



The Ideas Engine series showcases Credit Suisse's unique insights and investment ideas.

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Global Pharma and Biotech

SECTOR REVIEW

KEY CONCLUSIONS

Exploring future US pricing pressure

Future pathways for US drug cost control a critical debate for bio-pharma. In this Ideas Engine Series report, we use multiple sources of proprietary and public data to analyse drug price rises and rebates in 2016 for 28 companies, and identify those most at risk from future US drug price reform.

US drug price rises contributed 100% of industry EPS growth in 2016. Arguably, this is the most important issue for a Pharma investor today. Despite public scrutiny, we estimate US net price rises contributed c\$8.7bn in 2016 to net income, 100% of sector EPS growth. US net price growth was >100% of Biogen, Lilly, and AbbVie's total net income growth. BioMarin, Gilead, Novo and Regeneron were the least reliant on US net price rises.

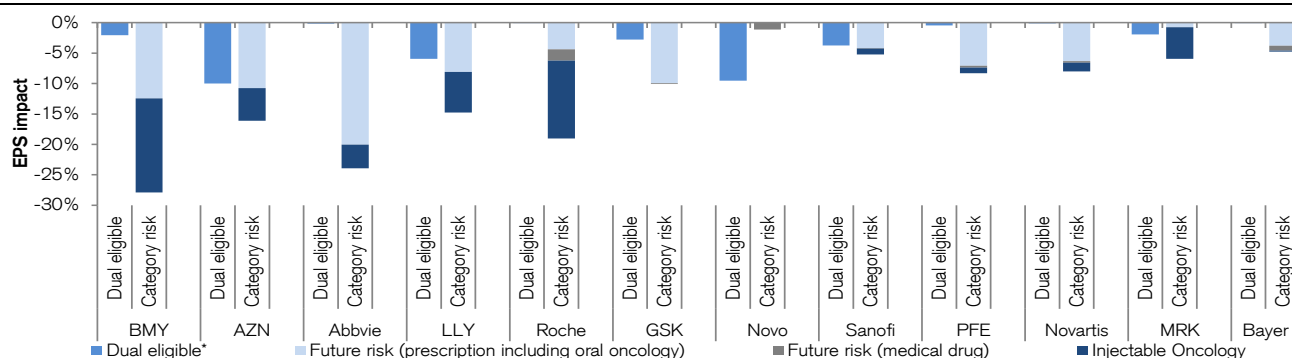
The key question: where will future pricing risk fall? We review the EPS impact of two possible new targets for incremental US price pressure: 1) Therapeutic Categories at high risk based on the greatest cost burden to payors and high Credit Suisse forecast sales growth. These include HIV, multiple sclerosis, and RA biologics; and 2) Changes in Medicare Part B cost control. Outpatient infused drugs represent a largely unmanaged cost today and are an obvious target for potential future reform. Companies with EPS most exposed to these combined drivers are Bristol-Myers and AbbVie (c25% negative impact) and in Europe, Roche and AstraZeneca (c-15%).

Changes in Dual Eligible funding: A switch of dual-eligibles from Medicare to Medicaid would result in a high one-off negative rebate charge. Based on 2016 EPS, in Europe we see AstraZeneca and Novo Nordisk (c-10%) as most at risk and in the US Eli Lilly.

Other observations: Overall Bristol-Myers scores the lowest of the Majors in our scorecard. Lilly has had the greatest negative change in portfolio outlook since 2016 (loss of Alzheimer's uniqueness). Shire's acquisition of Baxalta has brought greater risk of future pricing pressures to its portfolio.

Our full 120-page report contains further company detail, industry data, supporting analysis and a company pricing flexor.

Figure 1: EPS impact from change in dual eligible funding and identified future category risk

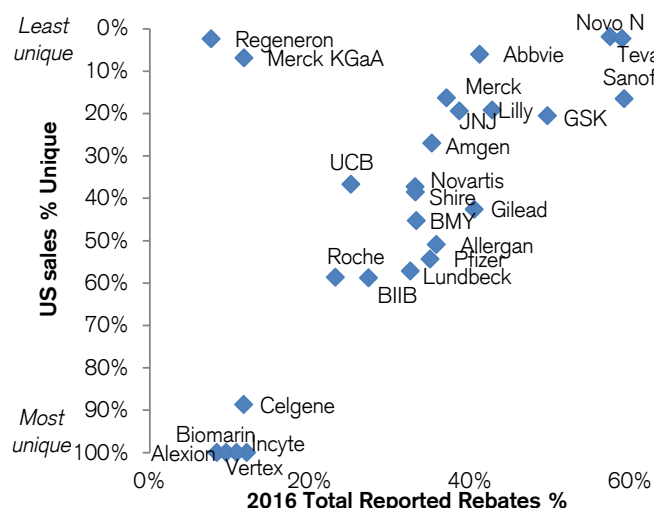


Source: Company data, Credit Suisse estimates. *Dual eligible data based on 2016 EPS, other based on 2020 CSe EPS

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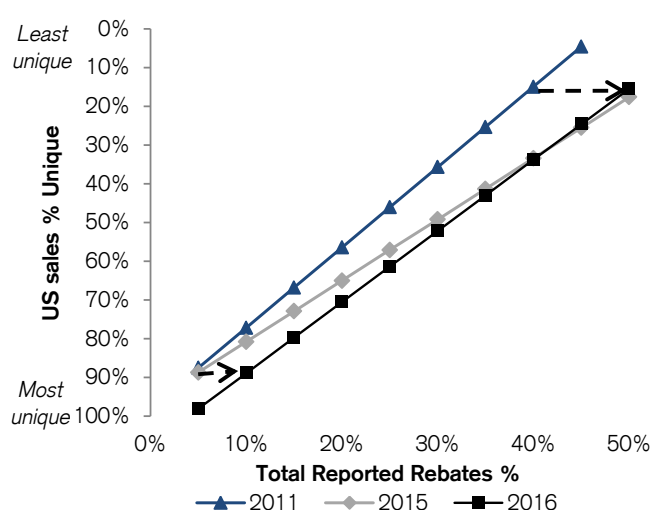
Key charts

Figure 2: Relationship between product uniqueness and rebates in 2016



Source: Company data, Credit Suisse estimates

Figure 3: Trends in relationship between product uniqueness and rebates 2011-2016



Source: Company data, Credit Suisse estimates

Figure 4: Credit Suisse US rebate Analysis 2017

Parameter	US Uniqueness 2016	Change in Uniqueness pressures	Impact on EPS of future focus on prescriptions	Impact on EPS of focus on Medical Benefit	Impact on EPS of change in dual eligibles	Overall
Weighting	10%	30%	20%	10%	30%	
Bayer	0	0	0	+	+	+
Novartis	0	0	0	+	+	+
Sanofi	0	+	0	+	0	+
AbbVie	-	+	-	0	+	0
Pfizer	+	-	0	+	+	0
MRK	0	0	+	0	0	0
GSK	0	+	-	+	0	0
Roche	+	-	0	-	+	0
Novo Nordisk	-	0	+	+	-	0
AZN	0	+	-	0	-	0
BMY	0	-	-	-	0	-
LLY	0	-	0	0	-	-
Teva	-	+	0	+	+	+
Allergan	0	0	+	+	+	+
Merck KGaA	-	0	0	+	+	0
UCB	0	0	-	+	+	0
Shire	0	-	+	-	+	0
Lundbeck	+	-	+	+	-	0
Alexion	+	0	+	+	+	+
Biomarin	+	0	+	+	+	+
Vertex	+	0	+	+	+	+
BIIB	+	0	-	+	+	0
Incyte	+	0	-	+	+	0
Celgene	+	0	-	+	+	0
Gilead	0	+	-	+	0	0
Regeneron	-	0	+	-	+	0
Amgen	0	0	0	-	+	0

