Solvay SA SOLB (XBRU) | ★★★

Last Price	Fair Value	Uncertainty	Economic Moat™	Moat Trend™	Stewardship	Industry Group
87.69 EUR	85.00 EUR	High	None	Stable	Standard	Chemicals

Solid Performance in Q2 for Solvay, Despite Continued Oil and Gas Headwinds

See Page 2 for the full Analyst Note from 29 Jul 2016

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The primary analyst covering this company does not own its stock.

Research as of 29 Jul 2016
Estimates as of 05 Jul 2016
Pricing data through 28 Jul 2016
Rating updated as of 28 Jul 2016

Currency amounts expressed with "$" are in U.S. dollars (USD) unless otherwise denoted.

Contents

Investment Thesis 19 Feb 2016

Solvay has been transitioning its portfolio of businesses to more specialised, less cyclical activities through acquisitions and divestitures. In recent years, Solvay has negotiated an exit to the highly cyclical European Polyvinyl Chloride, or PVC, market through a joint venture with Ineos, and has acquired Cytec, a leader in composites for the aerospace market. Cytec is a high-margin/high-growth business that gives Solvay a strong position in the aerospace market, which it was previously lacking. However, at 15 times EBITDA (before synergies), we think the acquisition price was too high, and this should prevent Solvay from earning its cost of capital for many years.

With the addition of Cytec, automotive and aerospace is now Solvay's largest end market at roughly 25% of sales, followed closely by consumer goods/healthcare. Solvay's end-market diversity remains a strength, as industrial applications, energy, construction, and agriculture/food each generate around 10%-15% of sales. Furthermore, sales are balanced globally, as Europe, North America, and Asia each contribute about a third to the total.

Solvay's primary engines for growth are its advanced formulations (25% of EBITDA) and advanced materials (40% of EBITDA) segments. However, the advanced formulations segment is significantly exposed to the oil and gas sector, which will weigh on results in the near term. We remain optimistic on the prospects for the advanced materials segment, given its strong speciality polymers businesses. Speciality polymers are high-value plastics typically used to replace metal in automotive, aerospace, and electronics, where demand is driven by trends toward increasing energy efficiency. The performance chemicals segment (30% of EBITDA) is comprised of largely commodified products. This ensures a high degree of cyclicality, but the segment remains valuable, as Solvay's strong competitive positions generally result in good margins and significant cash generation.

Vital Statistics

Market Cap (EUR Mil)	9,100
52-Week High (EUR)	120.81
52-Week Low (EUR)	70.52
52-Week Total Return %	-24.4
YTD Total Return %	-7.6
Last Fiscal Year End	31 Dec 2015
5-Yr Forward Revenue CAGR %	4.8
5-Yr Forward EPS CAGR %	2.5
Price/Fair Value	1.03

Valuation Summary and Forecasts

Fiscal Year:	2014	2015	*2016(E)*	*2017(E)*
Price/Earnings	14.3	12.2	*11.4*	*11.8*
EV/EBITDA	6.2	6.0	*5.7*	*6.0*
EV/EBIT	10.3	10.9	*9.5*	*9.7*
Free Cash Flow Yield %	6.8	5.7	*7.3*	*9.6*
Dividend Yield %	3.1	3.2	*4.0*	*3.9*

Financial Summary and Forecasts (EUR Mil)

Fiscal Year:	2014	2015	*2016(E)*	*2017(E)*
Revenue	10,629	11,047	*12,398*	*12,707*
Revenue YoY %	2.5	3.9	*12.2*	*2.5*
EBIT	1,069	1,076	*1,447*	*1,420*
EBIT YoY %	20.7	0.7	*34.5*	*-1.8*
Net Income, Adjusted	622	680	*813*	*784*
Net Income YoY %	64.6	9.3	*19.6*	*-3.6*
Diluted EPS	7.41	8.07	*7.69*	*7.43*
Diluted EPS YoY %	64.8	8.8	*-4.7*	*-3.4*
Free Cash Flow	721	-4,312	*855*	*1,076*
Free Cash Flow YoY %	-335.5	-697.8	*-119.8*	*25.9*

Historical/forecast data sources are Morningstar Estimates and may reflect adjustments.

Profile

Solvay is a Belgium-based producer of chemicals, plastics, and composites. The company has a top-three market position for nearly all of its products. Key business segments include advanced formulations, advanced materials, and performance chemicals. High-value products include aerospace composites, speciality polymers, and silica while traditional chemical products include soda ash, hydrogen peroxide, and acetate cellulose. Geographical exposure is relatively balanced, with Europe, North America, and Asia each contributing a third of sales.

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Morningstar Analysis

Solid Performance in Q2 for Solvay, Despite Continued Oil and Gas Headwinds 29 Jul 2016

After reviewing Solvay's second-quarter results, we are maintaining our EUR 85 fair value estimate and no-moat rating. EBITDA increased 8% versus the prior-year period, owing to limited pass-through of lower raw material costs and the benefits from operational excellence programs. In general, trends from the first quarter carried through the second, with all segments reporting positive increases in EBITDA, with the exception of the advanced formulations segment, which remains weighed down by persistent weakness in the oil and gas market. At current levels, shares look fairly valued.

