37.2	42.3	47.5

Our base case DCF valuation is boxed

Source: Goldman Sachs Global Investment Research.

Upcoming catalysts

Exhibit 18: Innate Pharma catalysts
Updates on both lirilumab and monalizumab expected by year-end

Timing	Drug	Indication	Partner	Development Status	Event	Type of Event
4Q16	Lirilumab - EffiKIR	AML (maintenance)	BMY	Phase II	Data read-out	Clinical data
Lymphoma Congress (Oct 26-28)	IPH4102	Cutaneous T-cell lymphomas		Phase I	Preliminary safety and clinical activity results	Clinical data
SITC (Nov 9-13)	Lirilumab + Nivolumab	Solid tumours	BMY	Phase I	Efficacy data read-out	Clinical data
29 Nov - 2 Dec	Monalizumab	Ovarian cancer	AZN	Phase I / II	Safety and first activity data	Clinical data
Apr-17	Lirilumab + Elotuzumab	R/R MM	BMY	Phase I	Data read-out	Clinical data
Apr 1-5	IPH4301	Cancer		Pre-Clinical	Pre-Clinical update	Progress update (AACR)
Apr 1-5	IPH52	Cancer		Pre-Clinical	Pre-Clinical update	Progress update (AACR)
Apr 1-5	IPH33	Inflammation		Pre-Clinical	Pre-Clinical update	Progress update (AACR)
2H17	Monalizumab + Erbitux	Head & Neck	AZN	Phase I/II	Data read-out	Clinical data
Late 2017/2018	IPH4102	Cutaneous T-cell lymphomas		Phase I	Data read-out	Clinical data
2017	Bispecific NK Cell Engager	Cancer	Sanofi	Pre-Clinical	Pre-Clinical update	Progress update

Source: Company data.

Key risks

We see the key risks to Innate Pharma as being the clinical data shown by lirilumab (both as a standalone agent in the EffiKIR trial and in the combination solid tumor studies) and portfolio reprioritization for development partners BMS, AstraZeneca and Sanofi. We take comfort from the diversification of Innate Pharma's science, with three large pharma partnerships and multiple different tumor targets.

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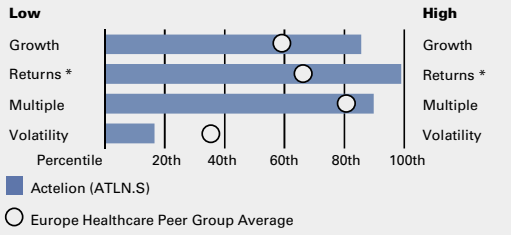
Actelion (ATLN.S): Changing PAH paradigm; Neutral

Investment Profile



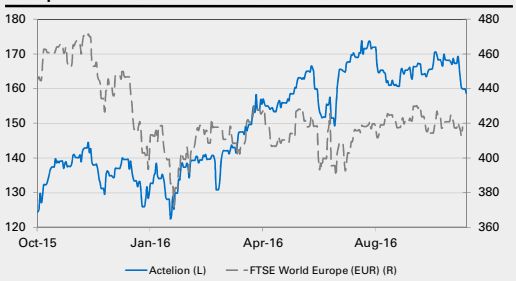
* Returns = Return on Capital

For a complete description of the investment profile measures please refer to the disclosure section of this document.

Key data	Current
Price (SFr)	158.60
12 month price target (SFr)	172.00
Upside/(downside) (%)	8
Market cap (SFr mn)	18,433.8
Enterprise value (SFr mn)	15,904.7

	12/15	12/16E	12/17E	12/18E
Revenue (SFr mn) New	**2,045.1**	**2,383.8**	**2,441.5**	**2,699.2**
Revenue revision (%)	2.0	17.7	19.4	25.3
EBIT (SFr mn) New	**809.4**	**982.1**	**989.6**	**1,193.4**
EBIT revision (%)	36.5	53.4	46.9	59.9
EPS (SFr) New	**6.15**	**7.97**	**8.02**	**9.74**
EPS (SFr) Old	5.39	6.07	6.52	7.23
EV/EBITDA (X)	14.9	14.8	14.2	11.4
P/E (X)	20.7	19.9	19.8	16.3
Dividend yield (%)	1.2	1.0	1.0	1.3
FCF yield (%)	4.6	4.5	5.0	5.9
CROCI (%)	43.1	48.5	46.9	54.9

Price performance chart



Share price performance (%)	3 month	6 month	12 month
Absolute	(6.2)	5.9	27.5
Rel. to FTSE World Europe (EUR)	(6.5)	7.0	33.2

Source: Company data, Goldman Sachs Research estimates, FactSet. Price as of 10/17/2016 close.

Investment view

We raise Actelion's 12-month price target to SFr172 from SFr121. We believe that the stock is fairly valued and remain Neutral-rated. Actelion is entering a new period as its previous development of new medicines for pulmonary arterial hypertension (PAH) changes to commercialization, and developing new pipeline assets in areas beyond PAH.

Key estimates

We update our forecasts to reflect the strong growth of Opsumit and impressive launch of Uptravi, and the potential for operating leverage going forward. Our summary financial forecasts are shown below.

Exhibit 19: Actelion earnings forecasts vs. consensus

P&L Summary (CHF mn)	3Q 2016 Gse	4Q 2016 Gse	Gse 2016E	Gse 2017E	Gse 2018E
Product sales	595	608	2,383	2,440	2,698
of which Tracleer	236	216	998	499	332
of which Opsumit	214	237	828	1,115	1,265
of which Selexipag	60	72	222	496	754
Total net revenue	**596**	**609**	**2,384**	**2,441**	**2,699**
Total operating expenses	-380	-417	-1,564	-1,607	-1,666
EBIT	216	192	820	835	1,034
Core Earnings	**254**	**229**	**982**	**990**	**1,193**
Net income	190	165	715	725	897
Fully diluted EPS (CHF)	1.75	1.53	6.60	6.72	8.37
Core EPS (CHF)	**2.07**	**1.85**	**7.97**	**8.02**	**9.74**
Consensus					
Total net revenue	599		2,364	2,405	2,674
Gse vs consensus	*-0.5%*		*0.8%*	*1.5%*	*0.9%*
Core Earnings	260		982	978	1,143
Gse vs consensus	*-2.3%*		*0.0%*	*1.2%*	*4.4%*
Core EPS	2.06		7.80	7.79	9.31
Gse vs consensus	*0.3%*		*2.2%*	*3.0%*	*4.6%*

Source: Goldman Sachs Global Investment Research.

Opportunities

We believe the upside potential in the earlier-stage pipeline could take some time to be appreciated by investors. We are cautious on Opsumit pricing in the US over the next two years as older drug Tracleer and then competitor drug Letairis go generic in 2017 and 2018, respectively.

Key catalysts

In the near term we expect stock performance to be driven by the sales performance of Uptravi and Opsumit. We also expect Phase 2 for Opsumit in CTEPH and Eisenmenger's by year end.

Valuation

We value Actelion on a SOTP-based DCF. We forecast cash flows to 2030, after the patent expiries of all three PAH drugs, and apply a 7.5% discount rate. Our 12m PT rises to SFr172 from SFr121 as we update forecasts to reflect the earning power of the PAH platform and the platform value of Actelion's early-stage science. We lower our M&A score to a 3 and remove the M&A valuation in our price target as we struggle to see a potential acquirer justifying a significant premium to the current stock price unless it is also willing to assign significant value to Actelion's scientific platform.

Key risks

Upside risks include any take-over approach, faster-than-expected sales growth for Opsumit and/or Uptravi, and continued delay of the introduction of Tracleer generics. Downside risks include value-destructive acquisitions, a slowdown in Opsumit sales growth following the introduction of Tracleer and Letairis generics, and any negative changes in Opsumit's formulary reimbursement status.

Source: Company data, Goldman Sachs Global Investment Research, FactSet.

The five key investing debates

We see five key investing debates for Actelion:

- The ability of Opsumit to grow post the launch of Tracleer generics in 2017 and the introduction of generic Letairis in 2018.
- The peak sales opportunity for Opsumit, including the market potential of the life cycle management opportunities.
- The market opportunity for Uptravi (selexipag) and the near-term sales potential.
- The potential of Actelion's near-term pipeline
- The resultant near-term margin profile.

(1) The ability of Opsumit to grow post Tracleer/Letairis generics

Opsumit sales have performed strongly since its launch. However, over the next two years, Actelion will need to navigate the changing landscape of first the introduction of Tracleer generics, which we expect in 1H17, and subsequently Letairis generics, which we expect in October 2018. Note that one reason why Actelion has beaten and raised guidance in 2016 is because the introduction of Tracleer generics in the US has been slower than expected due to the time needed to set up a shared REMS program with generic manufacturers.

Impact of Tracleer generics in 2017

Opsumit and Tracleer are currently priced similarly on commercial plans, on a gross basis. The question is whether the availability of generic Tracleer prompts a change in payer attitudes whereby pharmacy benefit managers (PBMs) try to direct formularies towards use of generic Tracleer rather than Opsumit. The risk of more negative payer actions has become increasingly topical following the publication of the 2017 formularies by the US patients, which included actions taken by payers CVS and UnitedHealth to promote the usage of biosimilar Basaglar over Lantus.

So far, Actelion has been quite effective in reducing the number of new patient starts on Tracleer. At year-end 2015, c.46,000 patients globally were taking Tracleer, of whom 5,800 were in the US. This number is declining quarter on quarter, and largely reflects legacy usage of Tracleer, mostly driven by non-PAH indications such as digital ulcers, not new patient starts in PAH. The reason for this is that Opsumit has demonstrated better data in PAH than Tracleer. In the SERAPHIN study, Opsumit showed a 45% reduction in the risk of a morbidity/mortality event compared with placebo. Tracleer never showed this benefit.

We see different scenarios evolving in the US and Europe. We continue to believe that innovation in the US will be paid for by payers, and therefore believe that Opsumit will continue to be reimbursed and favoured by physicians over generic Tracleer. However, in Europe, we forecast less growth for Opsumit as we expect greater use of generic alternatives.

Arguably CVS provides one example illustrating a potential counter to this view of the US willingness to pay for Opsumit, with the company continuing to exclude Opsumit from its formulary for 2017. However, we do not believe that this necessarily signals that CVS would favour the usage of Tracleer generics over more innovative medicines, as CVS continues to reimburse Letairis, while doctors also have the ability to request that CVS reimburses Opsumit by filling in an additional form. In any case, the commercial impact of the continuing CVS exclusion is limited, as the PBM under which more of Opsumit is prescribed commercially is Express Scripts, while Medicare and Medicaid are also more important channels than CVS.

Impact of Letairis generics in 2018

The main ERA competitor for Opsumit in terms of new patient starts is currently Letairis. Actelion has commented that the new patient market share is split approximately 50:50.

Letairis' exclusivity expires in October 2018. We expect competition from generic Letairis to dampen peak sales potential in Europe, but in the US we believe that Actelion will continue to defend Opsumit's market share. The downside risk to this view is that US payers post Letairis genericisation in 2018 could start to favour cheaper generic Letairis (especially given that the AMBITION trial, published in 2015, showed that the combination of Letairis and an ERA, tadalafil, reduced the risk of clinical failure by 50% compared to Letairis and tadalafil monotherapy). We would expect more visibility on the views of the payers this time next year, when payers release their formularies for 2018.

There are three reasons why we believe that Actelion should be well placed to defend Opsumit post Letairis generics. First, we would expect Actelion to emerge as the sole promotional voice post Letairis genericisation. Second, while the market seems approximately to be evenly split between Opsumit and Letairis, individual physicians who prescribe Opsumit may be resistant to switch patients to Letairis. Third, Actelion offers an extensive program of patient support with Opsumit. Under the Opsumit PLUS program, patients receive dedicated nurse support, which we believe is valuable for patients. Once Letairis is generic, we expect Opsumit to emerge as the best supported option for patients.