Source: Company data, Credit Suisse estimates

Company conclusions

- **Valuation premium does not capture US Majors' greater exposure vs Europe.** A key conclusion from our analysis is that US Major Pharma and US Biotech have much higher EPS exposure to potential US pricing risk. Given the larger EM footprints and more diversified portfolios of EU Pharma (generics, diagnostics, OTC, etc), this is not a surprise. However, it is in complete contrast to valuation multiples using both P/E and PharmaValues EV/NPV. On average, US Major Pharma trades on a 10% premium to EU Majors on EV/NPV. Arguably, US investors are closer to the massive complexity of the challenges around US drug pricing. One conclusion is that EU investors may simply be overreacting to the magnitude of the risks to US earnings.
- **Key catalyst – August 2017 PBM formulary season.** We expect the results of PBM rebate negotiations for the 2018 commercial health insurance season to be announced in early August 2017. This will be a critical time to understand the impact of future category risk on each company. We expect increased scrutiny on oral oncology, inflammation/RA, haemophilia and psoriasis.
- **Timing much less certain around possible political changes to the US pricing environment** around managing Medicare Part B/medical expenses and the possible shift of Medicare/Medicaid dual eligibles back to the higher discounts of Medicaid.
- **Bristol Myers (Neutral, TP \$52).** Surprisingly, BMY emerges as having the greatest risk of future pricing pressures in Major Pharma. This results from 1) our analysis of PD-1/PD-L1 as 'discountable' given the multiple players in the space; 2) the potential negative impact of greater payor focus on Eliquis and Orencia, both in areas of high cost for PBMs; and 3) BMY's high exposure to medical benefit/Medicare Part B, which may come under increasing scrutiny as a large area of unmanaged cost today.
- **Eli Lilly (Outperform, TP \$88)** sees the greatest negative change in future pricing pressures since our analysis in 2016. Its mid-term portfolio has been negatively affected by the failure of solanezumab (Alzheimer's, unique) and our view that migraine CGRP inhibitors are discountable given multiple competitors in this category.
- **Sanofi (Outperform, TP €85) and Novo Nordisk (Neutral, TP DKK270)** both score as having modest incremental future risk. This is because our analysis is targeting *new* areas of pricing pressure. As such, diabetes is viewed as an area where investors are already familiar with the risk, which should be included in earnings forecasts. We are not saying the pressure is over. Experience from respiratory shows that PBMs extract value from a large category over multiple years. Credit Suisse forecasts continue to assume significant price pressure in US insulin and GLP-1 into 2018E.
- **AstraZeneca (Underperform, TP £40)** scores as having high exposure in both future category risk and dual eligibles. This is driven partially by its portfolio (respiratory, diabetes, discountable oral oncology, I-O), but it is exacerbated by AZN's very low level of profitability today, which amplifies the impact on earnings sensitivities.
- **Lundbeck (Outperform, TP DKK325)** has the highest exposure to risk from dual eligibles being returned to Medicaid. CNS diseases (depression/schizophrenia) are the largest area of spending for the elderly poor. Given Lundbeck's robust use of US price increases, we estimate that any move to the Medicaid pricing structure would cut EPS by c12%; however, this is exaggerated by its current low profit base.
- **Shire (Outperform, TP 5400p).** The acquisition of Baxalta has had an adverse impact on Shire's future ability to resist pricing pressure. The company's 'uniqueness' is compromised by a greater proportion of discountable sales in haemophilia and IVIG/immunology. We see haemophilia as a high-cost area which PBMs may aim to manage – albeit less aggressively than previously seen in primary care categories.

Executive summary

Introduction

In this Ideas Engine Series report, we bring together multiple sources of proprietary and public data to analyse the biopharmaceutical companies most at risk from future US drug price reform.

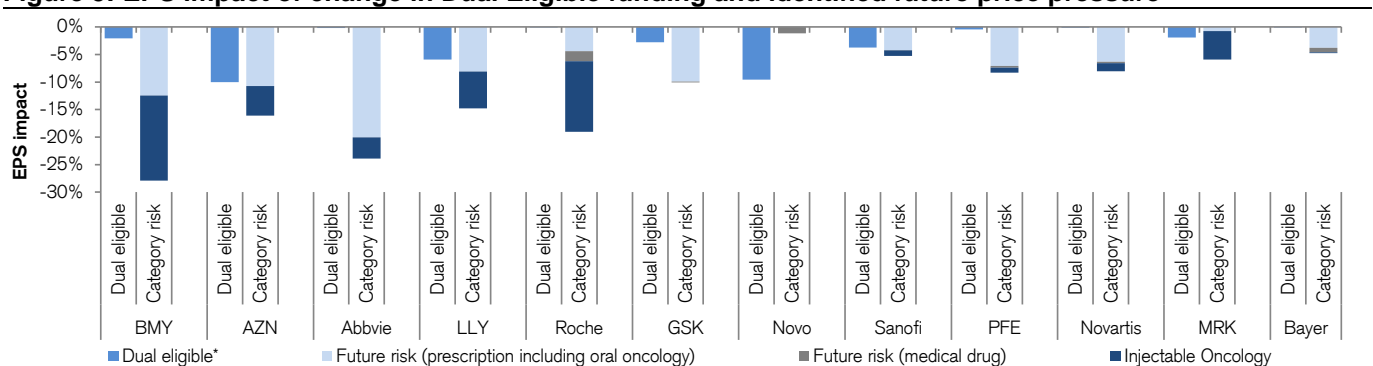
In 2015, total US healthcare spend was \$3.2trn, accounting for 17.8% of GDP (source: CMS.gov). Of this, IMS Health estimates net US drug spending reached \$318bn in 2016, up 9% YoY. Specialty drugs, including oncology and inflammation, were the key driver of spending growth, contributing over \$150bn. In addition, price increases have been a material driver of the spending increase, with net prices rising by 6.5% on average over the past five years and adding c\$70bn of cost, we estimate. With healthcare spending forecast by CMS to grow 1.2pp faster than GDP to 2025 and pharmaceuticals looking set to grow faster still, it is clear that something has to change. However, the highly complex (and often perverse) incentives that have evolved in the US healthcare system make this an exceptionally challenging task.

We summarise our key conclusions on three major topics:

- **Targets of future drug price pressure** based on areas of high-growth drug spend for health insurers and therapeutic categories where competition is increasing.
- **Earnings sensitivity to increased cost management for medical benefit** (outpatient infused drugs) in commercial plans and Medicare B. As the key driver of specialty drug cost growth, an area of relatively unmanaged spending, and an area of increasing competition (multiple PD1/PDL1s, IL17/IL23p19s, ophthalmic VEGFs), we see this as a key area of potential incremental pressure.
- **Risks of a shift in reimbursement for the elderly poor** (Medicare/Medicaid dual eligibles). In 2006, six million dual eligibles were moved from Medicaid (high discounts) to Medicare Part D (lower discounts). In 2008, the US Congress estimated that Medicare had paid prices 46% higher than Medicaid for the same drugs. With significant drug price inflation since then, this gap is likely to be much larger today. Returning dual eligibles back to Medicaid-like discounts could save c.\$15-20bn annually.

How much is at stake? For the 28 Major Pharma and Biotech stocks included in our analysis, we estimate that US drug price increases contributed 100% of 2016 earnings growth. Arguably, this is the most important issue for any pharmaceutical investor today.

Figure 5: EPS impact of change in Dual Eligible funding and identified future price pressure

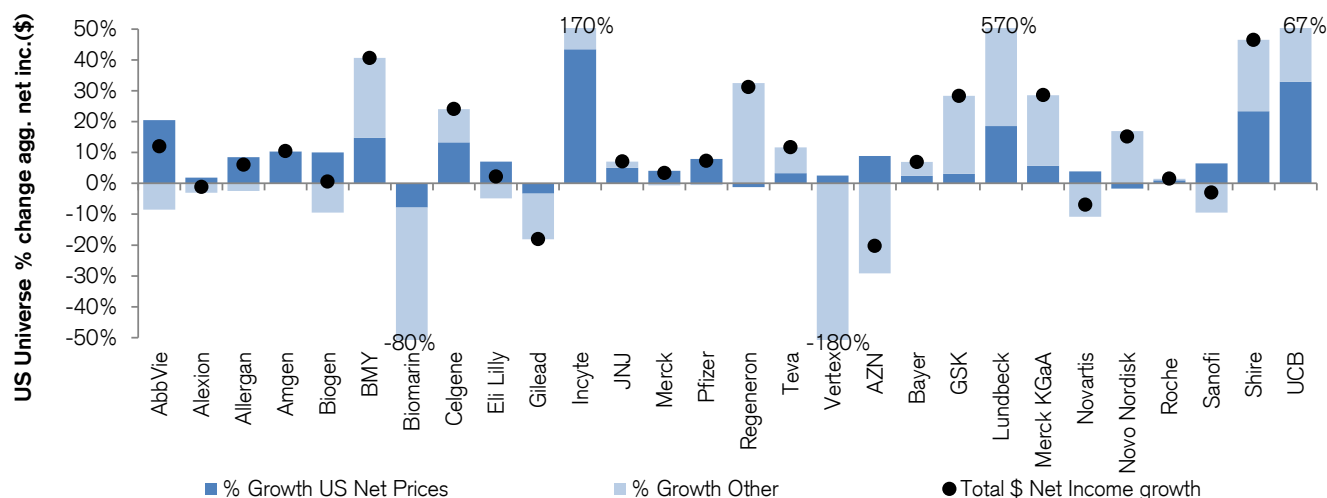


Source: Company data, Credit Suisse estimates, *Dual eligible data based on 2016 EPS, other based on 2020 CSe EPS