Functional polymers showed the most improvement for the second quarter in a row. EBITDA increased 24% year over year as a result of increasing volumes and cost improvements in chlorovinyls. In addition, the EBITDA margin remained high at 14%. However, we don't think this margin is sustainable, given that this segment holds most of Solvay's most commoditised businesses with little pricing power.

Performance chemicals also reported a sharp step-up in profitability, with EBITDA increasing 20% versus the prior-year period. Demand returned for soda ash after a slow first quarter. Also, the recovery in the acetate tow market continued globally, except for China. As we think acetate is a high-margin, moaty business, we were not surprised to see the performance chemicals EBITDA margin rise 5% in the quarter versus the year-ago period.

The advanced formulations segment remained a drag on performance, owing to the impact of headwinds in the oil and gas markets on the company's Novecare business. EBITDA fell 11% versus the prior-year period on the back of a 17% drop in sales at Novecare. We expect the lack of activity in oil and gas exploration to continue to dampen results in the advanced formulations segment in the near term.

Valuation, Growth and Profitability 19 Feb 2016

Our Solvay fair value estimate is EUR 85 per share, based on a discounted cash flow model. Our fair value estimate implies a price/earnings ratio of 14 times and EV/EBITDA ratio of 6.5 times, based on 2016 estimates. Overall, we expect low-single digit organic growth and a fairly stable average EBITDA margin of 18% over our forecast period.

We expect mid-single-digit revenue growth in the advanced materials segment, driven by speciality polymers and the aerospace composites business, which Solvay acquired with Cytec. The speciality polymer business has a long history of double-digit growth, and we expect this to continue, given mega-trend tailwinds, such as increasing demand for energy-efficient products. The aerospace business is benefiting from strong aeroplane production rates, as demand for air travel increases in emerging markets, along with the increasing use of composites in newer commercial aircraft. We expect continued growth in the medium term, as the business will provide resin systems for the fan blades and containment cases for the new Leap engine, developed by CFM (a GE/Safran joint venture) for single-aisle commercial jets. The Leap engine has an order book in excess of 10,000 units and is scheduled to commence production in 2016.

We expect revenue growth in the advanced formulations segment to be negative in the near term, with declining margins because of ongoing challenges in the oil and gas industry. In the performance chemicals segment, we expect medium-term results to be primarily driven by the soda ash business, which generates about half of the segment's revenue. Soda ash is a commodified product primarily used to make glass, and is currently enjoying high margins owing to tight market conditions. We expect margins to wane in the medium term, with significant new industry capacity set

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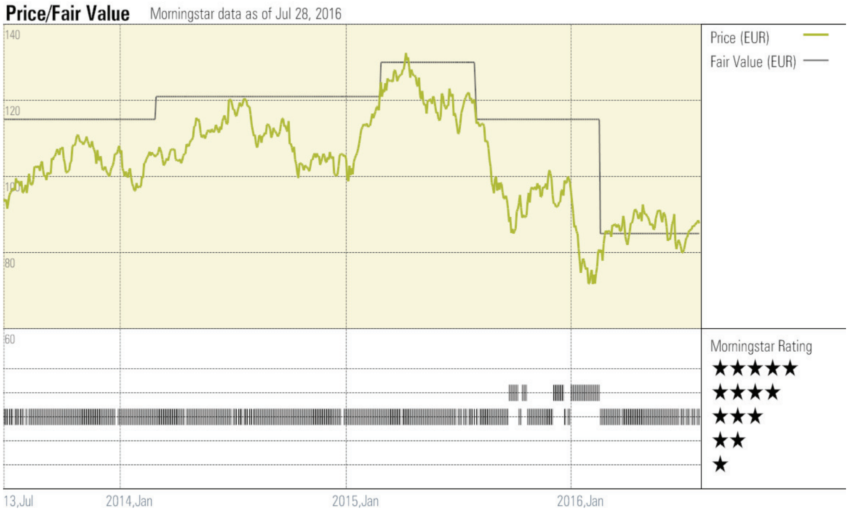
Price/Fair Value Morningstar data as of Jul 28, 2016



to come on line in 2017, which will push Solvay's European production up the cost curve.

Scenario Analysis
We assign Solvay a high uncertainty rating, which reflects its high operating leverage, exposure to commodity chemicals, and cyclical end markets.

In our bull-case scenario, we value Solvay at EUR 123 per share. In this scenario, a pickup in global economic growth further accelerates demand for speciality polymers. Solvay benefits from a fast turnaround in the oil and gas sector and a quick ramp-up in production of the Leap engine. New capacity in soda ash is delayed, allowing the company to maintain its high margins for longer. Organic revenue growth is in the midsingle digits, with the EBITDA margin averaging 21% in our forecast period.