(2) The peak sales potential for Opsumit and life cycle management opportunities

We see the peak sales potential for Opsumit as being driven by (1) the size of the PAH market, (2) potential penetration of the endothelin receptor antagonist (ERA) class in PAH patients, (3) Opsumit patient capture within the ERA class, (4) future pricing dynamics for Opsumit and (5) the opportunities from Opsumit line extension studies. Due to the differential in pricing between the US and Europe for Opsumit, and the upcoming competition from generic Tracleer and Letairis (with potential implications for reference pricing in Europe but not in the US), we expect the majority of the sales potential to come from the US. Our market model for Opsumit in PAH in the US is shown in Exhibit 20.

Exhibit 20: We forecast peak Opsumit sales in the US in PAH of SFr1.0 bn, based on 50% new patient capture
US PAH market model for Opsumit ($ mn unless otherwise stated)

Opsumit model (USA)	2016E	2017E	2018E	2019E	2020E	2021E	2022E	2023E	2024E	2025E	2026E	2027E	2028E	2029E	2030E
Total Opsumit patients (USA)	**8,933**	**10,866**	**12,327**	**13,273**	**13,713**	**14,086**	**14,446**	**14,762**	**15,079**	**15,399**	**15,722**	**16,047**	**16,376**	**16,707**	**17,041**
% growth	37%	22%	13%	8%	3%	3%	3%	2%	2%	2%	2%	2%	2%	2%	2%
% of ERA market	39%	44%	48%	49%	49%	49%	49%	49%	49%	49%	49%	49%	49%	49%	49%
% of total population	28%	33%	37%	39%	39%	40%	40%	40%	41%	41%	41%	42%	42%	43%	43%
1. - deaths / discontinuations in Opsumit patients															
Patients dying or discontinuing	**-326**	**-715**	**-1,159**	**-1,664**	**-2,212**	**-2,286**	**-2,348**	**-2,408**	**-2,460**	**-2,513**	**-2,567**	**-2,620**	**-2,675**	**-2,729**	**-2,784**
% of previous cohort	*5%*	*8%*	*11%*	*14%*	*17%*	*17%*	*17%*	*17%*	*17%*	*17%*	*17%*	*17%*	*17%*	*17%*	*17%*
2. + newly diagnosed patients:															
New patients taking an ERA	4,378	4,421	4,528	4,636	4,745	4,857	4,970	5,084	5,201	5,320	5,440	5,562	5,686	5,812	5,940
% new patients taking an ERA	*72%*	*72%*	*73%*	*74%*	*75%*	*76%*	*77%*	*78%*	*79%*	*80%*	*81%*	*82%*	*83%*	*84%*	*85%*
New patients taking Opsumit	**2,189**	**2,211**	**2,264**	**2,318**	**2,373**	**2,428**	**2,485**	**2,542**	**2,601**	**2,660**	**2,720**	**2,781**	**2,843**	**2,906**	**2,970**
% of whom take Opsumit	*50%*	*50%*	*50%*	*50%*	*50%*	*50%*	*50%*	*50%*	*50%*	*50%*	*50%*	*50%*	*50%*	*50%*	*50%*
3. + ERA adoption in existing patients															
Total patients taking an ERA at beginning of year	21,154	23,091	24,633	25,858	26,854	27,762	28,528	29,262	29,901	30,541	31,183	31,829	32,478	33,133	33,794
% penetration of PAH patients	*66%*	*70%*	*73%*	*76%*	*77%*	*78%*	*79%*	*80%*	*81%*	*81%*	*82%*	*83%*	*84%*	*84%*	*85%*
Patients who are ERA naïve	10,846	9,717	8,909	8,358	7,986	7,661	7,446	7,234	7,096	6,940	6,767	6,580	6,380	6,168	5,946
ERA starts among existing ERA naïve patients	1,085	874	713	585	559	460	447	362	355	347	338	329	319	308	297
% converted in the year	*10%*	*9%*	*8%*	*7%*	*7%*	*6%*	*6%*	*5%*	*5%*	*5%*	*5%*	*5%*	*5%*	*5%*	*5%*
New patients taking Opsumit	**542**	**437**	**356**	**293**	**280**	**230**	**223**	**181**	**177**	**173**	**169**	**164**	**159**	**154**	**149**
% of whom take Opsumit	*50%*	*50%*	*50%*	*50%*	*50%*	*50%*	*50%*	*50%*	*50%*	*50%*	*50%*	*50%*	*50%*	*50%*	*50%*
Patients diagnosed in the year taking an ERA	4,378	4,421	4,528	4,636	4,745	4,857	4,970	5,084	5,201	5,320	5,440	5,562	5,686	5,812	5,940
Deaths in year	5,333	5,333	5,468	5,590	5,703	5,807	5,904	5,996	6,083	6,166	6,247	6,325	6,401	6,476	6,550
Of whom taking an ERA	3,526	3,754	4,016	4,225	4,395	4,551	4,682	4,807	4,916	5,025	5,133	5,241	5,350	5,460	5,570
Of whom ERA naïve	1,808	1,580	1,452	1,366	1,307	1,256	1,222	1,188	1,167	1,142	1,114	1,084	1,051	1,016	980
Patients taking an ERA at year end	23,091	24,633	25,858	26,854	27,762	28,528	29,262	29,901	30,541	31,183	31,829	32,478	33,133	33,794	34,462
% growth		7%	5%	4%	3%	3%	3%	2%	2%	2%	2%	2%	2%	2%	2%
% penetration of PAH patients	*72%*	*75%*	*77%*	*78%*	*80%*	*81%*	*81%*	*82%*	*83%*	*83%*	*84%*	*85%*	*85%*	*86%*	*87%*
US sales															
US patients	8,933	10,866	12,327	13,273	13,713	14,086	14,446	14,762	15,079	15,399	15,722	16,047	16,376	16,707	17,041
% growth	37%	22%	13%	8%	3%	3%	3%	2%	2%	2%	2%	2%	2%	2%	2%
Gross price ($)	$ 90,000	$ 90,000	$ 90,000	$ 90,000	$ 90,000	$ 90,000	$ 90,000	$ 90,000	$ 90,000	$ 90,000	$ 90,000	$ 54,000	$ 10,800	$ 7,560	$ 5,292
% change in price		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	-40%	-80%	-30%	-30%
Net to gross	75%	75%	75%	75%	75%	75%	75%	75%	75%	75%	75%	75%	75%	75%	75%
Net price ($)	$ 67,500	$ 67,500	$ 67,500	$ 67,500	$ 67,500	$ 67,500	$ 67,500	$ 67,500	$ 67,500	$ 67,500	$ 67,500	$ 40,500	$ 8,100	$ 5,670	$ 3,969
Est. sales ($ mn)	$ 536	$ 733	$ 832	$ 896	$ 926	$ 951	$ 975	$ 996	$ 1,018	$ 1,039	$ 1,061	$ 650	$ 133	$ 95	$ 68
Est. % of US sales	49%	49%	49%	49%	49%	49%	49%	49%	49%	49%	49%	49%	49%	49%	49%
FX rate ($/CHF)	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02
US Sales (CHF mn)	526	720	816	879	908	933	957	978	999	1,020	1,041	638	130	93	66
% growth	45%	37%	13%	8%	3%	3%	3%	2%	2%	2%	2%	-39%	-80%	-29%	-29%

Source: Goldman Sachs Global Investment Research.

PAH prevalence: We estimate that c.32,000 patients in the US are currently diagnosed with PAH. Conservatively, we assume that the diagnosed PAH population grows at 2% going forward (corresponding to a diagnosed incidence of 19 per million, and an average survival of six years).

ERA penetration: We estimate that currently c.21k patients are treated by ERAs, or two-thirds of PAH patients currently. The penetration of ERAs is increasing, partly due to studies such as Letairis' AMBITION and Opsumit's SERAPHIN showing that ERAs should be the backbone of combination therapy for PAH. The ERA market is growing at a high single-digit rate, also demonstrating that ERA penetration is increasing against the backdrop of low single-digit growth in diagnosed PAH patients. We expect this trend to continue, and forecast that in 2025 ERAs will be taken by 85% of diagnosed PAH patients. This corresponds to a CAGR of ERA usage of 4% to 2025.

Opsumit patient capture within the PAH class: Our estimated year on year change in sales of Opsumit is driven by three factors: patient capture among new patients diagnosed with PAH who use ERAs, patient capture among patients who are already diagnosed with PAH, who switch to ERA, and deaths/discontinuations among existing Opsumit patients. We model that Opsumit captures 50% of new patients starting on an ERA. This is in line with the existing market dynamic. Potential downsides have been discussed above, and would chiefly stem from changing attitudes of the payers if they choose to promote usage of the generic ERA alternatives. The risks to the upside would be if Actelion is able to capitalize on its position as the sole promotional voice in the space, to increase new patient capture. In terms of patient deaths and discontinuations, we assume that discontinuations gradually increase to 17% of patients annually (in line with the deaths seen after year 3 in the SERAPHIN study). Another way of thinking about this is that we expect patients on average to remain on Opsumit for six years.

Future pricing dynamics for Opsumit: Given the increasing debate in the US around pricing, and the uncertainties around payer views of upcoming generic ERA alternatives, we model a cautious approach to Opsumit pricing from Actelion, and forecast flat price year on year in the US. We model net price at 75% of gross, which we back out from Actelion's previous reports of the number of patients on Opsumit vs. reported sales and list price.

Key sensitivities to our US PAH market model

To show the effect of these various moving parts, Exhibit 21 below shows the comparison of the PAH market as we believe it exists currently and our projections for 2025 Opsumit sales. Sensitivities to these key assumptions are show in Exhibits 22-23.

Exhibit 21: Key drivers for Opsumit sales
Top down model for sales in PAH in the US

PAH sales for Opsumit in the US	2015	CAGR	2025
PAH patients	32,000	1.6%	37,481
ERA patients	21,154	4%	31,183
ERA pentration	66%		83%
Opsumit patients	6,528	9%	15,399
Penetration among ERA patients			49%
Opsumit gross price	90,000	0%	90,000
Opsumit gross to net	75%		75%
Opsumit net price	67,500		67,500
Total annual sales ($ mn)	**441**	9%	**1,039**

Source: Goldman Sachs Global Investment Research.

Exhibit 22: Drivers for population expansion are PAH diagnosis and ERA penetration
Sensitivity of US 2025 PAH sales (US$ mn) to PAH population and ERA usage

		PAH population CAGR				
		1.0%	1.6%	2.0%	2.5%	3.5%
ERA penetration	75%	884	937	975	1,024	1,129
	80%	943	1,000	1,040	1,092	1,204
	83%	980	1,039	1,082	1,136	1,252
	85%	1,002	1,062	1,105	1,161	1,279
	90%	1,060	1,124	1,170	1,229	1,354

Source: Goldman Sachs Global Investment Research.

Exhibit 23: Long-term Opsumit market share is the key value driver
Sensitivity of US 2025 PAH sales to Opsumit penetration and price growth

		Opsumit price growth				
		0.0%	0.8%	1.5%	2.0%	2.5%
Opsumit penetration	40%	842	912	977	1,026	1,078
	49%	1,039	1,126	1,206	1,267	1,331
	60%	1,263	1,368	1,466	1,539	1,617
	70%	1,473	1,595	1,710	1,796	1,886
	80%	1,684	1,823	1,954	2,053	2,156

Source: Goldman Sachs Global Investment Research.

The market opportunity for macitentan beyond PAH: Actelion is conducting a number of trials to examine macitentan in additional indications. The most important of these are MAESTRO for Eisenmenger's syndrome and MERIT for Chronic Thromboembolic Pulmonary Hypertension (CTEPH). We expect MERIT to read out later in 2016 and MAESTRO to read out in December 2016. Actelion is also conducting the MELODY study for combined pre- and post-capillary pulmonary hypertension due to left ventricular dysfunction, but this study did not meet the primary endpoint. Based on management comments, we understand that Actelion is analyzing potential patient subgroups from this study, but we do not forecast sales for this indication currently.