US Price rises contributed 100% of 2016 EPS growth

- **US List prices rose 9.8% in 2016**, broadly in line with an increase of 10.8% in 2015. Despite the negative rhetoric around list price rises in the US and commitments from the industry for change, prices still increased in 1Q2017 by >8%. Lundbeck and AbbVie had the highest list price rises in 2016; price increases at Sanofi and Novo were significantly lower in 2016 than in 2015.
- Rebates continue to rise and eat away at list price rises. **In 2016, rebates rose to 37.3% from 35.7% in 2015**. AZN had the highest rebates as a percentage of gross sales in 2016 of 61.8%, although absolute dollar rebates fell as US overall sales declined post Crestor patent expiry. The greatest rebate increases were seen by Merck and Lilly.
- After rebates, US net pricing remained a very healthy 6%. **We estimate US net prices positively affected net income by 6% in 2016, representing 100% of earnings growth**. US price rises were crucial in mitigating the impact of patent expiry losses in 2012 and 2013, but have since continued to be important drivers of growth. Our analysis suggests that US net price rises contributed at least 100% of the net income growth seen for Biogen, Eli Lilly, AbbVie, Allergan, Merck, Pfizer and Amgen.
- The aggregate of our forecasts for the 28 companies in our coverage universe for 2017 shows zero dollar net income growth, impacted partly by FX translation but with underlying local currency declines for AZN, Sanofi, Gilead and BMJ and no growth for Amgen, GSK, and Merck. US pharma price rises will likely remain a driver of overall growth in 2017 and beyond.

Figure 6: Estimate of impact on 2016 net income of US price rises per company

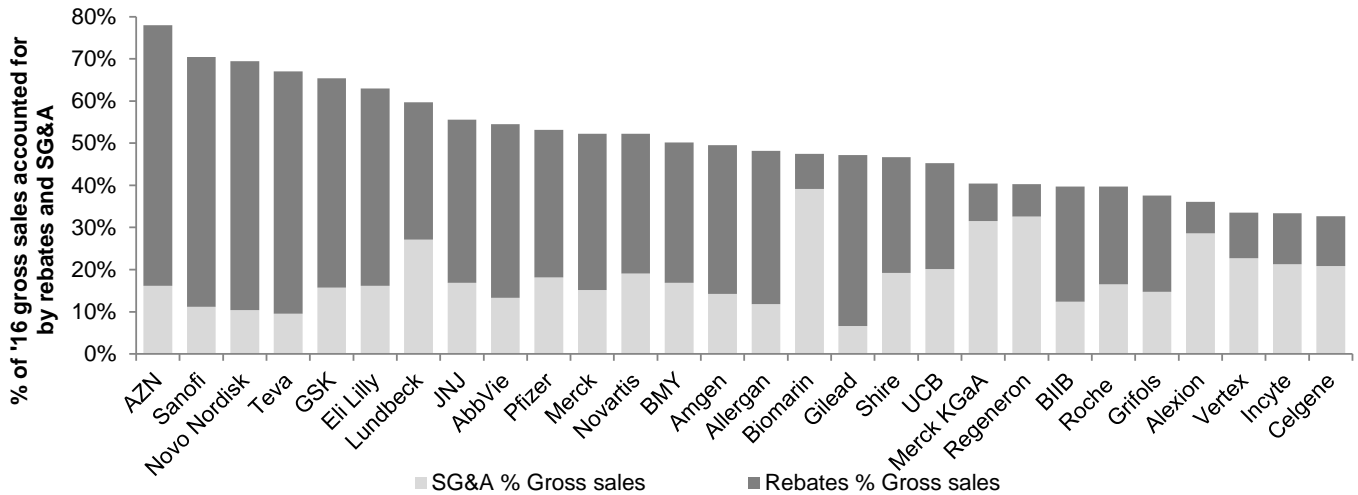


Source: Company data, Credit Suisse estimates

Overall promotional spend growing, as rising rebates offset SG&A declines

The overall promotional budget that a company has to influence doctors' prescribing and payors' formulary decisions encompasses both direct rebates and traditional SG&A. Importantly, whilst reported SG&A has fallen as a percentage of reported sales, the combination of SG&A and rebates continues to increase as a percentage of gross sales.

Companies with the highest overall promotional spend include AZN and Sanofi, despite low traditional SG&A. Companies with the lowest promotional spend are Incyte and Celgene.

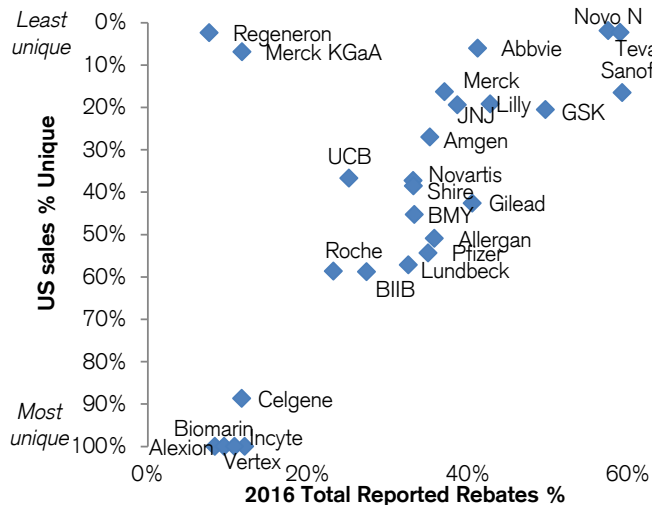
Figure 7: Full promotion spend: SG&A & rebates as a % of US gross drug sales per company in 2016

Source: Company data, Credit Suisse estimates

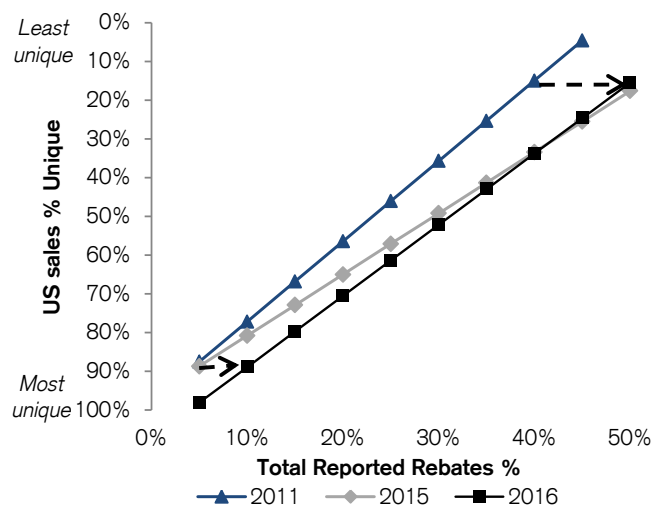
Portfolio uniqueness is the key protection against rebates

We find a strong correlation between the level of rebates reported and the uniqueness of a company's portfolio. Companies with more unique products typically report lower levels of rebates and we believe should be able to maintain higher long-term pricing, access to patients and, ultimately, profitability.

In 2016, we saw an increase in the level of rebates for more unique portfolios for the first time (Figure 9). For a US portfolio with 90% of sales from unique products, rebates increased from 5% to 10% between 2015 and 2016. The rebate levels in 2016 for the less unique portfolios remained broadly consistent with 2015.

Figure 8: Relationship between product uniqueness and rebates in 2016

Source: Company data, Credit Suisse estimates

Figure 9: Trends in relationship between product uniqueness and rebates 2011-2016

Source: Company data, Credit Suisse estimates

PharmaValues implied increase in rebates

Using our proprietary PharmaValues database, we explore how changes in portfolio uniqueness could suggest movements in rebate pressure through to 2020. Our theoretical rebates based on different levels of uniqueness correlate well with reported rebates (Figure 10). We forecast future rebates based on expected changes in portfolio uniqueness.