In our bear-case scenario, we value Solvay at EUR 55 per share. In this scenario, global economic growth wanes, causing demand for speciality polymers to soften. The oil and gas sector remains weak and the ramp-up in production of the Leap engine takes longer than expected. New capacity in soda ash has a more negative impact on margins, owing to stagnant demand from lacklustre economic activity in Europe. Organic revenue growth is mostly flat, with the EBITDA margin averaging 16% in our forecast period.

Economic Moat
We don't assign Solvay a moat. Solvay has a wide variety of businesses in its portfolio with distinct products and competitive dynamics. We do think some of these businesses are moatworthy, including the aerospace materials business, which Solvay recently acquired with Cytec. However, at around 30% of total revenue, the contribution of these moaty segments is not sufficient to dig a moat for the consolidated company. Furthermore, the high price paid for Cytec has largely neutralised the moat-building aspect of the acquisition, given the additional weight in the capital base from the associated goodwill. Consequently, we don't expect Solvay to earn its cost of capital in our forecast period.

About 70% of consolidated revenue is generated from no-moat businesses, in our opinion. Three of the largest business units at Solvay are novecare, polyamide, and soda ash; in our opinion, none of these have moats. Together, these business units contribute about 50% of consolidated revenue. Novecare is focused on surface chemistry, a highly competitive market in which all leading speciality chemical companies are active. Surface chemistry products alter the behaviour of fluids, giving them cleansing, moisturising, texturising, or dispersing properties, for example. While the business serves a wide variety of end markets, such as home/personal care, agriculture, and industrial coatings, its performance is particularly tied to oil and gas exploration activity. Consequently, financial performance has suffered along with the decline in the oil sector, and thus we have little confidence in the business' ability to consistently earn its cost of capital.

Polyamide is Solvay's most commodified business, and is vertically integrated for cost efficiency. The business produces polyamide 6.6 monomers upstream for use in its downstream products of engineering plastics and textiles. Engineering plastics are often used in the automotive, transportation, electronics, and construction sectors to replace metal and for their flame-retardant properties. These plastics can be thought of as "off the shelf", in contrast to Solvay's speciality polymers, which are bespoke plastic solutions developed for specific customer needs. Solvay's textile products include swim and sportswear and are primarily developed for Latin American markets. The polyamide business has historically generated weak returns, and Solvay is not expecting a meaningful improvement in the medium term.

Soda ash was the foundation of the company, formed some 150 years ago when Ernest Solvay invented the process to manufacture synthetic soda ash, now known as the "Solvay" process. About 50% of global soda ash production is used to make glass. As the bulk of glass demand is tied to the construction and automotive sectors, this is a cyclical business. The company continues to be largest producer in the world, with roughly 35% of European capacity and 20% of North American capacity. There are two methods for producing soda ash: the natural process and the synthetic process. The natural process is more cost-effective than the synthetic process. However, the natural process requires access to a trona deposit, and global resources are largely concentrated in the United States and Turkey. Solvay's US production, which uses the natural method, sits near the bottom of the global cost curve, while its European production, which uses the synthetic method, sits more in the middle of the cost curve. On a regional basis, Solvay's cost position is on par with other producers in the US. In Europe, its cost position is higher than natural production from Turkey, but a portion of its production base is below other European synthetic producers. Consequently, while we believe Solvay has a strong competitive position, we are not convinced that a durable cost advantage is evident.

We think Solvay's speciality polymers, peroxides, acetow, and aerospace materials businesses would likely earn moats as stand-alone entities, but together they contribute only about 30% of Solvay's consolidated revenue. Solvay is the industry leader in high-performance speciality polymers (plastics) with by far the broadest product range. Tailor-made solutions are designed in collaboration with long-term customers, which results in pricing based on the value of the solution, rather than the product components. As a result, we think the business is earning high returns, owing to the switching costs associated with these long-term strategic partnerships with customers.

We believe the peroxides business has a cost advantage and intangible asset from its distinctive hydrogen peroxide mega-plant technology. Solvay can build massive hydrogen peroxide plants that are used to provide the main feedstock to propylene oxide plants as part of the hydrogen peroxide to propylene oxide process. The HPPO process was developed by BASF and Dow as a more cost-effective, environmentally friendly way to produce propylene oxide. Only Solvay and Evonik have developed the technology (with each company having a different technology) to build these hydrogen peroxide mega-plants, which are 3-4 times the size of a conventional plant. As these plants require a huge investment and are largely beholden to a single customer, a respectable ROIC is essentially locked in through long-term take-or-pay agreements.

Acetow's primary product is cellulose acetate tow for cigarettes, a market in secular decline. This has resulted in a consolidated industry with four major players (Solvay is the number-four player) operating as a rational oligopoly. Profitability and returns are high as incumbents have shuttered excess capacity with falling demand, resulting in consistent price increases. Given the industry is in secular

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Morningstar Analysis

decline, we think the significant time and capital costs of building a plant are a meaningful barrier to entry for potential competitors.