We see the largest life cycle management market opportunity in CTEPH, which is a form of pulmonary hypertension caused by pulmonary embolism (blood clots in the lungs). Our market model for CTEPH is shown in Exhibit 24 below. Incidence of CTEPH is estimated at up to 2,500 patients a year, and we estimate that patients could take macitentan for three years on average. MERIT is a Phase 2 study, and we therefore apply a 50% probability of success to this indication.

Exhibit 24: Significant market opportunity in CTEPH
Market opportunity for CTEPH

CTEPH	2016E	2017E	2018E	2019E	2020E	2021E	2022E	2023E	2024E	2025E	2026E	2027E	2028E	2029E	2030E
Incidence in the US (can occur post pulmonary embolism)	2,500	2,525	2,550	2,576	2,602	2,628	2,654	2,680	2,707	2,734	2,762	2,789	2,817	2,845	2,845
% growth		1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	0%
% penetration				*10%*	*20.0%*	*25.0%*	*30.0%*	*35.0%*	*40.0%*	*40%*	*40%*	*40%*	*40%*	*40%*	*40%*
Number of patients being prescribed Macitentan				258	520	657	796	938	1,083	1,094	1,105	1,116	1,127	1,138	1,138
Number of years of therapy				5	5	5	5	5	5	5	5	5	5	5	5
Total number of patients on Macitentan				258	778	1,435	2,231	3,169	3,994	4,568	5,015	5,335	5,524	5,579	5,623
Probability of success				*50%*	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%
CTEPH patients (probabilized)		0	0	129	389	717	1,115	1,585	1,997	2,284	2,508	2,667	2,762	2,789	2,812
Net price		$ 67,500	$ 67,500	$ 67,500	$ 67,500	$ 67,500	$ 67,500	$ 67,500	$ 67,500	$ 67,500	$ 67,500	$ 40,500	$ 8,100	$ 5,670	$ 3,969
Net probabilized revenue		$ -	$ -	$ 9	$ 26	$ 48	$ 75	$ 107	$ 135	$ 154	$ 169	$ 108	$ 22	$ 16	$ 11

Source: Goldman Sachs Global Investment Research.

We see the usage in Eisenmenger's syndrome as potentially smaller. Eisenmenger's, which is pulmonary hypertension caused by an unrepaired congenital heart defect, is a relatively rare disease, with prevalence estimated at 1-9/million (we estimate a midpoint of 5). We estimate a probability of success of 60%.

Exhibit 25: Market opportunity in Eisenmenger is relatively modest
Market opportunity for Eisenmenger

Eisenmenger	2016E	2017E	2018E	2019E	2020E	2021E	2022E	2023E	2024E	2025E	2026E	2027E	2028E	2029E	2030E
Number of patients in the US	1,600	1,616	1,632	1,648	1,665	1,682	1,698	1,715	1,733	1,750	1,767	1,785	1,803	1,821	1,839
Estimated prevalence (per million)	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
% penetration			*20%*	*40%*	*50.0%*	*60.0%*	*70.0%*	*70.0%*	*70.0%*	*70.0%*	*70.0%*	*70.0%*	*70.0%*	*70.0%*	*70.0%*
Number of patients on Macitentan			326	659	832	1,009	1,189	1,201	1,213	1,225	1,237	1,250	1,262	1,275	1,287
Probability of success			*60%*	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%
Probabilized number of patients			196	396	499	605	713	720	728	735	742	750	757	765	772
Net price		$ 67,500	$ 67,500	$ 67,500	$ 67,500	$ 67,500	$ 67,500	$ 67,500	$ 67,500	$ 67,500	$ 67,500	$ 40,500	$ 8,100	$ 5,670	$ 3,969
Net probabilized revenue		$ -	$ 13	$ 27	$ 34	$ 41	$ 48	$ 49	$ 49	$ 50	$ 50	$ 30	$ 6	$ 4	$ 3

Source: Goldman Sachs Global Investment Research.

(3) The market opportunity for Uptravi

We have had a number of investor questions around the near-term sales trajectory for Uptravi, how we think about the discontinuation rates for the drug and the potential for its broader adoption. As a reminder, Actelion aims to position Uptravi as both an alternative to inhaled and injected prostacyclins, and as an add-on treatment for earlier-stage patients, (in addition to the ERA). Exhibit 26 shows our market model for Uptravi in the US, where we estimate patient capture from both these subgroups. We believe that the US sales opportunity is the most significant for Uptravi, because this is where payers may be more amenable to add on therapies which add to the total drug spend for a patient.

Exhibit 26: We believe upside potential for Uptravi will be driven by sales in earlier-stage PAH patients
US market model for Uptravi

Uptravi model (USA)	2016E	2017E	2018E	2019E	2020E	2021E	2022E	2023E	2024E	2025E	2026E	2027E	2028E	2029E	2030E
Total PAH patients	**32,000**	**32,807**	**33,542**	**34,216**	**34,840**	**35,423**	**35,974**	**36,497**	**36,998**	**37,481**	**37,950**	**38,408**	**38,858**	**39,301**	**39,740**
1. Eligible for Uptravi @ end of life	4,800	4,921	5,031	5,132	5,226	5,314	5,396	5,474	5,550	5,622	5,693	5,761	5,829	5,895	5,961
% of total patients	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%
Of whom start Uptravi	1,680	2,215	2,767	3,336	3,919	3,985	4,047	4,106	4,162	4,217	4,269	4,321	4,372	4,421	4,471
% of total patients prescribed Uptravi	35%	45%	55%	65%	75%	75%	75%	75%	75%	75%	75%	75%	75%	75%	75%
Of whom are still on Uptravi after a year	1,596	2,104	2,629	3,169	3,724	3,786	3,845	3,901	3,954	4,006	4,056	4,105	4,153	4,200	4,247
% discontinuation rate	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Number of months on Uptravi	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Years since launch	-	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Total number of patients on Uptravi @ end of life	*1,596*	*2,104*	*2,629*	*3,169*	*3,724*	*3,786*	*3,845*	*3,901*	*3,954*	*4,006*	*4,056*	*4,105*	*4,153*	*4,200*	*4,247*
2. Eligible for Uptravi in combination with ERA															
Total number of patients on ERA therapy	21,154	23,091	24,633	25,858	26,854	27,762	28,528	29,262	29,901	30,541	31,183	31,829	32,478	33,133	33,794
Of whom at end of life	3,526	3,754	4,016	4,225	4,395	4,551	4,682	4,807	4,916	5,025	5,133	5,241	5,350	5,460	5,570
Patients earlier in life on ERA therapy	17,629	19,337	20,617	21,633	22,458	23,211	23,846	24,455	24,985	25,517	26,050	26,587	27,128	27,673	28,224
Of whom start Uptravi	176	967	2,268	3,029	3,593	4,178	4,292	4,402	4,497	4,593	4,689	4,786	4,883	4,981	5,080
% of total patients prescribed Uptravi (incidence)	1%	5%	11%	14%	16%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%
Number of months on Uptravi	12	12	15	18	18	18	18	18	18	18	18	18	18	18	18
Effective penetration of Uptravi	1%	5%	11%	17%	23%	26%	27%	27%	27%	27%	27%	27%	27%	27%	27%
Number of patients on Uptravi at the start of the ye	176	967	2,268	3,624	5,165	6,035	6,438	6,603	6,746	6,889	7,034	7,179	7,325	7,472	7,621
Discontinuing Uptravi	-18	-97	-227	-303	-359	-418	-429	-440	-450	-459	-469	-479	-488	-498	-508
% discontinuation rate	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%
Number of patients on Uptravi at the end of the yea	*159*	*870*	*2,041*	*3,321*	*4,806*	*5,617*	*6,009*	*6,163*	*6,296*	*6,430*	*6,565*	*6,700*	*6,836*	*6,974*	*7,112*
Total number of patients on Uptravi	**1,755**	**2,974**	**4,670**	**6,490**	**8,530**	**9,403**	**9,854**	**10,063**	**10,250**	**10,436**	**10,621**	**10,805**	**10,989**	**11,174**	**11,360**
% growth		*69%*	*57%*	*39%*	*31%*	*10%*	*5%*	*2%*	*2%*	*2%*	*2%*	*2%*	*2%*	*2%*	*2%*
N of US patients	1,755	2,974	4,670	6,490	8,530	9,403	9,854	10,063	10,250	10,436	10,621	10,805	10,989	11,174	11,360
% growth		69%	57%	39%	31%	10%	5%	2%	2%	2%	2%	2%	2%	2%	2%
Gross price ($)	160,000	161,600	163,216	164,848	166,497	168,162	169,843	171,542	173,257	174,990	176,740	178,507	35,701	21,421	12,852
% growth		1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	-80%	-40%	-40%
Net to gross	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%
Net price ($)	144,000	145,440	146,894	148,363	149,847	151,345	152,859	154,387	155,931	157,491	159,066	160,656	32,131	19,279	11,567
Sales to patients ($ mn)	171	433	686	963	1,278	1,423	1,506	1,554	1,598	1,644	1,689	1,736	353	215	131
Stocking effect ($ mn)	46	40	30	42	56	62	66	68	70	72	74	76	15	9	6
Est. sales ($ mn)	217	473	716	1,005	1,334	1,485	1,572	1,622	1,668	1,715	1,763	1,812	369	225	137
Of which end of life	197	334	403	491	582	598	613	629	644	658	673	688	139	85	51
Of which earlier stage	20	138	313	514	752	887	959	993	1,025	1,057	1,090	1,123	229	140	86
CHF:USD	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02
Est. sales CHF mn	212	464	702	986	1,309	1,457	1,542	1,591	1,637	1,683	1,730	1,777	362	221	135

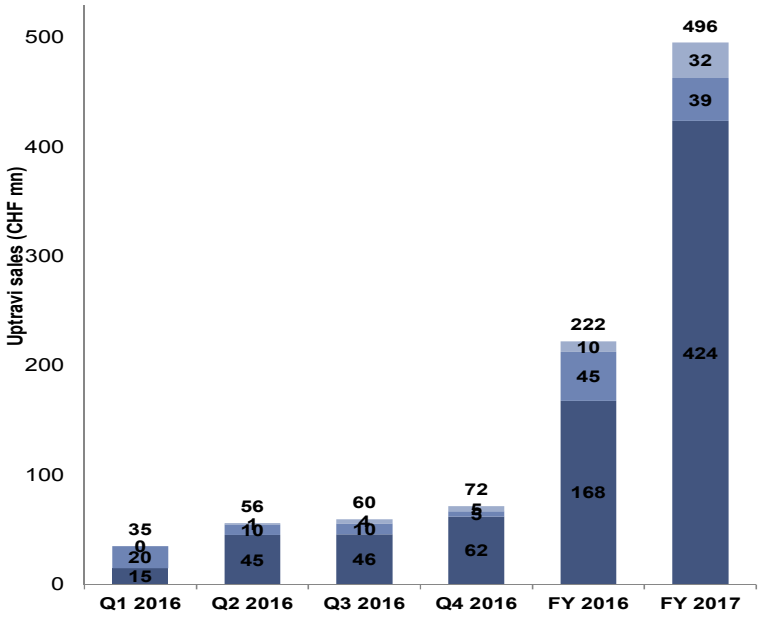
Source: Goldman Sachs Global Investment Research.

Use of Uptravi at the end of life: We estimate that this usage of Uptravi will be predominantly in patients in the last year of life. Assuming an approximate 7-year lifespan in PAH, this corresponds to c.15% of total patient prevalence each year. We estimate that Uptravi is eventually prescribed in 75% of these patients. We model a longer-term discontinuation rate in the end of life population of 5%, as the drug becomes better understood by physicians. Usage in this patient population drives US$688 mn of our 2027 US peak sales estimate (35% of US peak sales).