Overall, we expect rebates to grow to 40% of gross sales in 2020 from 37% in 2016. Our analysis suggests Major Pharma rebates increasing 4ppt, as uniqueness declines 5ppts while Specialty/Biotech rebates remain stable. This is despite an overall increase in the proportion that is unique from 41% in 2016 to 53% in 2020. Companies with the highest increase in expected rebate pressure are Pfizer and Roche. Companies with the biggest expected fall in rebates are AstraZeneca, GSK, Teva and Gilead (Figure 12 and Figure 13).

Figure 10: Correlation derived & reported rebates

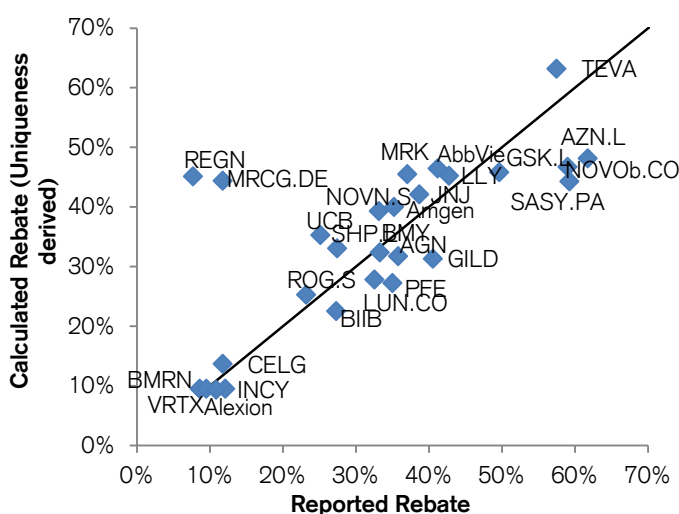
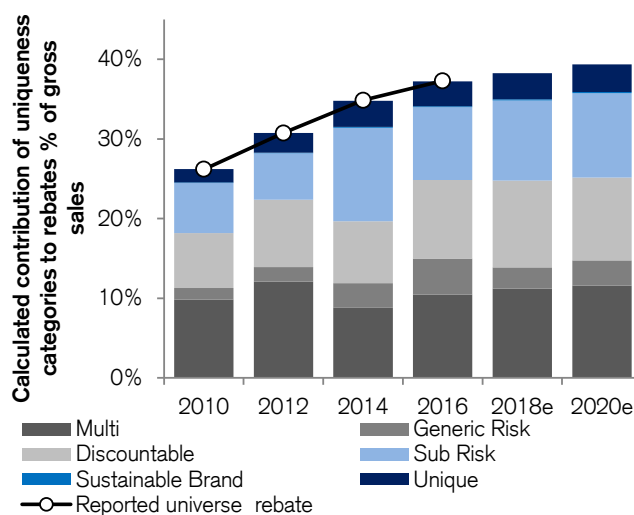


Figure 11: Category contribution to universe rebate



Source: Company data, Credit Suisse estimates

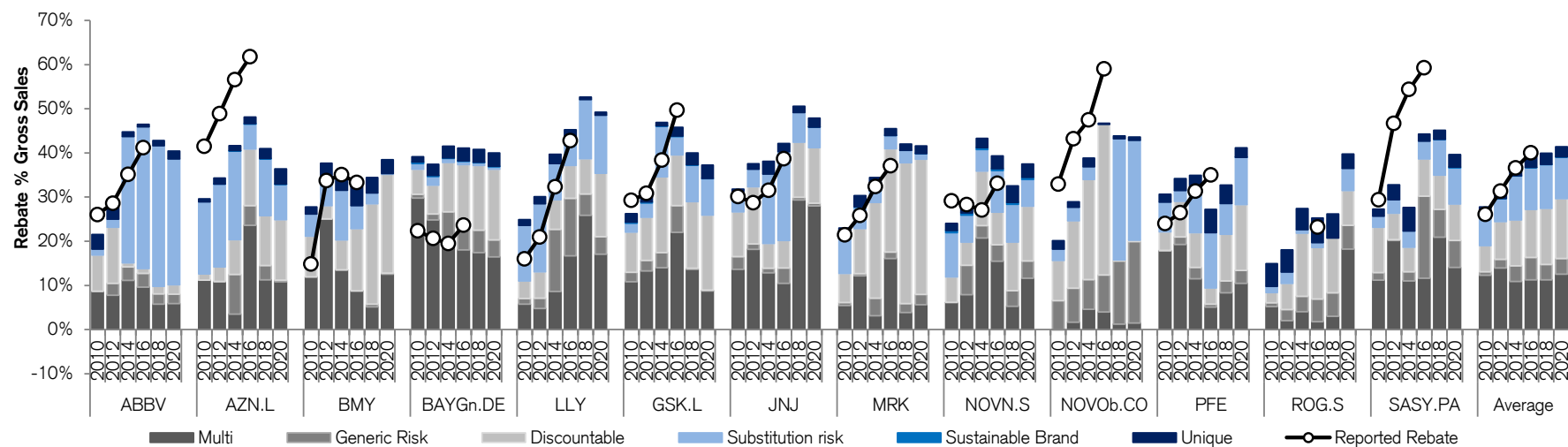
Source: Company data, Credit Suisse estimates

Which categories will see greater pressure from payors next?

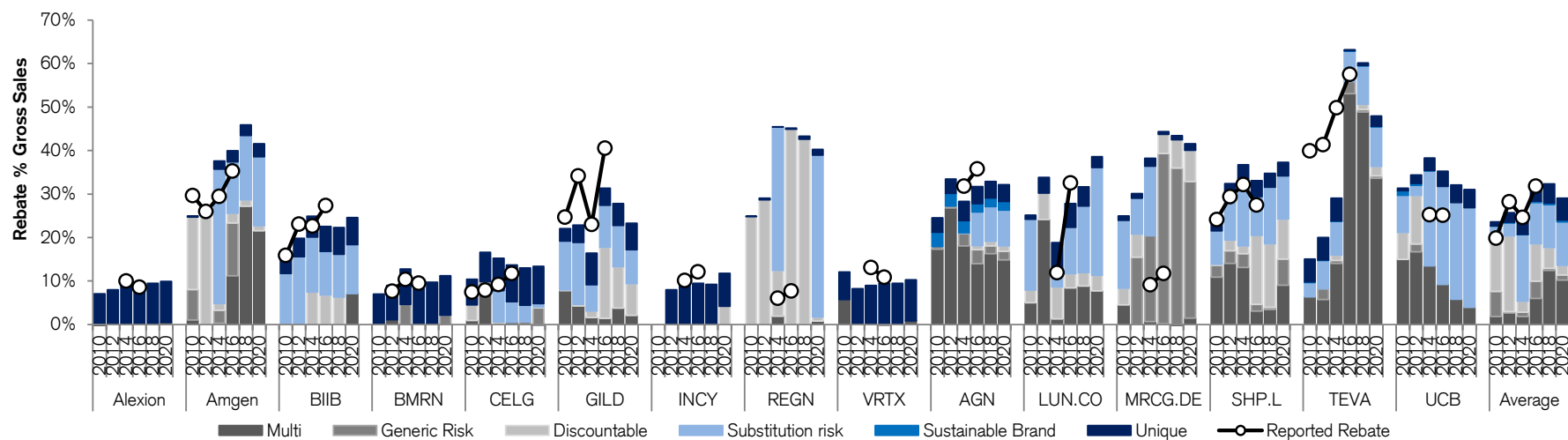
In a new analysis for 2017, we look to identify categories of high cost burden and future growth to suggest where pressure may fall next. To identify categories at risk, we reviewed recent PBM Drug Trend reports and our PharmaValues database to isolate categories where strong growth is expected and there are broadly therapeutically equivalent offerings from multiple players. Using PharmaValues we are able to conduct a drug-by-drug analysis to identify which companies would be most affected and evaluate the related EPS impact from greater pricing pressure going forward. We separate this analysis into prescription and medical drug benefit owing to the different dynamics.