The aerospace materials business was recently acquired with Cytec. This business is one of three major suppliers (Hexcel, Cytec, Toray) of aerospace carbon-fiber composites. Demand is growing from the need to reduce weight for fuel efficiency, but also owing to carbon fiber's strength and corrosion-resistance properties, which result in lower maintenance costs. We think the qualification process for aerospace composite materials is a significant barrier to entry. Qualifying a new composite material for the aerospace industry can take six to 10 years and can cost EUR 50 million-EUR 100 million. Once qualified, aeroplane manufacturers have little incentive to consider alternative materials, and the qualified supplier is often the only source for the product.

Moat Trend

Our moat trend rating for Solvay is stable. Solvay is actively shifting towards more moatworthy businesses through acquisitions and divestitures. While growth in these segments may ultimately lead to a moat for the company, we don't think the competitive dynamics in the underlying business segments are changing enough to warrant a positive or negative moat trend for the company. However, we see some noteworthy developments in Solvay's peroxide and soda ash businesses, which are a part of the performance chemicals segment. On the positive side, we think Solvay's competitive position in peroxide is strengthening, as the company's singular abilities in mega-plant HPPO technology is displacing conventional production. On the negative side, a 2.5-million-metric-ton soda ash plant built by a competitor in Turkey is expected to come on line in 2017. The project represents about 25% of industry capacity in Europe and uses the natural process, which is more cost-effective than the synthetic process. Given that Solvay uses the synthetic process for its European plants, we think the new production facility plant will push Solvay's European production up the cost curve.

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Bulls Say/Bears Say

Bulls Say

- The acquisition of Cytec gives Solvay a strong competitive position in the growing market for aerospace composites.
- Acquisitions and divestitures of recent years have lowered the cyclicality of the business.
- Solvay is well-positioned to benefit from mega-trends, such as increasing wealth in emerging markets and the rising demand for energy-efficient products and solutions.

Bears Say

- Solvay has a meaningful exposure to the oil and gas sector, which could be a long-term drag on growth and profitability.
- Solvay overpaid for Cytec, which will hamper the company's ability to earn its cost of capital for many years.
- Current margins in the company's soda ash business will not be sustainable as significant new industry capacity commences production in 2017.

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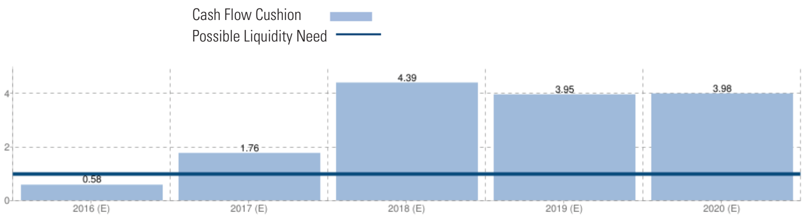
Five Year Adjusted Cash Flow Forecast (EUR Mil)

	2016(E)	2017(E)	2018(E)	2019(E)	2020(E)
Cash and Equivalents (beginning of period)	177	1,617	2,075	2,831	2,795
Adjusted Available Cash Flow	444	666	964	668	765
Total Cash Available before Debt Service	621	2,284	3,039	3,499	3,560
Principal Payments	-891	-1,101	-500	-700	-720
Interest Payments	-178	-193	-193	-187	-174
Other Cash Obligations and Commitments	—	—	—	—	—
Total Cash Obligations and Commitments	-1,069	-1,294	-693	-887	-894

Cumulative Annual Cash Flow Cushion



Adjusted Cash Flow Summary

	EUR Millions	% of Commitments
Beginning Cash Balance	177	3.7
Sum of 5-Year Adjusted Free Cash Flow	3,508	72.5
Sum of Cash and 5-Year Cash Generation	3,685	76.2
Revolver Availability	—	—
Asset Adjusted Borrowings (Repayment)	—	—
Sum of Cash, 5-Year Cash Generation, Revolver and Adjustments	3,685	76.2
Sum of 5-Year Cash Commitments	-4,836	—

Financial Health

Solvay is in satisfactory financial health, although leverage has increased meaningfully with the acquisition of Cytec. Solvay issued near EUR 5 billion in debt (including the hybrid bond) to finance the acquisition. The increase in gearing was softened somewhat by a EUR 1.5 billion rights issue, but balance sheet leverage remains on the higher side. With Cytec fully consolidated, we expect debt to represent almost 50% of the capital structure, and this will likely remain stable in the near term as the company completes some major capital investments in 2016-17. Cash flow leverage should remain comfortable, as we expect 2016 net debt/EBITDA to be around 2.5 times, but this rises to approximately 3.5 times, including pension obligations. EBIT interest coverage is adequate at 5 times. We don't expect another sizeable acquisition in the near term, and Solvay's cash-generating businesses should whittle down the debt over time. In addition, it is likely that some businesses will be divested, which could accelerate the reduction in debt.