Use of Uptravi in earlier-stage PAH patients: We view this as the larger market opportunity, driving 65% of our 2027 US peak sales estimate. The two key debates are around what percentage of PAH patients take Uptravi, and how long these patients take Uptravi for. We assume that 20% of incident PAH patients take Uptravi, and that they stay on the drug for 18 months on average. We also model a 10% discontinuation rate. We could see upside if patients ultimately use Uptravi for longer than 18 months. However, we do not include this in our estimates until we have more real world data on penetration into this population and the discontinuation patterns.

Near-term Uptravi sales trajectory: Uptravi has so far exceeded estimates from the time of launch. While there has been some debate about discontinuation rates in the first two quarters of sales, we believe that the more important takeaway from the launch is that Uptravi is already being well prescribed (1,100 patients in the US at end-2Q16). Exhibit 27 shows our sales projections for the remaining two quarters of 2016 and 2017, split between US sales, US inventory building and European sales.

Exhibit 27: We forecast the bulk of Uptravi sales to come from the US
Uptravi sales (CHF mn) in the US (darkest blue), stocking (mid blue) and international (lightest blue)



Source: Goldman Sachs Global Investment Research.

(4) The potential of Actelion's near-term pipeline

For the first time, focus on Actelion's pipeline is switching from new product development in PAH to new areas. The two nearer-term opportunities are cadazolid and MS drug ponesimod. We forecast relatively modest risk-adjusted sales for cadazolid (US$60 mn in 2020) and ponesimod (US$100 mn in 2021). We continue to look for ongoing updates on Actelion's earlier-stage portfolio, including lucerastat for Fabry disease, in the months to come, but do not explicitly forecast sales until we see more details. Actelion's pipeline is summarized in the table below:

Exhibit 28: Actelion's Pipeline

Asset	Indication	Phase
Neurological Pipeline		
Ponesimod	Multiple sclerosis	3
Clazosentan	Vasospasm (SAH)	2
Dual Orexin Receptor Antagonist	Insomnia	2
Selective Orexin 1 Receptor Antagonist	Neurological disorders	1
T-type calcium channel blocer	Neurological disorders	1
Other Pipeline		
Cadazolid	Clostridium difficile	3
Cenerimod	SLE	2
Endothelin Receptor Antagonist	Speciality cardiovascular disorder	2
Ponesimod	Graft-versus-host disease	2
Cardiovascular compounds	Undisclosed CV indications	1
Lucerastat	Fabry disease	1b

SAH: subarachnoid haemorrhage; SLE: systemic lupus erythematosus

Source: Company data, Goldman Sachs Global Investment Research.

On MS drug ponesimod, the investor debate has focused on how Actelion plans to differentiate ponesimod from upcoming Gilenya generics (as both drugs share the S1P1 mechanism). Actelion recently announced the trial design for its second Phase 3 trial. Recall that the first trial is vs. Sanofi's Aubagio (the OPTIMUM study), which is needed from a regulatory perspective but would not necessarily distinguish ponesimod commercially. The second trial will be for ponesimod as an add-on therapy to Tecfidera (the POINT study). The study is being conducted under an SPA with the FDA, which gives us comfort that the regulators would view a positive trial as meeting an unmet need. Enrolment for the POINT study is expected to start before the end of 2016, with the duration of the study lasting until the last patient enrolled into the study has been treated for 60 weeks (expected average treatment duration of two years and maximum duration of three years). We expect readout from the studies in 2019 (Optimum) and 2020 (Point), with product launch in 2021.

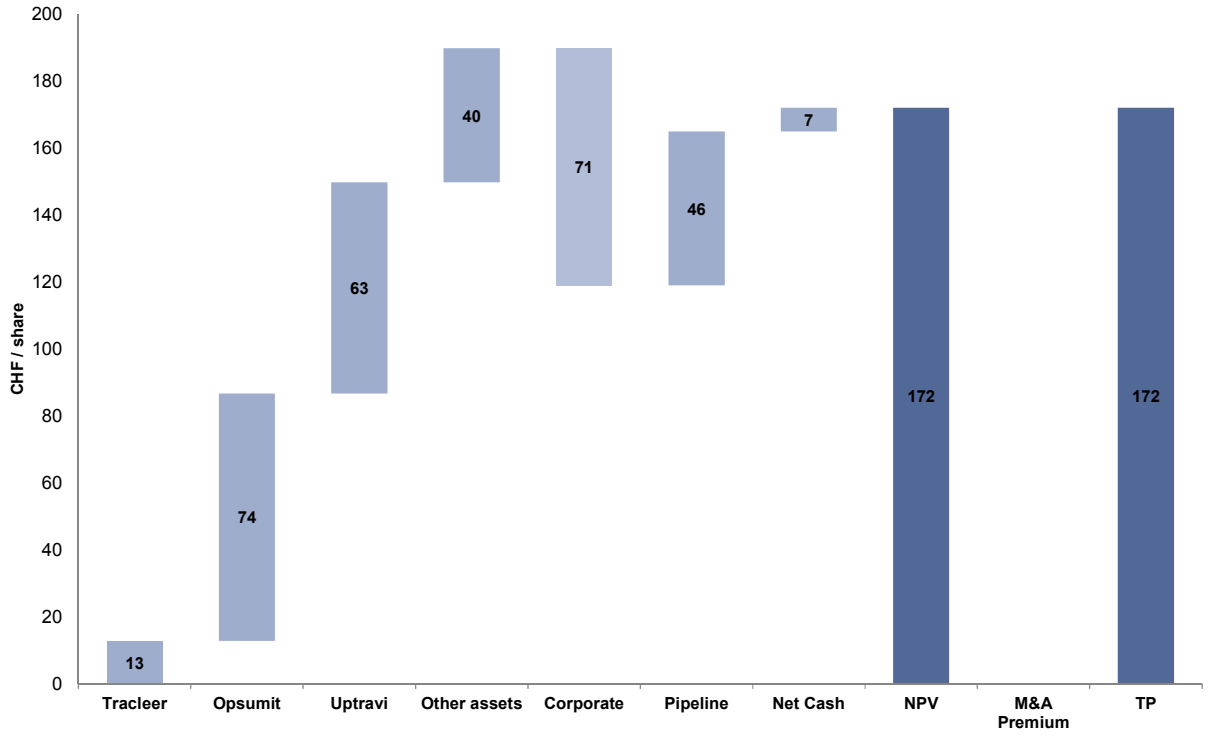
(5) Potential for near-term margin expansion

We expect Actelion's sales to grow significantly over the next few years (2016-20E sales CAGR of 10%). One key question is the extent to which this translates to margin expansion. We assume relatively modest growth rates in R&D and SG&A, resulting in their decline as a percentage of sales. We do expect COGS as a percentage of sales to increase over time, as Uptravi (where Actelion pays mid-teens royalties to Nippon Shinyaku) takes a greater share of sales. Overall, we forecast an expansion in EBIT margin to 43.1% in 2020E from 37.1% in 2016E.

Our 12-month SFr172 price target is based on a SOTP-based DCF

We value Actelion on a sum of the parts-based DCF. We forecast cash flows to 2030, after the patent expiries of all three PAH drugs, and apply a 7.5% discount rate. The valuation is shown below:

Exhibit 29: Our sum of the parts-based DCF valuation suggests a value of SFr172
Actelion sum of the parts valuation; target price has a 12-month timeframe



Source: Company data, Goldman Sachs Global Investment Research.

The two key value drivers are Opsumit and Uptravi. One key question for the valuation is how to treat the DCF valuation of the ongoing R&D spend and earlier stage pipeline. The approach we have taken is to assume a rate of return on the unallocated R&D spend (the R&D spend not connected to assets that we explicitly value) of 7.5%, in line with Actelion's cost of capital, so that the valuation applied to the pipeline effectively offset the R&D spend from a DCF perspective. This pipeline valuation implicitly includes Actelion's earlier-stage opportunities and platform value. This gives a 12-month target price of SFr172.

M&A valuations provide potential floor

With its narrow product and therapeutic area focus and attractive growth profile, Actelion could be strategically attractive to potential acquirers. We have analysed what an acquirer could potentially pay in an M&A scenario, looking at recent precedent biotech deals as a multiple of 2020 sales. Taking the 5.1x mean multiple of 2020 sales of previous transactions suggests a potential enterprise value for Actelion of SFr17.9 bn, which corresponds to SFr178/share.

Exhibit 30: Recent precedent biopharma take-outs have occurred at a 5.1x 2020E sales multiple on average

Acquirer	Seller	Date	Acquisition value ($ mn)	2020 Sales multiple
Pfizer	Medivation	Aug-16	13,694	5.5x
Shire	NPS	Jan-15	5,058	3.4x
Alexion	Synageva	Jun-15	7,941	8.3x
Abbvie	Pharmacyclics	Mar-15	19,777	3.3x
Median				**4.5x**
Mean				**5.1x**

Source: Company data; Goldman Sachs Global Investment Research.

We also prepared a fully synergized DCF valuation, where we remove all SG&A and R&D from our estimates. This suggests that the "maximum" DCF-based synergized value of the currently marketed assets would be c.SFr207/share.

At current trading levels, this suggests that a potential acquirer may find it difficult to justify a full M&A premium to the current stock price unless the acquirer is also willing to assign significant value to Actelion's scientific platform. Given Actelion's leading position in the PAH space, we would not expect an acquirer to be able to add significant revenue synergies to Actelion's existing PAH commercialization expertise. However, we believe that these potential M&A valuations do provide support against significant downside to the Actelion stock price.

Exhibit 31: Marketed assets are worth SFr207/share if all costs were to be stripped out
DCF valuation under a 100% synergy scenario

Synergized DCF (CHF mn)	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Revenues	2,440	2,698	3,096	3,501	3,821	4,009	4,150	4,283	4,402	4,453	3,820	1,571	1,237	1,015
Gross margin	10%	11%	11%	14%	14%	14%	14%	13%	11%	11%	11%	11%	11%	11%
Gross profit	2,202	2,414	2,753	3,016	3,294	3,461	3,587	3,706	3,918	3,963	3,399	1,398	1,101	904
Tax rate	13%	13%	13%	13%	13%	13%	13%	13%	13%	13%	13%	13%	13%	13%
After tax profit	1,916	2,100	2,395	2,624	2,866	3,011	3,121	3,225	3,409	3,448	2,958	1,216	958	786
Discount period	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Discount factor	0.93	0.87	0.80	0.75	0.70	0.65	0.60	0.56	0.52	0.49	0.45	0.42	0.39	0.36
Discounted valuation	1,782	1,818	1,928	1,965	1,996	1,951	1,881	1,808	1,778	1,673	1,335	511	374	286
Enterprise Value	**21,085**													
Discount factor	7.50%													

	Synergized DCF
Implied Enterprise Value	21,085
Plus net cash	1,251
Implied Equity Value	22,336
Shares outstanding	108
Potential take out price	**207**
2016 EBITDA	*973*
Implied 2016 EBITDA multiple	*21.7x*

Source: Goldman Sachs Global Investment Research.

Upcoming catalysts

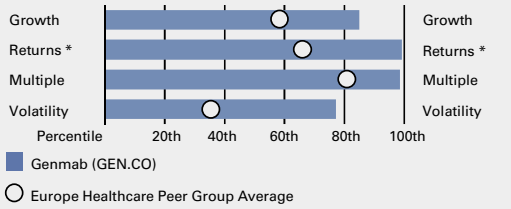
Exhibit 32: We view the key upcoming datapoints as the Macitentan life cycle management studies
Upcoming catalysts for Actelion

Timing	Compund	Indication	Study	Development status	Event	Type of Event
Oct-16	Opsumit	CTEPH	MERIT	Phase II	Phase 2 results	Clinical data
Dec-16	Opsumit	Eisenmenger syndrome	MAESTRO	Phase III	Phase 3 results	Clinical data
Dec-16	Clazosentan	Vasospasm 2° subararchnoid haemorrhage	REVERSE	Phase II	Phase 2 results	Clinical data
1Q17	Mechlorethamine (Valchlor)	Cutaneous T-cell lymphoma (MF)			EMA filing	Regulatory approval
Jan-17	Cadazolid	C. diff diarrhoea	IMPACT	Phase III	Phase 3 results	Clinical data
Feb-17						FY17 Guidance
Jun-17	Ponesimod	Graft-versus-host disease	-	Phase II	Phase 2 results	Clinical data

Source: Company data.