- **Prescription drugs future focus:** Here PBMs could use their purchasing power to secure substantial discounts for preferred drug access. We see potential pressures in HIV, anti-coagulants, inflammation, multiple sclerosis, migraine and psoriasis.
- **Medical drug benefit future risk:** Both specialty injectable and oncology products are areas of strong cost growth for plans. These outpatient infused drugs are a largely unmanaged cost today. Strong cost growth for payors could bring about reforms to Medicare Part B and see the medical benefit more aggressively managed in the future. We explore potential reforms and assess the impact on company earnings from greater pressure in haemophilia, ophthalmology, plasma fractions and oncology.

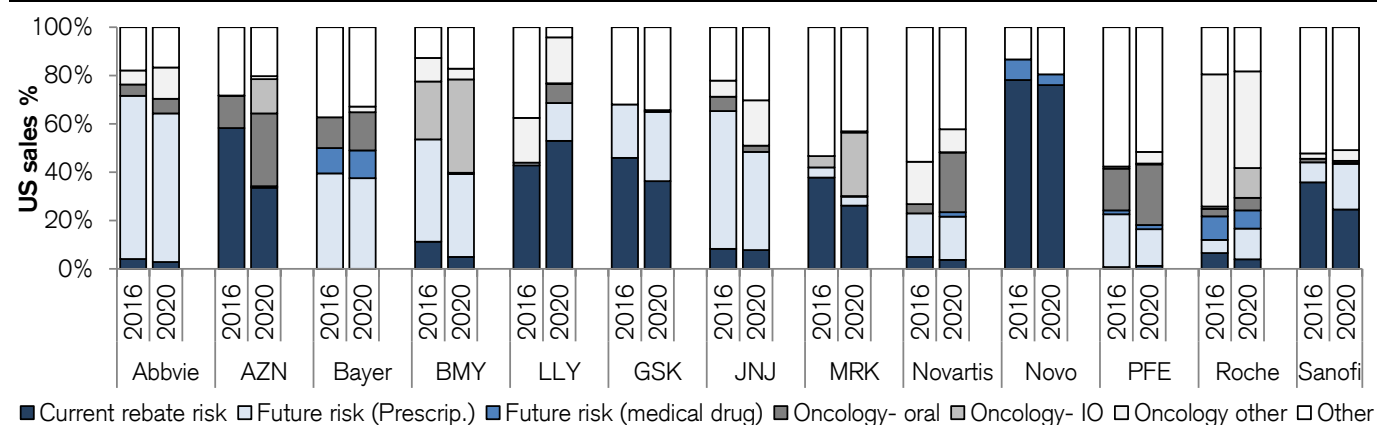
Companies with EPS most exposed to these combined drivers are BMY & AbbVie and in Europe, Roche and AstraZeneca.

Figure 12: Global Majors: Historical and derived predicted US rebates based on CS uniqueness

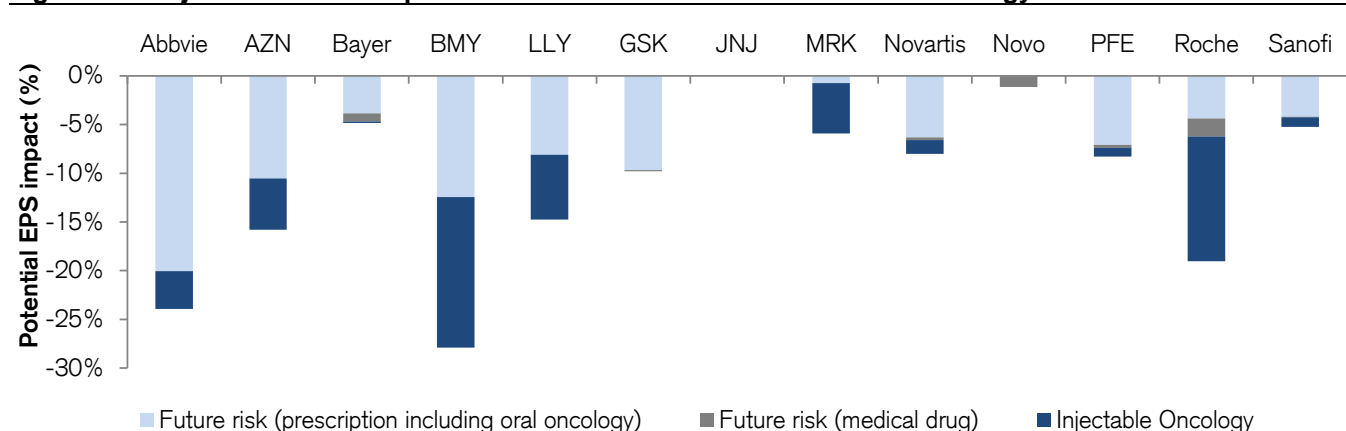
Source: Company data, Credit Suisse estimates

Figure 13: Biotech/Specialty Pharma: Historical and derived predicted US rebates based on CS uniqueness

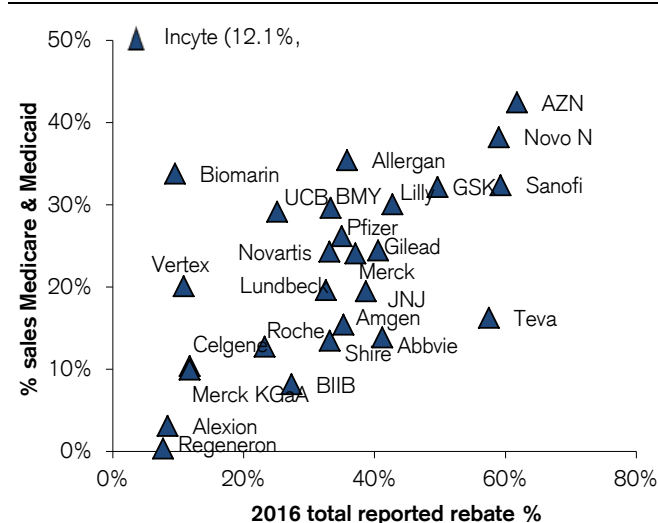
Source: Company data, Credit Suisse estimates

Figure 14: Majors: US 2016/20E Sales Exposure to Existing focus, Future focus and Oncology

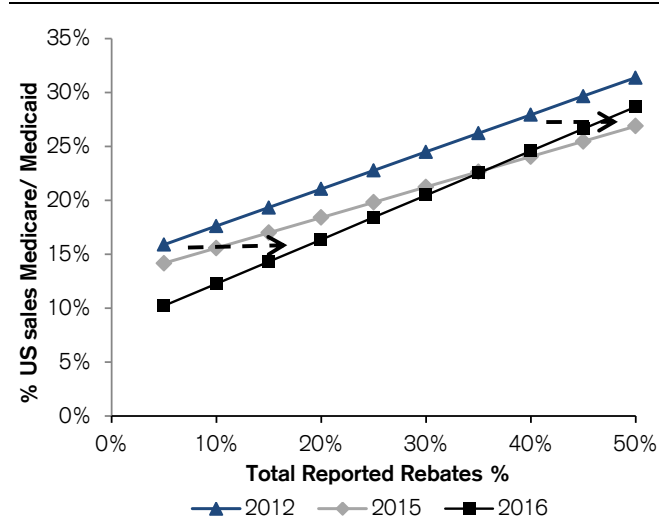
Source: Company data, Credit Suisse estimates

Figure 15: Majors: 2020 EPS impact of a 20% reduction in Future focus/Oncology sales

Source: Company data, Credit Suisse estimates, JNJ is excluded from this analysis

Figure 16: Exposure to Medicare Part D and Medicaid vs rebates in 2016

Source: Company data, Credit Suisse estimates

Figure 17: Exposure to Medicare and Medicaid vs rebates in 2016

Source: Company data, Credit Suisse estimates

Exposure to government-funded programmes increases rebate pressures

We find a positive correlation between companies' reported rebate levels and the level of company exposure to the US government programmes Medicaid and Medicare Part D in 2016 (Figure 16). Global Major Pharma has the most exposure to Medicare Part D currently and the Biotech names have the lowest exposure to Medicare Part D.

Among Major Pharma names, recent launches and pipeline assets at Novo Nordisk are the most exposed to Medicare Part D as they are primarily focused on diabetes. Roche, BMY and Merck are the least exposed, with growth mainly driven by new oncology products. In Specialty pharma, Shire has one of the lowest exposures to Part D as its main growth drivers rare orphan diseases and dry eye disease (commercial exposure); Lundbeck has a high exposure to Part D given its CNS portfolio.