Enterprise Risk

Solvay's acquisitions and divestitures in recent years have increased its exposure to the speciality end of the chemicals spectrum, and have therefore lessened the cyclicality of the consolidated company. This is further supported by wide geographical and end-market diversity, with no significant customer concentration at the group level. However, its performance chemicals and polyamides segments remain largely commodified businesses with high operating leverage, which will continue to amplify financial performance along with the business cycle. In addition, the performance chemicals segment tends to have a more concentrated customer base, with several products having at least one customer representing more than 10% of sales. The chemicals sector is generally capital-intensive, and production facilities can take three to six years to mature after the initial investment. As a result, demand expected at the time capital was committed may not be there when

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the production facility is complete. In recent years, Solvay has been investing heavily in growth projects, resulting in a capital intensity that is above peers. As the acquisition of Cytec has increased debt, integration and execution risk will be heightened as Cytec is folded into the company in the next few years. Solvay uses significant amounts of energy and raw materials (around 40% of total costs), where the price of such materials is largely out of Solvay's control. Increases in raw material prices cannot always be passed through to customers and even when they do, the time lag can negatively affect financial results. Petrochemicals account for approximately 60% of Solvay's raw materials, with benzene accounting for 15%. Consequently, Solvay is directly exposed to volatility in oil and gas prices.

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Management & Ownership

Management Activity

Name	Position	Shares Held	Report Date*	InsiderActivity
NA	NA	NA	NA	NA

*Represents the date on which the owner's name, position, and common shares held were reported by the holder or issuer.

Fund Ownership

Top Owners	% of Shares Held	% of Fund Assets	Change (k)	Portfolio Date
Vanguard Total Intl Stock Idx Fund	0.74	0.03	11	30 Jun 2016
WisdomTree Europe Hedged Equity Fund	0.72	0.69	—	28 Jul 2016
iShares MSCI EAFE (AU)	0.37	0.06	—	26 Jul 2016
Atout France	0.33	1.53	17	31 May 2016
Pear Tree Polaris Foreign Value Fund	0.35	2.33	—	30 Jun 2016
Concentrated Holders				
KBC Multi Track Belgium	0.05	6.65	—	29 Feb 2016
Richelieu Equity Belgium	0.05	5.77	—	30 Jun 2016
Petercam Equities Belgium	0.06	5.23	—	31 Mar 2016
Argenta Actions Belges	0.01	5.20	—	30 Jun 2016
Degroof Eqs Belgium Active	0.06	4.91	—	30 Jun 2016

Institutional Transactions

Top 5 Buyers	% of Shares Held	% of Fund Assets	Shares Bought/ Sold (k)	Portfolio Date
Amundi	1.39	0.79	104	31 May 2016
State Street Global Advisors	0.15	0.05	76	30 Jun 2016
Société Générale Gestion	0.47	1.06	62	31 May 2016
Bansabadell Inversión SGIIC	0.08	2.00	56	31 Dec 2015
Mackenzie Investments	0.05	0.70	52	30 Apr 2016
Top 5 Sellers				
Government Pension Fund of Norway - Global	0.80	0.01	-242	31 Dec 2013
Teachers Advisors Inc	0.10	0.01	-61	31 May 2016
Natixis Asset Management	0.41	0.69	-48	31 May 2016
Ireland National Pensions Reserve Fund	0.06	0.04	-24	31 Dec 2009
Petercam S.A.	0.24	0.97	-20	31 Mar 2016

Management 19 Feb 2016

We assign Solvay a Standard stewardship rating. Jean-Pierre Clamadieu has been CEO of Solvay since 2012. Prior to that, Clamadieu was CEO of the Rhodia Group from 2003 to 2011, when it was acquired by Solvay. Several of Solvay's most important businesses were obtained with the Rhodia acquisition. Consequently, we believe that Clamadieu has a deep knowledge of Solvay's key business lines and is well suited to lead the company.

Overall, we applaud the strategic direction of Clamadieu's acquisition and divestiture activity towards higher-growth-/higher-margin activities with less cyclicality. In particular, the successful exit of the highly cyclical European PVC business was a significant achievement. The company continues to pursue divestiture of the remaining PVC business, and a full exit will be completed when market conditions warrant.

Since taking over the helm of Solvay, Clamadieu has made two significant acquisitions: Chemlogics in 2013 and Cytec in 2015. Chemlogics produces chemicals for the US oil and gas market. Despite the recent challenges in the sector, we think this was a value-accretive acquisition. The enterprise value of the transaction was $1.345 billion, representing 8.7 times EBITDA (including the present value of a tax benefit). We think this was a reasonable price for a low-capital-intensity business with the ability to generate 20%-25% EBITDA margins in a midcycle environment.