Genmab (GEN.CO): Darzalex launch impressive; shares fairly valued; Neutral

Investment Profile

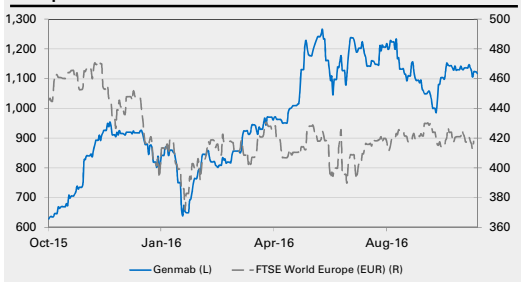


* Returns = Return on Capital

For a complete description of the investment profile measures please refer to the disclosure section of this document.

Key data				Current
Price (Dkr)				1,123.00
12 month price target (Dkr)				1,200.00
Upside/(downside) (%)				7
Market cap (Dkr mn)				63,594.6
Enterprise value (Dkr mn)				65,923.3
	12/15	12/16E	12/17E	12/18E
Revenue (Dkr mn) New	**1,132.9**	**1,051.7**	**3,856.1**	**4,377.9**
Revenue revision (%)	0.0	19.2	68.3	80.7
EBIT (Dkr mn) New	**730.3**	**226.7**	**3,014.6**	**3,519.5**
EBIT revision (%)	0.0	176.0	104.4	121.4
EPS (Dkr) New	**13.04**	**3.56**	**40.09**	**46.96**
EPS (Dkr) Old	13.04	1.68	20.19	21.99
EV/EBITDA (X)	45.7	NM	21.1	17.3
P/E (X)	46.7	315.2	28.0	23.9
Dividend yield (%)	0.0	0.0	0.0	0.0
FCF yield (%)	0.8	0.0	2.9	4.1
CROCI (%)	32.8	6.9	70.5	75.2

Price performance chart



Share price performance (%)	3 month	6 month	12 month
Absolute	(2.2)	20.1	77.9
Rel. to FTSE World Europe (EUR)	(2.5)	21.4	85.9

Source: Company data, Goldman Sachs Research estimates, FactSet. Price as of 10/17/2016 close.

Investment view

We continue to rate Genmab Neutral, and raise our 12-month target price to Dkr1,200 from Dkr950 following the stronger-than-anticipated launch of Darzalex. We believe that the company is fairly valued on a DCF basis. The investing debate around Genmab centres on the eventual peak sales opportunity for Darzalex, and the likely progress of the Darzalex launch from here. We also continue to pay attention to Genmab's earlier stage pipeline, for which we assign a platform value of Dkr150/share.

Key assets and estimates

We raise our sales forecasts for Darzalex to reflect the strong launch. For 2016, we now expect underlying Darzalex sales of US$512 mn (vs Genmab's guidance of US$440-490 mn). As a reminder, in the first half of the year, Darzalex sold US$209 mn, with sales of US$102 mn in 1Q and US$107 mn in 2Q. We now expect sales to reach peak levels more rapidly than previously. Our sales forecast for 2020E is now US$5.1 bn vs US$2.2 bn previously. Our peak sales expectation is now US$7.5 bn vs. US$6.6 bn previously.

Opportunities

In terms of upside to the Genmab story from here, we believe that in addition to a better-than-expected sales trajectory from Darzalex, further value could stem from (1) Darzalex working in solid tumours, (2) Darzalex in cancers beyond multiple myeloma, and (3) Genmab's earlier-stage pipeline. However, we do not believe that we have seen enough data so far to include forecasts for Darzalex in multiple tumour types in our estimates.

Key catalysts

The near-term drivers of the stock will be the sales performance of Darzalex. We also await the readouts from the studies of Darzalex in front-line multiple myeloma, the earliest of which we expect in 2017.

Valuation

Our 12-month target price of Dkr1,200 is derived 70% from DCF valuation and 30% from M&A valuation (reflecting a score of 1 on our M&A framework). Our DCF valuation of Dkr1126/share uses a 7.5% WACC (as Genmab's Darzalex is now marketed), and includes a Dkr150/share platform valuation, to reflect Genmab's earlier-stage pipeline of assets. Our M&A valuation of Dkr1400/share is based on our DCF value with the removal of 90% of our forecast corporate costs and an additional Dkr150/share for platform value (i.e. the value to an acquirer that looked to acquire Genmab for its Darzalex royalty and science platform).

Key risks

We see the key upside risks as being a stronger-than-expected Darzalex launch, and signs of efficacy in immuno-oncology combinations in different tumor types. Downside risks would be a slowdown in the sales growth of Darzalex, and unexpectedly negative data in frontline therapy.

Source: Company data, Goldman Sachs Global Investment Research, FactSet.

Eyes on Darzalex launch

Darzalex launch

The launch of Darzalex has been impressive and has exceeded Genmab and consensus' expectations at the time. Genmab's full-year sales guidance for Darzalex implies that the launch should be more rapid than precedent multiple myeloma launches of Kyprolis (US$306 mn of sales) and Velcade (US$143 mn of sales in the US only). However, we note that the quarter on quarter of Darzalex has shown less growth (+5%). One reason for this is the dosing of Darzalex. The label of Darzalex calls for once weekly administration in the first eight weeks, followed by dosing every two weeks from weeks 9 to 24. Therefore, in the first quarter, a patient would receive 10 injections, but only six in the second quarter. Patient numbers would need to increase by 67% just to offset the reduction in dosing frequency. Genmab's full-year guidance suggests that it expects quarterly sales to increase by a run-rate of 22%.

We believe that the strong sales performance of Darzalex suggests that the launch was partly boosted by a bolus effect, with a rapid uptake of patients. To think about the longer-term implications of this bolus on the sales potential, the extent to which the bolus included off-label patients is important. Anecdotal reports (e.g. our physician call on multiple myeloma) suggest that some doctors are prescribing Darzalex earlier in the treatment cycle. As a reminder, Darzalex is currently approved for fourth-line therapy in multiple myeloma. JNJ has filed a BLA to extend this approval into 2L, off the back of the impressive data seen in this setting from POLLUX and CASTOR (where daratumumab, in combination with Revlimid and Velcade respectively, showed Hazard Ratios of 0.37 and 0.39, respectively).

In terms of upcoming catalysts, we look to the first-line studies for Darzalex. There are three studies for Darzalex, ALCYONE, MAIA and CASSIOPEIA. The company has guided that it would expect at least one of these studies to read out at interim during next year. The first of the studies to be enrolled was ALCYONE, and therefore we believe this is the most likely to read out first. Below, we show our bottom-up market model for Darzalex sales in multiple myeloma:

Exhibit 33: Significant market opportunity for Darzalex as backbone therapy for multiple myeloma
Daratumumab market model

	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Total MM eligible patients (prevalence)	**264,471**	**280,288**	**294,528**	**307,392**	**316,331**	**324,113**	**330,556**	**335,511**	**340,548**	**345,669**
1st line	97,884	103,738	110,921	117,762	123,240	126,272	128,782	130,712	132,675	134,670
Maintenance	30,911	32,759	35,028	37,188	38,918	39,875	40,668	41,278	41,897	42,527
2nd line	67,787	71,841	75,491	78,788	81,079	83,074	84,725	85,995	87,286	88,599
3rd line	29,374	31,131	30,196	28,889	27,026	27,691	28,242	28,665	29,095	29,533
Smoldering	38,515	40,819	42,892	44,766	46,068	47,201	48,139	48,861	49,594	50,340
Dara MM penetration										
1st line	0.0%	0.0%	3.2%	7.2%	17.6%	18.9%	20.3%	21.8%	22.8%	23.9%
Maintenance	0.0%	0.0%	0.0%	1.3%	2.9%	5.5%	9.5%	14.2%	16.1%	18.1%
2nd line	0.2%	7.2%	13.2%	20.4%	22.7%	23.3%	23.9%	24.5%	25.3%	25.1%
3rd line	15.4%	30.3%	41.1%	48.9%	51.7%	47.1%	45.5%	43.5%	41.3%	38.8%
Smoldering	0.0%	0.0%	0.0%	3.0%	6.0%	8.1%	8.4%	9.0%	10.8%	11.7%
Dara sales (USDmn, unprobabilized)										
Total	**512**	**1,397**	**2,439**	**3,972**	**5,458**	**5,752**	**6,206**	**6,708**	**7,132**	**7,504**
1st line	0	0	419	999	2,039	2,041	2,191	2,385	2,549	2,717
Maintenance	0	0	0	46	88	164	291	457	539	626
2nd line	19	596	967	1,445	1,649	1,740	1,822	1,885	1,954	1,996
3rd line	493	801	1,053	1,194	1,193	1,124	1,114	1,088	1,054	1,012
Smoldering	0	0	0	137	227	290	296	326	402	456
Other non-MM indications	0	0	0	150	263	394	492	566	634	697
Dara sales (USDmn, probabilized)										
Total	**512**	**1,397**	**2,397**	**3,753**	**5,050**	**5,258**	**5,643**	**6,067**	**6,409**	**6,708**
1st line @ 90% PoS	0	0	377	899	1,835	1,837	1,972	2,147	2,294	2,446
Maintence @ 90% PoS	0	0	0	41	79	147	262	411	485	563
2nd line @ 100% PoS	19	596	967	1,445	1,649	1,740	1,822	1,885	1,954	1,996
3rd line @ 100% PoS	493	801	1,053	1,194	1,193	1,124	1,114	1,088	1,054	1,012
Smoldering @ 60% PoS	0	0	0	82	136	174	177	195	241	273
Other non-MM indications @ 60% PoS	0	0	0	90	158	236	295	340	380	418
Dara sales (DKrmn, probabilized)										
Total	**3,422**	**9,329**	**16,010**	**25,069**	**33,734**	**35,125**	**37,694**	**40,527**	**42,810**	**44,810**
1st line	0	0	2,516	6,005	12,259	12,270	13,171	14,340	15,324	16,336
Maintenance	0	0	0	276	527	985	1,751	2,748	3,240	3,763
2nd line	127	3,982	6,462	9,656	11,018	11,623	12,173	12,594	13,052	13,333
3rd line	3,295	5,348	7,032	7,979	7,969	7,507	7,440	7,270	7,043	6,757
Smoldering	0	0	0	551	909	1,162	1,185	1,305	1,611	1,826
Other non-MM indications	0	0	0	601	1,052	1,578	1,973	2,269	2,541	2,795
Royalty rate	12%	14%	16%	17%	18%	18%	18%	18%	19%	19%
Daratumumab royalties (DKrmn)	**412**	**1,292**	**2,517**	**4,351**	**6,098**	**6,384**	**6,901**	**7,471**	**7,932**	**8,335**

Source: Goldman Sachs Global Investment Research.

In terms of upside to the Genmab story from here, we believe that in addition to a better-than-expected sales trajectory from Darzalex, further value could stem from (1) Darzalex working in solid tumours (2) Darzalex in cancers beyond multiple myeloma and (3) Genmab's earlier-stage pipeline.

Darzalex in solid tumours

The existing FDA label for Darzalex highlights that one of its mechanisms of action is via an immunological effect, via targeting myeloid derived CD38+ Reg T and B cells which are immune suppressant. JNJ has partnered with Roche in multiple myeloma and solid tumours and Celgene in blood cancer to conduct Phase 1 studies to analyse this. However, we do not currently assign valuation /sales forecasts to this opportunity, until we see more data.

Darzalex in other blood cancers

We expect JNJ to start Phase 3 trials in other blood cancers over the course of the next year. Currently, daratumumab is being trialed in a Phase 2 trial in non-Hodgkin's lymphoma. We estimate sales of US$697 mn in 2025E from other blood cancers.