Dual Eligibles: potential target of future pharma savings

Recent debates on strategies to reduce US healthcare spending have discussed the option of transitioning 'dual eligibles' (elderly and poor patients) back from Medicare Part D to Medicaid. Given this focus, in this year's report we provide a new assessment of the sensitivity of earnings for each company to this possible change in status based on categories historically important for dual eligibles (CNS, diabetes and respiratory).

Novo and **AZN** have the highest exposure to dual eligibles given their focus on diabetes (Novo) and diabetes/respiratory (AZN). If AZN's pipeline delivers, their exposure would decrease as the focus of the group changes. AZN's EPS exposure appears large due to the low level of current profitability. Lundbeck scores particularly poorly on this measure due to its high exposure to Medicare Part D (c30%) and the CNS franchise.

Figure 18: Major Pharma Exposure to high, medium and low risk therapeutic areas within US sales

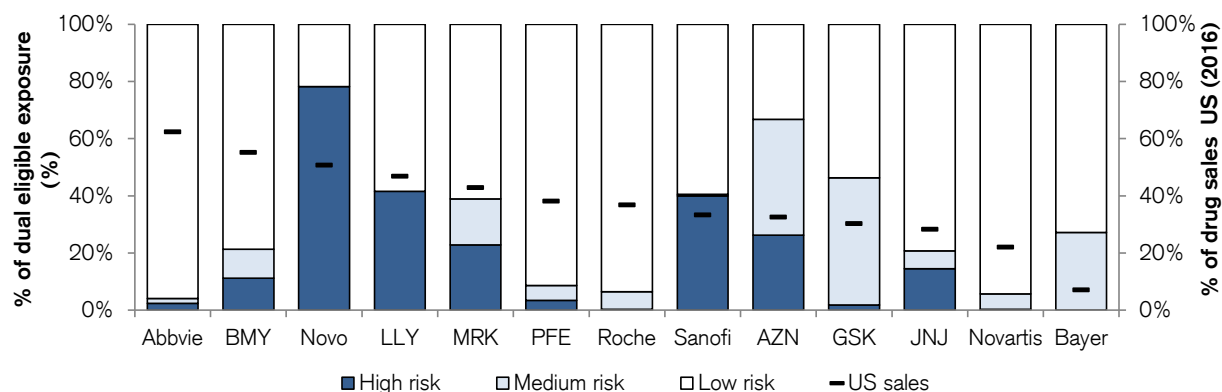
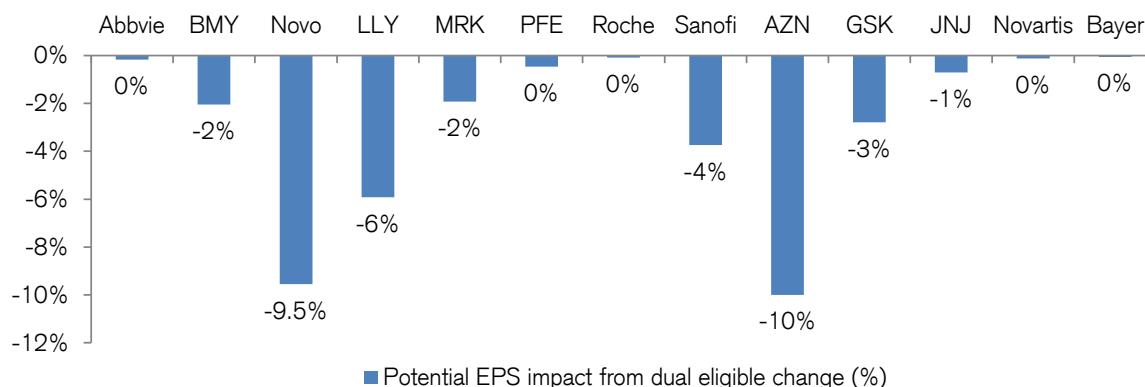


Figure 19: Major Pharma 2016 EPS sensitivity to change in dual eligible funding



Source: Company data, Credit Suisse estimates

Company Scorecard

We analyse the historical rebates, overall promotional spend and impact of US net drug price rises on group EPS growth for 28 companies in our universe. We look at the uniqueness of each company's portfolio over time, and highlight the drugs we expect to be the drivers of growth from 2017 to 2021 and identify the degree of rebate risk by looking at each drug's likely exposure to government/commercial funding.

We score the companies in our coverage universe based on current and future uniqueness, exposure to categories where we see future pressure and exposure to dual eligibles risk.

Figure 20: Credit Suisse US rebate Analysis 2017

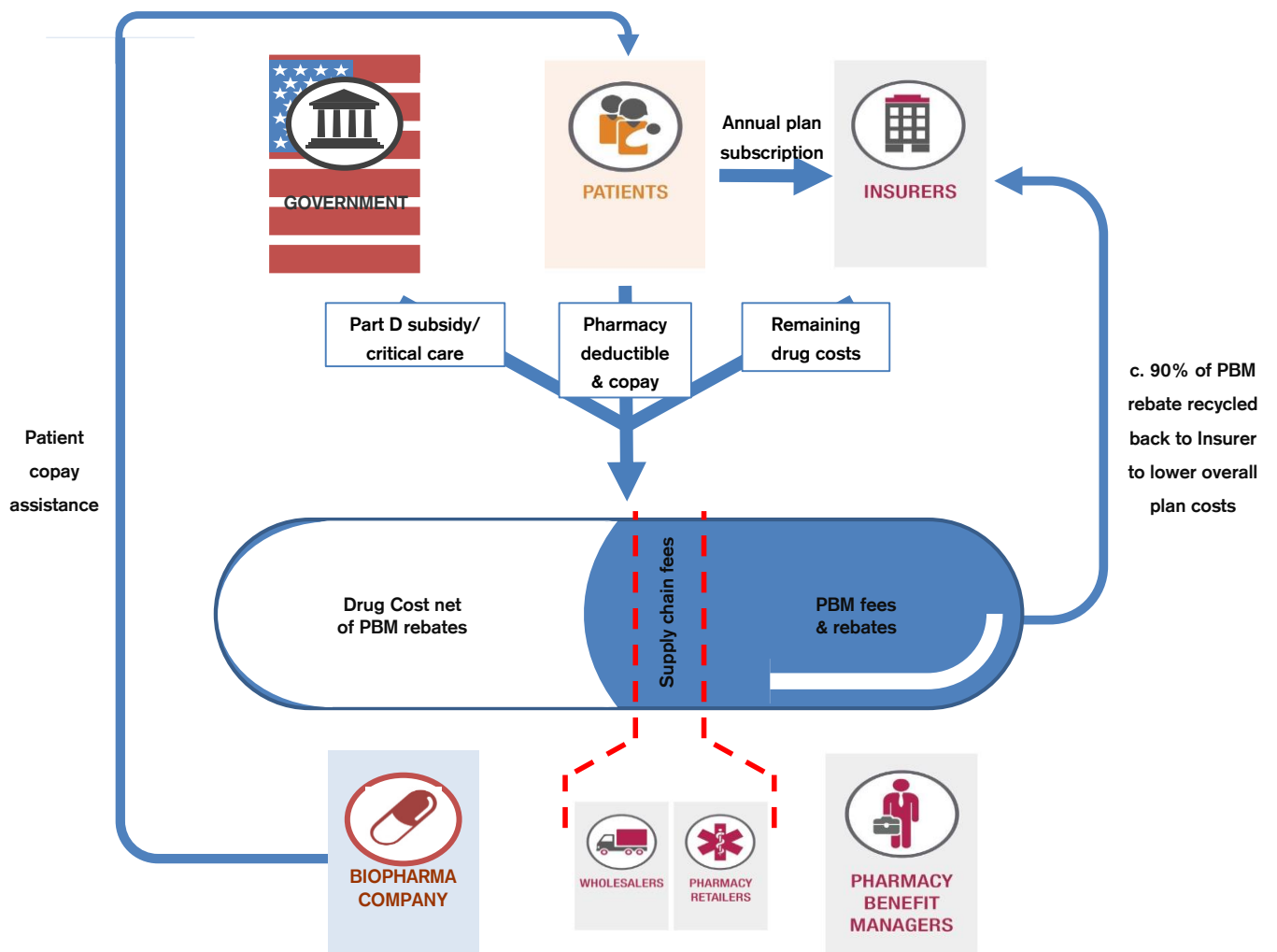
Parameter	US Uniqueness 2016	Change in Uniqueness pressures	Impact on EPS of future focus on prescriptions	Impact on EPS of focus on Medical Benefit	Impact on EPS of change in dual eligibles	Overall
<i>Weighting</i>	<i>10%</i>	<i>30%</i>	<i>20%</i>	<i>10%</i>	<i>30%</i>	
Bayer	0	0	0	+	+	+
Novartis	0	0	0	+	+	+
Sanofi	0	+	0	+	0	+
AbbVie	-	+	-	0	+	0
Pfizer	+	-	0	+	+	0
MRK	0	0	+	0	0	0
GSK	0	+	-	+	0	0
Roche	+	-	0	-	+	0
Novo Nordisk	-	0	+	+	-	0
AZN	0	+	-	0	-	0
BMJ	0	-	-	-	0	-
LLY	0	-	0	0	-	-
Majors						
Teva	-	+	0	+	+	+
Allergan	0	0	+	+	+	+
Merck KGaA	-	0	0	+	+	0
UCB	0	0	-	+	+	0
Shire	0	-	+	-	+	0
Lundbeck	+	-	+	+	-	0
Specialty						
Alexion	+	0	+	+	+	+
Biomarin	+	0	+	+	+	+
Vertex	+	0	+	+	+	+
BIIB	+	0	-	+	+	0
Incyte	+	0	-	+	+	0
Celgene	+	0	-	+	+	0
Gilead	0	+	-	+	0	0
Regeneron	-	0	+	-	+	0
Amgen	0	0	0	-	+	0
Biotech						