We are not as convinced that the acquisition of Cytec was value-enhancing for shareholders, and this was a much bigger transaction, at $5.5 billion. Cytec has some attractive businesses, primarily aerospace materials and in-process materials. However, before potential synergies, Solvay paid 14.7 times EBITDA for the business, which is significantly higher than a typical acquisition multiple of around 10 times for a speciality chemical company. Consequently, Solvay will need many years of increasing profit growth in this

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business to offset the drag from the increased capital in the transaction. As a result of this transaction, we don't forecast Solvay to generate ROICs above its cost of capital in the foreseeable future.

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Analyst Notes

Solvay Gets Temporary Boost From Lower Raw Material Costs in Q1; Headwinds From Oil & Gas Continue 04 May 2016

After reviewing Solvay's first-quarter results, we are maintaining our EUR 85 fair value estimate and no-moat rating. EBITDA increased by 2% relative to the prior-year period, primarily as a result of limited pass-through of lower raw material costs. At current levels, shares look fairly valued.

The functional polymers segment saw the largest improvement in the quarter, with EBITDA increasing 54% year over year, despite sales falling 6.6%. The segment benefited from cost optimisation programs and lower raw material and energy costs. As pass-through of lower input costs to customers was limited, the EBITDA margin rose 550 basis points to 14%. However, we think this segment holds Solvay's most commodified businesses with little pricing power. As a result, we wouldn't expect this quarter's margin to be sustainable.

The advanced formulations segment remained a drag on performance, owing to the impact of headwinds in the oil and gas markets on the company's Novecare business. EBITDA fell 9.8% compared with the prior-year period, on the back of a 16% drop in sales at Novecare. We expect the lack of activity in oil and gas exploration to continue dampening results in the advanced formulations segment in the near term.

We think Solvay's specialty polymers business line would be moatworthy on a stand-alone basis, given switching costs associated with its long-term strategic partnerships with customers. Indeed, another solid quarter for the business offset weak results in all other business lines held within Solvay's advanced materials segment. In total, EBITDA in the advanced materials segment increased 1.4% compared with the prior-year period. A strong competitive position serving markets with mega-trend tailwinds, such as increasing demand for energy-efficient products, should enable the specialty polymers business to drive positive long-term results in the advanced materials segment.

Slowdown in Oil and Gas Sector Weighs on Solvay's Q4 Results 25 Feb 2016

After reviewing Solvay's fourth-quarter results, we are maintaining our EUR 85 fair value estimate and no-moat rating. At current levels, shares look fairly valued.

Full-year 2015 financial results were in line with our expectations. We expect similar revenues and recurring EBITDA, or REBITDA, in 2016 compared with 2015, if the Cytec acquisition was fully included in both time periods. This is slightly more conservative than Solvay's outlook in 2016 for high-single-digit growth in REBITDA, although the company expects most of this growth to materialise in the back half of the year. On a positive note, Solvay reports that the integration of Cytec is running ahead of schedule, with EUR 20 million in cost savings achieved, compared with the ultimate goal of more than EUR 100 million by 2018.

The advanced formulations segment continued to struggle in the fourth quarter, owing to the negative impact of the oil and gas sector on the company's Novecare business. Compared with the prior-year period, segment sales and REBITDA were down 16% and 23%, respectively. We expect this headwind to carry over into 2016. The advanced materials segment continued to post strong results, with modest organic revenue growth bolstered by a strong currency tailwind. Within the segment, the important speciality polymers business saw demand for smart-device applications fall on a sequential basis. We expect this to be a temporary issue. In the performance chemicals segment, sales and REBITDA increased modestly, compared with the prior-year period. Destocking in the acetate tow market,

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Analyst Notes

which was the theme of 2015, appears to be easing. The soda ash markets remained strong in Europe and the United States, although increased pressure from Chinese players affected volumes on the seaborne market. We still expect strong performance from Solvay’s soda ash business until new industry capacity comes on line in 2017.

Solvay Is Too Optimistic on Cytec; Lowering FVE to EUR 85 19 Feb 2016

We are transferring coverage of Solvay to a new analyst. We are maintaining our no-moat rating but are lowering our fair value estimate to EUR 85 from EUR 115, primarily because of our more negative assessment of the Cytec acquisition and our tempered expectations of the soda ash business. Our fair value estimate implies a price/earnings ratio of 14 times and EV/EBITDA ratio of 6.5 times, based on 2016 estimates. Overall, we expect low-single-digit organic growth and a fairly stable average EBITDA margin of 18% over our forecast period.

Solvay has been transitioning its portfolio of businesses to more-specialised, less-cyclical activities via acquisitions and divestitures. In 2015, Solvay acquired Cytec, a leader in composites for the aerospace market, for a hefty price of $5.5 billion. Cytec is a high-margin/high-growth business that gives Solvay a strong position in the aerospace market, which it was previously lacking. However, at 15 times EBITDA (before synergies), we think the acquisition price was too high, and it should prevent Solvay from earning its cost of capital for many years. Solvay's soda ash business is currently enjoying high margins because of tight market conditions. We expect margins to wane in the medium term, with significant new industry capacity set to come on line in 2017, which will push Solvay’s European production up the cost curve.