JNJ partnership

Genmab and JNJ agreed their partnership for Darzalex in August 2012. At the time, JNJ made an upfront payment of US$55 mn to Genmab, invested US$80 mn in new Genmab shares, and agreed to up to US$1 bn in development, regulatory and sales milestones, and tiered double-digit royalties between 12% and 20%. JNJ pay all costs for developing and commercializing daratumumab going forward. Since then, JNJ has sold down its stake in Genmab. However, we see that as an asset allocation decision from JNJ rather than signaling its commitment to Genmab. The partnership is becoming increasingly important to JNJ as a future growth driver. In 2020E, our US analyst projects operating income for JNJ of US$27.1 bn (32.6% operating margin). On our projections, JNJ could be paying Genmab risk-adjusted royalties of US$913 mn on Darzalex sales of US$5.1bn. In other words, by 2020E, Darzalex royalties could represent c.3.4% of JNJ's operating income or 1.1% of JNJ sales.

Genmab's earlier stage pipeline

Genmab is developing several other early stage medicines, summarized in the table below:

Exhibit 34: Genmab's early stage pipeline

Drug	Mechanism	Target	Partnership	Developmental stage	Indication	Primary Endpoint	Primary Readout
Tisotumab vedotin (HuMax-TF-ADC)	ADC	TF	SGEN (after Ph 1/2)	1	Solid tumours	Safety	Oct 2016
AMG 714 / HuMax-IL15	IgG Antibody	IL-15	Celimmune	2	Celiac	Vh:Cd ratio	Jan 2017
HuMax-IL8	IgG Antibody	IL-8	BMY	1	Solid tumours	Safety	Apr 2017
Humax-TAC-ADC	ADC	CD25	ADC Therapeutics	1	Lymphoma, AML	Safety	Jun 2018
JNJ-61186372	DuoBody	EGFR and cMET	JNJ	1	NSCLC	Safety	Oct 2018
Pre-Clinical Assets							
HuMax-AXL-ADC	ADC	AXL	SGEN	PC			2016
HexaBody DR5/DR5	IgG Antibody	Death receptor 5	Proprietary	PC			End-2017
HexaBody Program	IgG Antibody	Various	Agenus, Humabs BioMed	PC			Ongoing
DuoBody CD3xCD20	IgG Antibody	CD3/CD20	Proprietary	PC			End-2017
DuoBody	IgG Antibody	Various	NOVN, Novo, GILD, JNJ	PC			Ongoing

Source: Company data, Goldman Sachs Global Investment Research.

The four assets highlighted by Genmab are tisotumab vedotin, HuMax-AXL-ADC, HexaBody DR5/DR5 and DuoBody CD3xCD20.

Tisotumab Vedotin (HuMax-TF-ADC) is an antibody-drug conjugate (ADC) targeting Tissue Factor (TF), a protein involved in tumour signaling and vessel formation (angiogenesis). It combines an antibody against TF with a synthetic toxin, vedotin. Vedotin in a potent anti-mitotic (stops cell division); however, due to its high toxicity, it cannot be administered alone. Vedotin is part of the ADC, Adcetris (Takeda), approved for the treatment of Hodgkin's lymphoma and anaplastic large cell lymphoma. Tisotumab vedotin is being studied in collaboration with Seattle Genetics in several solid tumours indications, including ovarian, cervical, endometrium, bladder, prostate, oesophagus, lung and squamous cell head and neck cancer.

Similarly, HuMax-AXL-ADC is an ADC targeting Axl, a tyrosine kinase molecular target found on several cancers, combined with the toxin, vedotin. After binding to tumour cells, HuMax-AXL-ADC is internalized leading to intercellular release of the toxin, which interferes with cell division and causes rapid cell death.

The HexaBody and DuoBody programs encompass more than 20 proprietary and collaborator molecules across a variety of disease indications. The HexaBody program creates clusters of six (hexamers) antibodies, inducing and enhancing cell killing through programmed cell death (apoptosis) and antibody derived complement dependent cytotoxicity (CDC). The DuoBody program combines two antibodies to make a bispecific antibody, and Genmab believes its DuoBody platform should be applicable to any antibody.

Valuation

Our DCF valuation is shown below. In addition to valuing the cash flows at a WACC of 7.5%, we include value for net cash at Dkr6/share, and platform value at Dkr150/share:

Exhibit 35: Our estimates imply a DCF value of Dkr1,126/share
Overview of Genmab DCF (Dkr mn)

Discounted Cash Flow Analysis
DKr mn

	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Royalties Azerra	81	88	95	108	122	135	140	146	152	158	134	114	97	82	70	60	51	43
Royalties Daratumumab	417	1,306	2,543	4,397	6,162	6,451	6,973	7,549	8,015	8,422	8,664	8,875	9,080	9,284	9,485	9,491	8,808	8,077
Milestones - daratumumab	405	2,363	1,586	1,485	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Milestones - Arzerra	0	0	54	54	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Milestones - Duobodies	60	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0
Deferred revenue	89	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other revenues	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Revenues	**1,052**	**3,856**	**4,378**	**6,144**	**6,383**	**6,586**	**7,114**	**7,695**	**8,167**	**8,580**	**8,798**	**8,990**	**9,177**	**9,366**	**9,555**	**9,551**	**8,859**	**8,120**
R&D	-720	-734	-749	-764	-779	-795	-811	-827	-844	-860	-878	-895	-913	-931	-950	-969	-872	-785
R&D (%)	*-68.5%*	*-19.0%*	*-17.1%*	*-12.4%*	*-12.2%*	*-12.1%*	*-11.4%*	*-10.7%*	*-10.3%*	*-10.0%*	*-10.0%*	*-10.0%*	*-9.9%*	*-9.9%*	*-9.9%*	*-10.1%*	*-9.8%*	*-9.7%*
SG&A	-105	-107	-109	-111	-114	-116	-118	-121	-123	-125	-128	-131	-133	-136	-139	-141	-127	-114
SG&A (%)	-10%	-3%	-2%	-2%	-2%	-2%	-2%	-2%	-2%	-1%	-1%	-1%	-1%	-1%	-1%	-1%	-1%	-1%
EBIT	**227**	**3,015**	**3,520**	**5,268**	**5,490**	**5,675**	**6,185**	**6,748**	**7,200**	**7,594**	**7,792**	**7,964**	**8,131**	**8,299**	**8,467**	**8,440**	**7,859**	**7,221**
EBIT margin	*22%*	*78%*	*80%*	*86%*	*86%*	*86%*	*87%*	*88%*	*88%*	*89%*	*89%*	*89%*	*89%*	*89%*	*89%*	*88%*	*89%*	*89%*
Tax rate	*-22.0%*	*-22.0%*	*-22.0%*	*-22.0%*	*-22.0%*	*-22.0%*	*-22.0%*	*-22.0%*	*-22.0%*	*-22.0%*	*-22.0%*	*-22.0%*	*-22.0%*	*-22.0%*	*-22.0%*	*-22.0%*	*-22.0%*	*-22.0%*
Less: Taxes	-60	-677	-793	-1,159	-1,208	-1,248	-1,361	-1,484	-1,584	-1,671	-1,714	-1,752	-1,789	-1,826	-1,863	-1,857	-1,729	-1,589
NOPLAT	**167**	**2,338**	**2,727**	**4,109**	**4,282**	**4,426**	**4,824**	**5,263**	**5,616**	**5,924**	**6,078**	**6,212**	**6,342**	**6,473**	**6,604**	**6,583**	**6,130**	**5,632**
Plus: Depreciation & Amortization	10	11	11	12	13	13	13	13	13	13	13	13	13	13	13	13	13	13
Depreciation as a % of sales	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Less: Deferred revenue	-89	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Less: Capital expenditures	-9	-10	-11	-11	-12	-12	-12	-12	-12	-12	-12	-12	-12	-12	-12	-12	-12	-12
Capex as a % of sales	-1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Free cash flow	**78**	**2,338**	**2,728**	**4,110**	**4,283**	**4,427**	**4,825**	**5,264**	**5,617**	**5,924**	**6,079**	**6,212**	**6,343**	**6,474**	**6,605**	**6,584**	**6,131**	**5,633**
FCF as a % of sales	*7%*	*61%*	*62%*	*67%*	*67%*	*67%*	*68%*	*68%*	*69%*	*69%*	*69%*	*69%*	*69%*	*69%*	*69%*	*69%*	*69%*	*69%*

Source: Company data, Goldman Sachs Global Investment Research.

Our M&A valuation of Dkr1,400 per share is derived from elimination of 90% of the corporate cost going forward (R&D and SG&A), and an additional Dkr150/share in platform value. On the cost synergies estimate, we believe that an acquirer would be able to eliminate the vast majority of the costs because Genmab's main value is a royalty stream from JNJ, and therefore does not require employees to market or develop products. On the incremental DKr 150/share in platform value, because Genmab receives royalties from JNJ, an acquirer would not be able to realise any value from revenue synergies. However, an acquirer could act if they believe that the market underestimates the potential revenues of Darzalex. We note that Genmab's management have commented that their internal projections for Darzalex are greater than current analyst consensus.

Upcoming catalysts

Exhibit 36: Key Genmab catalysts will be the readouts for Darzalex in the first line clinical trials
Upcoming Genmab catalysts

Timing	Compound	Indication	Study	Partner	Development status	Event
Oct-16	Tisotumab vedotin	Solid cancers		SGEN	Phase I/II	Data read-out
Nov 10						Capital Markets Day
4Q16	HuMax-AXL-ADC			SGEN	Pre-clinical	IND filing
Early 2017	Darzalex (daratumumab)	Multiple Myeloma (MM)		JNJ	Approval	Potential Approval in second line
2017	Ofatumumab + bendamustine	Follicular Lymphoma (FL)	COMPLEMENT A+B	NOVN	Phase III	Interim Efficacy data
Jan-17	Darzalex (SC)	Multiple Myeloma (MM)	MMY1004 (Pavo)	JNJ	Phase I	Data read-out
Feb-17						**FY17 Guidance**
Mar-17	Teprotumumab	Graves' orbitopathy (GO)		River Vision	Phase II	Data read-out
Apr-17	HuMax-IL8	Metastatic solid tumors		BMS	Phase I	Data read-out
2017	Daratumumab + VMP	Front line Multiple Myeloma (MM)	MMY3007 (Alcyone)	Janssen	Phase III study ongoing	Potential interim Data read-out
Nov-17	Daratumumab	Smoldering Multiple Myeloma (MM)	SMM2001 (Centaurus)	Janssen	Phase II study ongoing	Data read-out
Dec-17	Daratumumab + durvalumab	Multiple Myeloma (MM)	MM003 (FUSION)	Janssen	Phase III study ongoing	Data read-out
Late 2017	HexaBody-DR5/DR5				Pre-clinical	Potential IND filing
Late 2017	DuoBody-CD3xCD20				Pre-clinical	Potential IND filing
2018	Daratumumab + revlimid + dexmethasone	Front line Multiple Myeloma (MM)	MMY3008 (Maia)	Janssen	Phase III study ongoing	Potential interim Data read-out

Source: Company data.

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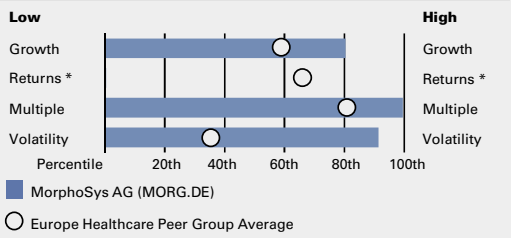
MorphoSys (MORG.DE): Guselkumab boosts sentiment; Neutral

Investment Profile



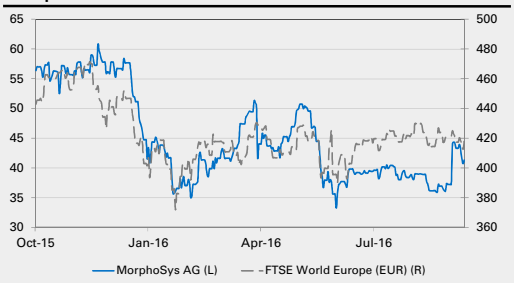
* Returns = Return on Capital

For a complete description of the investment profile measures please refer to the disclosure section of this document.