Source: Company data, Credit Suisse estimates

Understanding US Managed Care pathways

- **US Rebates: How much and to whom?** An estimated \$179bn of rebates were paid from companies in our coverage universe in 2016; of these, 30% went to the government, 50% to market access, and 20% to the supply chain. Importantly, we believe that the majority of these rebates are recycled back into the system via payments to subsidise premiums. It is important to remember that this recycling already happens when looking for additional savings in the system. The purchasing of medicines in the US Healthcare system is complicated by the number of different payors involved – employers, government and insurers – and the lack of price transparency.

Figure 21: Illustration of the importance of rebate recycling



Source: Credit Suisse research

- **Complex system can lead to perverse incentives.** Expensive drugs can be highly profitable for payors, rebates for older drugs can leave branded drugs much cheaper than generic alternatives, government subsidies may blunt traditional formulary restrictions and category domination is hard to break.
- **Rebates are just one part of access control.** Whilst an important contributor to cost controls, we have continued to see a rise in other access controls, with data showing increased restrictions in formulary tiering with particularly strong acceleration in patient co-pays in specialty pharmacy.

- **Insights into medical benefits/Medicare Part B.** Around 50% of all specialty drug spend is billed via a medical benefit as opposed to a drug benefit programme. In both commercial and Medicare Part B plans, where the government provides funding for the elderly, there are fewer controls on this spending compared to drug benefit programmes. Prior authorisation is a key control that is utilised, and there appeared to be a notable increase in plans using 'product preferences' in 2016, which we see as nascent formulary pressure. There are still very significant differences in costs by site of delivery.
- **340B as an additional layer of hospital rebates.** In 2016, Roche disclosed the magnitude of its rebates in its annual report for the first time, with a 28% increase for 2016 over 2015. This largely relates to the US 340B and Medicaid programmes. Unlike more usual PBM rebates, it is important to note that this additional discount does not get companies any additional patient access. We see increasing numbers of institutions eligible for 340B discounts, and acquisitions of community-based practices by these entities, but trends now seem to be slowing.
- **Biosimilars potential to shake up Part B:** 2017 is expected to be a key year for biosimilars, with the number of approved products potentially tripling. Biosimilars will be an important cost saver for the US healthcare system if the mechanisms for their adoption are well implemented. We look at the uncertainties around the uptake of biosimilars including: payor reimbursement; interchangeability; CMS biosimilar payment policy and the ongoing litigation around the patent dance and 180-day stay post approval.

Industry impact from possible reforms

- **Impact on Pharma of Healthcare Reform:** We set out 13 proposals for Healthcare reform. We see Risk Sharing and Indication-Based Pricing as potentially the most beneficial to the Pharma industry and also reasonably likely to become more prevalent. Conversely, changes to the incentives in Part B, a movement towards Reference Pricing and allowing Medicare to directly negotiate drug prices would be the most detrimental, in our view.