We don’t ascribe a moat to Solvay. Solvay has a wide variety of businesses in its portfolio with distinct products and competitive dynamics. We do think some of these businesses are moatworthy, including the aerospace materials business, which it recently acquired with Cytec. However, at around 30% of total revenue, the contribution of these moaty segments is insufficient to dig a moat for the consolidated company. Furthermore, the high price paid for Cytec has largely neutralised the moat-building aspect of the acquisition, given the additional weight in the capital base from the associated goodwill.

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Last Price	Fair Value	Uncertainty	Economic Moat™	Moat Trend™	Stewardship	Industry Group
87.69 EUR	85.00 EUR	High	None	Stable	Standard	Chemicals

Morningstar Analyst Forecasts

Financial Summary and Forecasts

Fiscal Year Ends in December

Growth (% YoY)	3-Year Hist. CAGR	2013	2014	2015	*Forecast* *2016*	*2017*	*5-Year Proj. CAGR*
Revenue	*0.4*	-5.0	2.5	3.9	*12.2*	*2.5*	*4.8*
EBIT	*-6.2*	-32.1	20.7	0.7	*34.5*	*-1.8*	*8.9*
EBITDA	*-2.3*	-23.2	10.7	9.7	*24.8*	*-5.3*	*5.5*
Net Income	*-5.9*	-53.7	64.6	9.3	*19.6*	*-3.6*	*7.1*
Diluted EPS	*-6.5*	-54.4	64.8	8.8	*-4.7*	*-3.4*	*2.5*
Earnings Before Interest, after Tax	*-16.1*	-77.3	17.1	121.7	*163.5*	*3.4*	*25.8*
Free Cash Flow	*-312.5*	-168.2	-335.5	-697.8	*-119.8*	*25.9*	—

Profitability	3-Year Hist. Avg	2013	2014	2015	*2016*	*2017*	*5-Year Proj. Avg*
Operating Margin %	*9.5*	8.6	10.1	9.7	*11.7*	*11.2*	*11.5*
EBITDA Margin %	*16.7*	15.5	16.8	17.7	*19.7*	*18.2*	*18.5*
Net Margin %	*5.2*	3.7	5.9	6.2	*6.6*	*6.2*	*6.5*
Free Cash Flow Margin %	*-11.7*	-3.0	6.8	-39.0	*6.9*	*8.5*	*8.5*
ROIC %	*8.4*	9.6	5.3	10.5	*10.5*	*10.3*	*11.1*
Adjusted ROIC %	*5.2*	6.1	3.2	6.5	*6.7*	*6.6*	*7.0*
Return on Assets %	*1.4*	1.5	0.9	1.9	*2.9*	*2.9*	*3.1*
Return on Equity %	*3.8*	4.1	2.3	5.1	*7.9*	*7.8*	*8.0*

Leverage	3-Year Hist. Avg	2013	2014	2015	*2016*	*2017*	*5-Year Proj. Avg*
Debt/Capital	*0.33*	0.33	0.26	0.41	*0.44*	*0.43*	*0.41*
Total Debt/EBITDA	*2.28*	2.18	1.31	3.34	*3.16*	*3.34*	*3.06*
EBITDA/Interest Expense	*15.00*	9.94	15.50	19.55	*13.71*	*11.98*	*13.18*

Valuation Summary and Forecasts

	2014	2015	*2016(E)*	*2017(E)*
Price/Fair Value	0.87	0.86	—	—
Price/Earnings	14.3	12.2	*11.4*	*11.8*
EV/EBITDA	6.2	6.0	*5.7*	*6.0*
EV/EBIT	10.3	10.9	*9.5*	*9.7*
Free Cash Flow Yield %	6.8	5.7	*7.3*	*9.6*
Dividend Yield %	3.1	3.2	*4.0*	*3.9*

Key Valuation Drivers

Cost of Equity %	11.0
Pre-Tax Cost of Debt %	6.5
Weighted Average Cost of Capital %	8.4
Long-Run Tax Rate %	30.0
Stage II EBI Growth Rate %	10.0
Stage II Investment Rate %	18.2
Perpetuity Year	10

Additional estimates and scenarios available for download at http://select.morningstar.com.

Discounted Cash Flow Valuation

	EUR Mil	Firm Value (%)	Per Share Value
Present Value Stage I	4,397	25.5	41.61
Present Value Stage II	12,842	74.5	121.55
Present Value Stage III	—	—	—
Total Firm Value	**17,239**	**100.0**	**163.16**
Cash and Equivalents	177	—	1.68
Debt	-6,520	—	-61.71
Preferred Stock	—	—	—
Other Adjustments	-2,072	—	-19.61
Equity Value	**8,824**	**—**	**83.52**
Projected Diluted Shares	106		
Fair Value per Share (EUR)	—		

The data in the table above represent base-case forecasts in the company's reporting currency as of the beginning of the current year. Our fair value estimate may differ from the equity value per share shown above due to our time value of money adjustment and in cases where probability-weighted scenario analysis is performed.