Key data	Current
Price (€)	41.25
12 month price target (€)	50.00
Upside/(downside) (%)	21
Market cap (€ mn)	1,073.2
Enterprise value (€ mn)	843.6

	12/15	12/16E	12/17E	12/18E
Revenue (€ mn) New	**106.2**	**50.1**	**117.5**	**85.1**
Revenue revision (%)	0.0	2.3	(0.8)	2.7
EBIT (€ mn) New	**17.2**	**(67.0)**	**(7.5)**	**7.0**
EBIT revision (%)	0.0	1.7	(15.2)	47.2
EPS (€) New	**0.57**	**(2.52)**	**(0.23)**	**0.25**
EPS (€) Old	0.57	(2.56)	(0.19)	0.19
EV/EBITDA (X)	58.0	NM	NM	63.1
P/E (X)	114.6	NM	NM	162.8
Dividend yield (%)	NM	NM	NM	NM
FCF yield (%)	(1.5)	(5.9)	(0.6)	0.5
CROCI (%)	(9.3)	(20.0)	(0.6)	4.0

Price performance chart



Share price performance (%)	3 month	6 month	12 month
Absolute	5.5	(16.6)	(25.0)
Rel. to FTSE World Europe (EUR)	5.1	(15.7)	(21.7)

Source: Company data, Goldman Sachs Research estimates, FactSet. Price as of 10/14/2016 close.

Investment view

We rate MorphoSys as Neutral, with a DCF-based, 12-month target price of €50. MorphoSys has underperformed YTD (down -28%). The under-performance would have been more marked, until the recent positive data for guselkumab in psoriasis on October 4, 2016 led to an 18% rebound in the stock. We believe that the investment case is ultimately set to be driven by the efficacy shown by key unpartnered assets MOR-202 and MOR-208.

Opportunities

We believe that part of the recent stock price rebound has been driven by increasing investor confidence that guselkumab's success could validate MorphoSys' other assets. However, while (and perhaps because) we have had no doubts over the quality of MorphoSys' science or platforms, we do not believe that positive data in guselkumab necessarily makes other MorphoSys assets more likely to work, as the key question is whether each drug is acting on the right molecular targets.

Key assets

Exhibit 37: Key assets and sales

Asset	Indication	Partner	Phase of development	Launch date	Peak sales ($mn) before risk adj	PoS	Value / share €
MOR208	various blood cancers	N/A	Phase 2	2021	787	40%	9.1
MOR202	Multiple Myeloma	N/A	Phase 1/2a	2020	1,089	50%	12.6
MOR103	Rheumatoid Arthritis	GSK	Phase 2b	2022	321	50%	4.5
guselkumab	Psoriasis	J&J	Phase 3	2017	961	90%	6.6
bimagrumab	others	Novartis	Phase 2	2020	1,056	10%	0.6
anetumab	mutliple cancers	Bayer	Phase 2	2018	2,382	31%	3.4
Gantenerumab	Alzheimer's Disease	Roche	Phase 2/3	2022	3,308	5%	1.3

Source: Goldman Sachs Global Investment Research, Company data.

Catalysts

Over the next few months, we look for updates on the other guselkumab Phase 3 trials and filing, and await more mature data for unpartnered assets MOR202 and MOR208, which we expect at ASH in December 2016 and ASCO in June 2017. If these data are strong, they could lead to a partnering event which would be positive for the stock. At year-end 2017 we expect anetumab ravtansine Phase 2 results.

Valuation

Our 12-month price target is €50, and is based on a DCF valuation. Our price target is up from €43 previously reflecting (1) inclusion of anetumab ravtansine, (2) increasing probability of success and sales forecasts for guselkumab following the Phase 3 data, and (3) increasing MorphoSys' platform value to €10/share (following the positive catalysts of guselkumab and Bayer's comments on anetumab).

Key risks

We see the key upside risks to MorphoSys as being unexpectedly strong data for MOR-202 and/or MOR-208, potentially leading to a large partnering agreement or acquisition, and better-than-expected data for other pipeline assets. Downside risks are if data for MOR-202 or MOR-208 is underwhelming, or if the data from the five other Phase 3 guselkumab trials is not as positive as that seen from the first trial to read out.

Source: Company data, Goldman Sachs Global Investment Research, FactSet.

A shot in the arm from guselkumab

Adjusting guselkumab estimates

Guselkumab is an anti-IL-23 antibody in three Phase 3 trials for psoriasis, partnered with JNJ. The results of the first Phase 3 trial recently read out, under which guselkumab showed superiority to adalimumab. The table below summarises the responses shown in guselkumab to those for Taltz and for Cosentyx. The impressive data adds credence to MorphoSys' belief that IL17/23 could become the gold standard in psoriasis and displace TNFa. MorphoSys believes that this product could achieve peak sales of > US$1 bn. In terms of next steps, we expect data from the other two Phase 3 studies, and JNJ to file, later this year.

As a result of the strong data shown, we increase our probability of success estimate to 90% from 65%. We also increase our peak sales estimate to US$1.0 bn from US$659 mn. The impact of the sales on MorphoSys' financials is relatively limited, as MorphoSys receives mid-single digit milestones on filing and approval, and mid-single digit royalties. We believe that the marked stock price reaction to the data has been driven by investor confidence in one of MorphoSys' pipeline assets working.

Exhibit 38: Guselkumab clinical trial summary and comparison to Taltz and Cosentyx

	GUSELKUMAB		COSENTYX (Secukinumab)						TALTZ (Ixekizumab)					
	VOYAGE-1		ERASURE			FIXTURE			UNCOVER-1		UNCOVER-2		UNCOVER-3	
Primary Endpoint (Week 16)			**Primary Endpoint (Week 12)**						**Primary Endpoint (Week 12)**					
	Guselkumab 100mg (N=329) n (%)	**Placebo** (N=174) n (%)	**Cosentyx** 300mg (N=245) n (%)	**Cosentyx** 150mg (N=245) n (%)	**Placebo** (N=248) n (%)	**Cosentyx** 300mg (N=327) n (%)	**Cosentyx** 150mg (N=327) n (%)	**Placebo** (N=326) n (%)	**Taltz** 80mg, Q2W (N=433) n (%)	**Placebo** (N=431) n (%)	**Taltz** 80mg, Q2W (N=351) n (%)	**Placebo** (N=168) n (%)	**Taltz** 80mg, Q2W (N=385) n (%)	**Placebo** (N=193) n (%)
IGA Score of 0 or 1	280 (85.1)	12 (6.9)	160 (65.3)	125 (51.2)	6 (2.4)	202 (62.5)	167 (51.1)	9 (2.8)	354 (81.8)	14 (3.2)	292 (83.2)	4 (2.4)	310 (80.5)	13 (6.7)
PASI 90 response	241 (73.3)	5 (2.9)												
PASI 75 response			200 (81.6)	174 (71.6)	11 (4.5)	249 (77.1)	219 (67.0)	16 (4.9)	386 (89.1)	17 (3.9)	315 (89.7)	4 (2.4)	336 (87.3)	14 (7.3)
	Guselkumab (N=329)	**Adalimumab** (N=334)												
Secondary Endpoint (Week 48)			**Secondary Endpoint (Week 12)**						**Secondary Endpoint (Week 12)**					
IGA Score of 0 or 1	265 (80.5)	185 (55.4)												
IGA Score of 0	166 (50.5)	86 (25.7)							160 (37.0)	0	147 (41.9)	1 (0.6)	155 (40.3)	0
PASI 75 response	289 (87.8)	209 (62.6)												
PASI 90 response	251 (76.3)	160 (47.9)	145 (59.2)	95 (39.1)	3 (1.2)	175 (54.2)	137 (41.9)	5 (1.5)	307 (70.9)	2 (0.5)	248 (70.7)	1 (0.6)	262 (68.1)	6 (3.1)
PASI 100 response	156 (47.4)	78 (23.4)	70 (28.6)	31 (12.8)	2 (0.8	78 (24.1)	47 (14.4)	0 (0)						

IGA Score 0=clear; 1=almost clear

Source: Company data, Goldman Sachs Global Investment Research

Key value drivers remain MOR208 and MOR202

We also expect near-term news updates on the two largest value drivers of MorphoSys' stock, the unpartnered assets MOR202 (CD38, multiple myeloma) and MOR208 (CD19, NHL and CLL), as per Exhibit 39. Of these, we believe that the most important update will be at ASCO 2017 for MOR 202 (the combination data at the 16 mg/kg dose with lenalidomide):

Exhibit 39: We expect the most important data for MOR 202 at ASCO next year
Summary of upcoming conference data for MOR 202 and MOR 208

	ASH 2016 (December)	ASCO 2017 (June)
MOR 202	Incremental data from new patients in combination therapy	Mature combination data at highest 16 mg/kg dose with lenalidomide
MOR 208	Data in CLL from IIT trial Longer response data in NHL	First combination data with lenalidomide (L-MIND study)

Source: Company data, Goldman Sachs Global Investment Research.

For MOR202, MorphoSys is testing the drug at the highest 16 mg/kg dose in combination therapy with imids. We expect an update on this data at ASCO. If data is compelling, we believe that management could use the data to explore partnership options. However, the commercial hurdle that MorphoSys and any partner would face is that data would need to be significantly differentiated to recently launched Darzalex (daratumumab) given that MOR202 would be several years behind in coming to market. However, the data shown by Darzalex has been very strong.

MorphoSys recently initiated a potential pivotal trial for MOR208, the B-MIND trial (evaluating bendamustine + MOR208 in second-line R/R DLBCL vs Rituxan and bendamustine). MOR-208 is also in an ongoing Phase 2 trial, the L-MIND trial, examining lenalidomide and MOR208 in second line R/R DLBCL. MorphoSys expect data from MOR-208 in the L-MIND trial at ASCO next year, and we expect additional data to come at ASH in 2017. Potentially, MorphoSys could look to partner this asset after this data is presented. MorphoSys has stated that it would like to retain European rights for this asset in any partnering scenario.

Adding anetumab ravtansine estimates

One asset where we expect more focus from investors is anetumab ravtansine, and we include sales forecasts for this drug. Anetumab is an antibody drug conjugate (ADC), targeting mesothelin. Bayer highlighted its excitement about this asset at its 'Meet the Management' Day on September 20, 2016. Bayer highlighted the long duration of response it has seen in an admittedly small number of patients with mesothelioma. Anetumab ravtansine is in a Phase 2 registrational trial in mesothelioma, where we expect readout in November 2017. Bayer has also started an exploratory trial to look at anetumab in a variety of tumours where mesothelin is expressed (e.g. ovarian, NSCLC, pancreatic, thymic, cholangiocarcinoma). This trial is expected to read out in 2018.