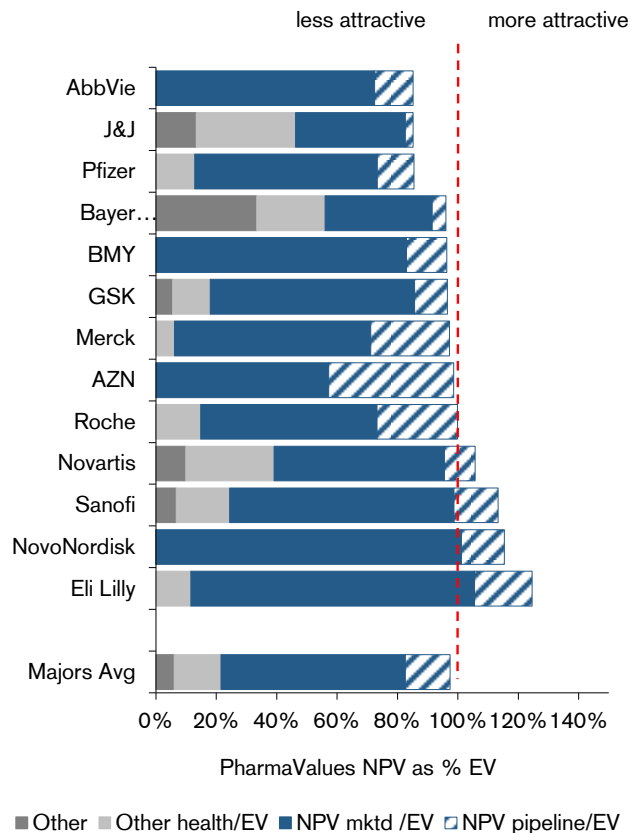
Valuation summary

Figure 22: Valuation Summary Table

		price	PE							16-21	16-21	Div Yield	EV/NPV	NPV/ share	Equity NPV/ share
			2015A	2016E	2017E	2018E	2019E	2020E	2021E	L.C Sales growth	L.C EPS growth				
AbbVie Inc.	\$	64.2	14.9	13.2	11.7	10.0	8.9	8.4	8.1	5.1%	10.2%	4.0%	1.19	68.0	52.7
Bristol-Myers Squibb Co.	\$	53.0	26.3	18.7	19.2	20.6	18.7	16.9	17.0	0.5%	1.9%	2.9%	1.10	49.4	51.1
Eli Lilly & Co.	\$	85.9	25.0	24.4	20.9	21.6	17.2	14.3	12.3	4.9%	14.6%	2.4%	0.79	109.5	107.7
JNJ (IBES data)	\$	124.2	20.0	18.5	17.6	16.8	15.9	15.1	13.8				1.17	96.9	108.6
Pfizer	\$	33.9	15.4	14.2	13.1	12.4	12.2	11.3	10.6	1.6%	5.9%	3.8%	1.18	32.1	28.5
Merck & Co., Inc.	\$	62.6	17.4	16.6	16.3	14.6	13.4	12.4	11.4	2.9%	7.7%	3.0%	1.04	61.8	61.2
US Majors average			19.9	17.6	16.5	16.0	14.4	13.1	12.2	3.0%	8.1%	3.2%	1.08		
AstraZeneca	p	4,745.0	23.3	29.2	45.5	31.3	24.1	16.2	12.9	3.0%	17.7%	4.7%	1.04	5862	4529
Bayer	€	105.9	15.6	14.6	14.4	14.0	13.1	12.4	12.0	3.1%	4.0%	2.4%	1.05	13724	9839
GlaxoSmithKline plc	p	1,645.0	25.4	17.6	16.1	16.0	14.6	13.4	12.5	5.7%	7.1%	4.9%	1.05	2167	1511
Novartis	SF	74.5	15.6	16.6	17.1	14.8	13.6	12.7	11.7	2.6%	7.3%	3.9%	0.96	89.0	78.2
Novo Nordisk A/S	DK	252.2	19.8	16.9	16.0	15.1	14.0	12.5	11.2	4.2%	8.6%	3.2%	0.82	270.2	276
Roche	SF	257.3	19.5	18.7	17.2	16.1	15.2	14.0	13.0	3.4%	7.5%	3.3%	1.01	276.9	254
Sanofi	€	84.8	15.1	15.1	15.3	14.5	12.7	11.4	10.7	3.8%	7.0%	3.5%	0.88	115.4	98
EU Majors average (ex AZN)			18.5	16.6	16.0	15.1	13.9	12.7	11.8	3.7%	8.5%	3.7%	0.99		
Global Majors average			19.5	18.0	18.5	16.7	14.9	13.1	12.1				1.03		
Allergan Plc.	\$	239.1	17.8	17.7	14.7	13.4	11.8	10.3	9.3	8.0%	13.8%	1.2%	1.02	275	235
Lundbeck	DK	337.4	nr	28.9	22.3	20.6	20.9	19.9	18.2	2.2%	9.7%	1.9%	1.28	234	246
Merck KGaA	€	104.8	21.8	17.1	16.3	15.3	13.7	12.9	12.7	3.1%	6.1%	1.2%	0.96	142	110
Shire Pharmaceuticals	p	4,519.0	14.5	12.8	11.5	9.8	9.0	8.4	8.1	NA	11.7%	0.0%	1.11	56.9	40
Teva Pharmaceutical	\$	32.1	5.9	6.2	6.4	6.1	5.5	5.2	4.7	3.9%	5.7%	4.3%	0.90	68	40
UCB	€	72.7	40.3	23.2	19.4	18.8	16.2	15.5	15.4	2.8%	8.6%	1.7%	0.95	80.3	75.3
Global Specialty average			20.1	17.7	15.1	14.0	12.9	12.0	11.4	4.0%	9.3%	1.7%	1.20		
Alexion Pharmaceuticals	\$	116.9	25.0	25.3	22.1	18.9	14.9	12.1	11.6	12.4%	16.9%	0.0%	0.94	140	129
Amgen, Inc.	\$	163.1	15.7	14.0	13.7	13.1	12.5	11.6	10.8	2.2%	5.4%	2.5%	1.14	173	140
Biomarin Pharmaceuticals	\$	88.5	-101.9	-480.8	482.9	162.8	51.2	27.7	20.3	18.3%	NA	0.0%	1.07	82	84
Biogen, Inc.	\$	268.7	15.8	13.3	12.8	12.4	12.2	11.8	11.0	2.7%	3.9%	0.0%	1.14	256	232
Celgene Corporation	\$	125.1	26.6	21.1	17.1	12.7	10.2	8.2	7.0	19.5%	24.6%	0.0%	1.11	120	111
Gilead Sciences, Incorporated	\$	66.0	5.2	5.7	8.1	9.1	9.0	8.1	6.9	-6.4%	-3.8%	3.1%	0.79	91	87
Incyte Corporation	\$	136.1	310.4	119.4	72.0	90.3	55.7	32.1	21.9	27.8%	40.4%	0.0%	1.38	98	102
Regeneron Pharmaceutical	\$	367.1	42.1	32.2	28.9	21.4	17.1	13.8	12.3	13.0%	21.2%	0.0%	1.02	372	387
Vertex Pharmaceuticals Inc.	\$	114.2	-103.4	133.3	107.6	36.3	22.3	15.6	12.8	31.6%	59.9%	0.0%	1.37	78	79
US Biotech average			26.2	-12.9	85.0	41.9	22.8	15.7	12.7	13.4%	21.1%	0.6%	1.12		

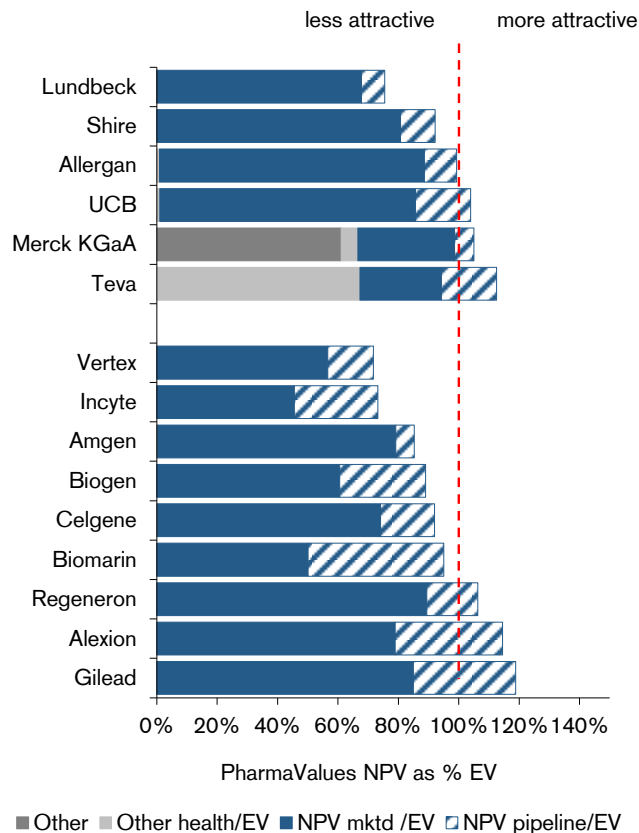
Source: Company data, Credit Suisse estimates, prices as of 12 April 2017

**Figure 23: PharmaValues NPV % EV valuation
Global Major Pharma**



Source: Company data, Credit Suisse estimates

**Figure 24: PharmaValues NPV % EV valuation
Specialty Pharma and Biotech**



Source: Company data, Credit Suisse estimates

Companies Mentioned (Price as of 12-Apr-2017)

AbbVie Inc. (ABBV.N, \$64.37)
Actelion (ATLN.S, SFr284.4)
Alexion Pharmaceuticals Incorporated (ALXN.OQ, \$114.57)
Allergan Plc. (AGN.N, \$237.83)
Amgen, Inc. (AMGN.OQ, \$163.05)
AstraZeneca (AZN.L, 4734.5p)
Baxter International Inc. (BAX.N, \$53.53)
Bayer (BAYGn.DE, €106.25)
Biogen, Inc. (BIIB.OQ, \$268.92)
Biomarin Pharmaceuticals, Inc. (BMRN.OQ, \$88.38)
Bioverativ, Inc. (BIVV.OQ, \$56.71)
Boehringer Ingelheim (Unlisted)
Bristol-Myers Squibb Co. (BMY.N, \$52.99)
Celgene Corporation (CELG.OQ, \$125.15)
Eli Lilly & Co. (LLY.N, \$86.25)
Express Scripts (ESRX.OQ, \$66.54)
Gilead Sciences, Incorporated (GILD.OQ, \$66.22)
GlaxoSmithKline plc (GSK.L, 1645.5p)
Incyte Corporation (INCY.OQ, \$138.27)
Johnson & Johnson (JNJ.N, \$125.4)
Lundbeck (LUN.CO, Dkr340.0)
Merck & Co., Inc. (MRK.N, \$63.05)
Merck KGaA (MRCG.DE, €105.45)
Mylan NL (MYL.TA, agora13970.0)
Novartis (NOVN.S, SFr74.2)
Novo Nordisk A/S (NOVOB.CO, Dkr253.5)
Otsuka Holdings (4578.T, ¥5,105)
Pfizer (PFE.N, \$33.92)
Regeneron Pharmaceuticals, Inc. (REGN.OQ, \$366.33)
Roche (ROG.S, SFr257.8)
Sanofi (SASY.PA, €85.24)
Shire Pharmaceuticals (SHP.L, 4535.0p)
Teva Pharmaceutical (TEVA.N, \$32.12)
UCB (UCB.BR, €73.62)
United Therapeutics Corp. (UTHR.OQ, \$121.95)
Valeant Pharm (VRX.TO, C\$12.76)
Vertex Pharmaceuticals Incorporated (VRTX.OQ, \$114.86)

Disclosure Appendix

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Rebekah Harper, Trung Huynh, Jo Walton, Matthew Weston PhD, Vamil Divan, MD and Alethia Young each certify, with respect to the companies or securities that the individual analyzes, that (1) the views expressed in this report accurately reflect his or her personal views about all of the subject companies and securities and (2) no part of his or her compensation was, is or will be directly or indirectly related to the specific recommendations or views expressed in this report.

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Neutral (N) : The stock's total return is expected to be in line with the relevant benchmark* over the next 12 months.

Underperform (U) : The stock's total return is expected to underperform the relevant benchmark* over the next 12 months.

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This research report is authored by:

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