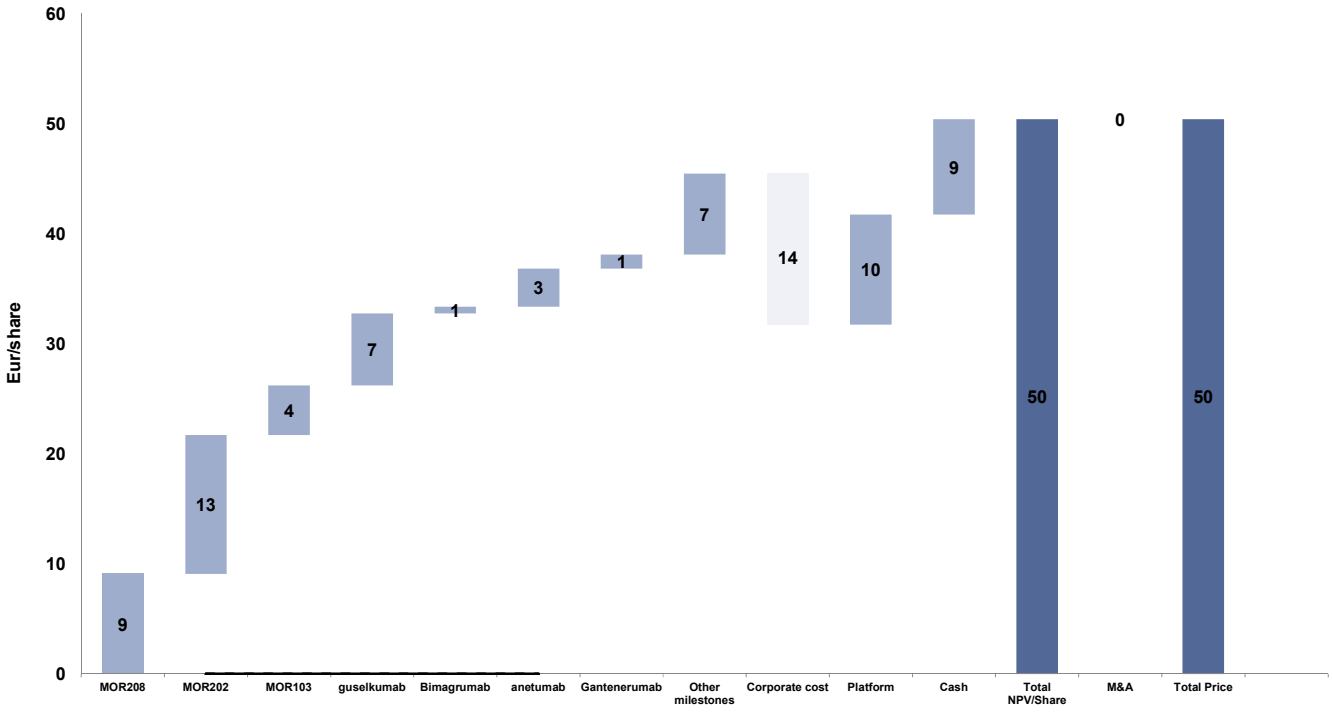
Bayer has guided that anetumab could generate peak sales of >= €2bn across cancer types, with potential launch in mesothelioma in 2019. However, this figure was presented before any adjustment for probability of success. It includes the sales potential both in mesothelioma, which we see as a nearer-term sales opportunity, and in other tumours, where the role of anetumab's target, mesothelin, is less validated. We forecast unprobabilized peak sales of €2.4 bn, of which c.€300 mn is derived from mesothelioma and the remainder is derived from other cancers. We apply probabilities of success of 70% for mesothelioma and 25% for other cancers. Applying MorphoSys' c.5% royalty rate to the probabilized sales estimates adds value of €3/share.

Revised valuation

Our new 12-month price target is €50 based on our DCF-based sum of the parts valuation. The DCF valuation assumes a 10% cost of capital. The changes to our previous DCF-based valuation are driven by (1) inclusion of anetumab ravtansine, (2) increasing probability of success and sales forecasts for guselkumab following the Phase 3 data, and (3) increasing MorphoSys' platform value to €10/share (following the positive catalysts of guselkumab and Bayer's comments on anetumab). The sum of the parts is shown below.

Our price target does not incorporate potential upside from M&A, as we believe that an acquirer would be more likely to wait to see more efficacy data from these assets (at ASCO in June 2017 and ASH in December 2017), and in the near term a licensing event remains more likely than an acquisition.

Exhibit 40: Revised sum of the parts valuation for MorphoSys
MorphoSys sum of the parts valuation



Source: Company data, Goldman Sachs Global Investment Research.

Upcoming catalysts

Exhibit 41: Key catalysts will be around MOR 202, MOR 208, guselkumab filing, anetumab ravtansine progress and the MOR103 data in rheumatoid arthritis
Summary of upcoming catalysts

Timing	Compound	Indication	Study	Phase	Partner	Event	Type of Event
Q416	Guselkumab	Psoriasis	VOYAGE 2	3	JNJ	Phase 3 results	Clinical data
Q416	Guselkumab	Psoriasis	Potential filing	3	JNJ	Filing	Regulatory
Q416	Anetumab Ravtansine	Cancer		1	Bayer	Phase 1 results	Clinical data
Dec 3-6 (ASH)	MOR202	Multiple myeloma		1/2a		Incremental data	Clinical data
Dec 3-6 (ASH)	MOR208	NHL		2	GSK	Longer response data	Clinical data
Dec 3-6 (ASH)	MOR208	CLL (ITT)		2	GSK	Phase 2 results	Clinical data
2017	Bimagrumab	Sarcopenia		2	Novartis	Phase 2 results	Clinical data
ASCO (Jun 2017)	MOR202	Multiple myeloma		1/2		Mature combination data	Clinical data
ASCO (Jun 2017)	MOR208	DLBCL	L-MIND	2	GSK	Phase 2 comb. data	Clinical data
2017	Anetumab Ravtansine	Cancer		1	Bayer	Phase 1 results	Clinical data
2017	MOR106	Inflammation		1	Galapagos	Phase 1 results	Clinical data
Jan-17	Guselkumab	Pustular/erythrodermic psoriasis		3	JNJ	Phase 3 results	Clinical data
March 9						FY17 Guidance	FY17 Guidance
Mar-17	Utomilumab	Solid tumors	KEYNOTE-0036	2	Pfizer	Phase 2 results	Clinical data
May-17	MOR103/GSK3196165	Rheumatoid Arthritis		2	GSK	Phase 2 results	Clinical data
2017	Gantenerumab	Alzheimer's disease		2/3	Roche	Potential update on development	Updates
Aug-17	MOR103/GSK3196165	Rheumatoid Arthritis		2	GSK	Phase 2 results	Clinical data
Aug-17	MOR103/GSK3196165	Osteoarthritis		2	GSK	Phase 2 results	Clinical data
Sep-17	Anetumab Ravtansine	Ovarian cancer		1	Bayer	Phase 1 results	Clinical data
Nov-17	Anetumab Ravtansine	Mesothelioma (MPM)		2	Bayer	Phase 2 results	Clinical data
Nov-17	Tesidolumab (LFG316) + CLG561	Geographic atrophy		2	Novartis	Phase 2 results	Clinical data
Dec-17	Bimagrumab (BYM338)	Hip fracture surgery		2	Novartis	Phase 2 results	Clinical data
Dec-17	Anetumab Ravtansine	Hepatic/renal impairment		1	Bayer	Phase 1 results	Clinical data
ASH (Dec 2017)	MOR208	DLBCL	L-MIND	2	GSK	Phase 2 comb. data	Clinical data

Source: Company data, Goldman Sachs Global Investment Research.

Disclosure Appendix

Reg AC

We, Tim Woodward, CFA, Keyur Parekh and Mick Readey, hereby certify that all of the views expressed in this report accurately reflect our personal views about the subject company or companies and its or their securities. We also certify that no part of our compensation was, is or will be, directly or indirectly, related to the specific recommendations or views expressed in this report.

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Growth is a composite of next year's estimate over current year's estimate, e.g. EPS, EBITDA, Revenue. **Return** is a year one prospective aggregate of various return on capital measures, e.g. CROCI, ROACE, and ROE. **Multiple** is a composite of one-year forward valuation ratios, e.g. P/E, dividend yield, EV/FCF, EV/EBITDA, EV/DACF, Price/Book. **Volatility** is measured as trailing twelve-month volatility adjusted for dividends.

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Coverage group(s) of stocks by primary analyst(s)

Tim Woodward, CFA: Europe-Biotech. Keyur Parekh: Europe-Pharmaceuticals.

Europe-Biotech: Actelion, Galapagos NV, Genmab, Innate Pharma SA, MorphoSys AG.

Europe-Pharmaceuticals: AstraZeneca, Bayer AG, GlaxoSmithKline, Lundbeck, Merck KGaA, Novartis, Novo Nordisk, Recordati, Roche, Sanofi, Shire, UCB.

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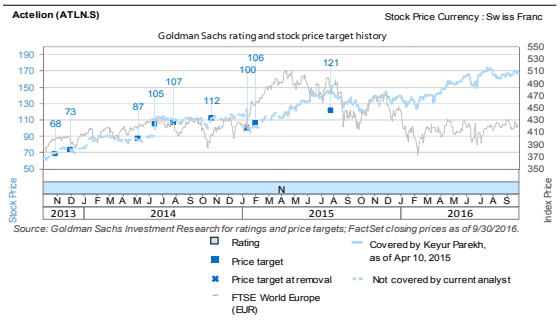
Distribution of ratings/investment banking relationships

Goldman Sachs Investment Research global Equity coverage universe

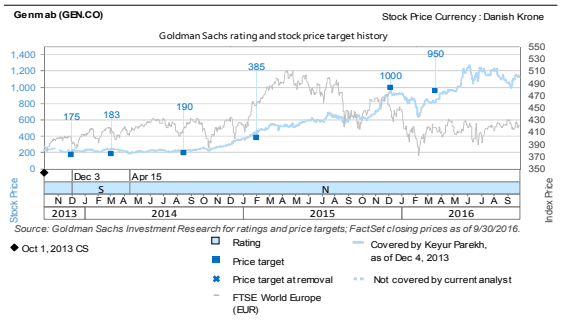
	Rating Distribution			Investment Banking Relationships		
	Buy	Hold	Sell	Buy	Hold	Sell
Global	31%	55%	14%	64%	59%	53%

As of October 1, 2016, Goldman Sachs Global Investment Research had investment ratings on 2,921 equity securities. Goldman Sachs assigns stocks as Buys and Sells on various regional Investment Lists; stocks not so assigned are deemed Neutral. Such assignments equate to Buy, Hold and Sell for the purposes of the above disclosure required by the FINRA Rules. See 'Ratings, Coverage groups and views and related definitions' below. The Investment Banking Relationships chart reflects the percentage of subject companies within each rating category for whom Goldman Sachs has provided investment banking services within the previous twelve months.

Price target and rating history chart(s)



The price targets show n should be considered in the context of all prior published Goldman Sachs research, which may or may not have included price targets, as well as developments relating to the company, its industry and financial markets.



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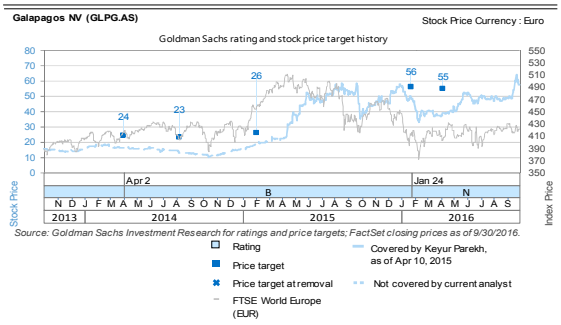

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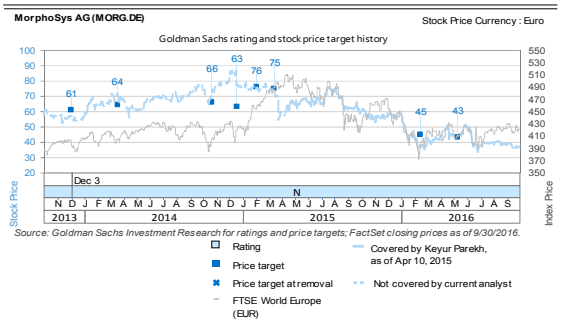

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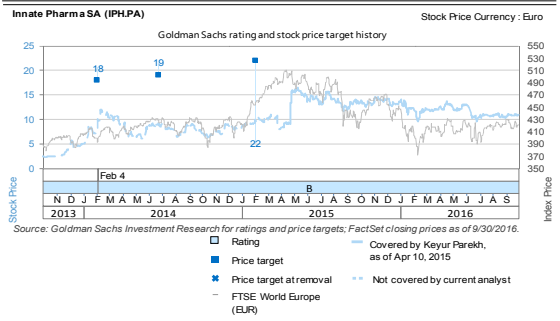

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