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Last Price	Fair Value	Uncertainty	Economic Moat™	Moat Trend™	Stewardship	Industry Group
87.69 EUR	85.00 EUR	High	None	Stable	Standard	Chemicals

Morningstar Analyst Forecasts

Income Statement (EUR Mil)

Fiscal Year Ends in December

	2013	2014	2015	*Forecast* 2016	*Forecast* 2017
Revenue	**10,367**	**10,629**	**11,047**	***12,398***	***12,707***
Cost of Goods Sold	8,043	8,070	8,289	*9,078*	*9,432*
Gross Profit	**2,324**	**2,559**	**2,758**	***3,320***	***3,274***
Selling, General & Administrative Expenses	1,199	1,225	1,327	*1,488*	*1,525*
Research & Development	237	247	277	*310*	*254*
Other Operating Expense (Income)	2	18	78	*75*	*75*
Depreciation & Amortization (if reported separately)	—	—	—	—	—
Operating Income (ex charges)	**886**	**1,069**	**1,076**	***1,447***	***1,420***
Restructuring & Other Cash Charges	239	308	245	*75*	—
Impairment Charges (if reported separately)	—	—	—	—	—
Other Non-Cash (Income)/Charges	—	—	—	—	—
Operating Income (incl charges)	**647**	**761**	**831**	***1,372***	***1,420***
Interest Expense	162	115	100	*178*	*193*
Interest Income	-48	-193	-127	*-50*	*-50*
Pre-Tax Income	**437**	**453**	**604**	***1,144***	***1,178***
Income Tax Expense	188	120	97	*343*	*353*
Other After-Tax Cash Gains (Losses)	66	-244	-55	—	—
Other After-Tax Non-Cash Gains (Losses)	—	—	—	—	—
(Minority Interest)	-45	67	-48	*-40*	*-40*
(Preferred Dividends)	—	—	—	—	—
Net Income	**270**	**156**	**404**	***761***	***784***
Weighted Average Diluted Shares Outstanding	84	84	84	*106*	*106*
Diluted Earnings Per Share	**3.21**	**1.86**	**4.79**	***7.19***	***7.43***
Adjusted Net Income	378	622	680	*813*	*784*
Diluted Earnings Per Share (Adjusted)	**4.50**	**7.41**	**8.07**	***7.69***	***7.43***
Dividends Per Common Share	3.20	3.20	3.30	*3.40*	*3.40*
EBITDA	**1,576**	**2,191**	**1,809**	***2,364***	***2,310***
Adjusted EBITDA	**1,611**	**1,783**	**1,955**	***2,439***	***2,310***

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Last Price	Fair Value	Uncertainty	Economic Moat™	Moat Trend™	Stewardship	Industry Group
87.69 EUR	85.00 EUR	High	None	Stable	Standard	Chemicals

Morningstar Analyst Forecasts

Balance Sheet (EUR Mil)

Fiscal Year Ends in December	2013	2014	2015	Forecast 2016	Forecast 2017
Cash and Equivalents	1,932	1,251	177	*1,617*	*2,075*
Investments	—	—	—	—	—
Accounts Receivable	1,322	1,418	1,615	*1,812*	*1,636*
Inventory	1,267	1,420	1,867	*2,045*	*2,125*
Deferred Tax Assets (Current)	35	52	158	*158*	*158*
Other Short Term Assets	2,686	2,225	2,796	*2,796*	*2,796*
Current Assets	**7,242**	**6,366**	**6,613**	***8,428***	***8,790***
Net Property Plant, and Equipment	4,679	5,386	6,946	*6,854*	*6,965*
Goodwill	3,096	3,151	5,840	*5,840*	*5,840*
Other Intangibles	1,620	1,543	3,919	*3,919*	*3,919*
Deferred Tax Assets (Long-Term)	502	710	1,059	*1,059*	*1,059*
Other Long-Term Operating Assets	257	194	427	*427*	*427*
Long-Term Non-Operating Assets	1,037	544	524	*524*	*524*
Total Assets	**18,433**	**17,894**	**25,329**	***27,052***	***27,525***
Accounts Payable	1,353	1,461	1,559	*1,707*	*1,774*
Short-Term Debt	769	853	892	*892*	*892*
Deferred Tax Liabilities (Current)	17	355	130	*130*	*130*
Other Short-Term Liabilities	2,004	2,360	1,751	*1,751*	*1,751*
Current Liabilities	**4,143**	**5,029**	**4,331**	***4,480***	***4,546***
Long-Term Debt	2,745	1,485	5,628	*6,822*	*6,822*
Deferred Tax Liabilities (Long-Term)	469	378	1,456	*1,456*	*1,456*
Other Long-Term Operating Liabilities	3,623	4,224	4,246	*4,246*	*4,246*
Long-Term Non-Operating Liabilities	—	—	—	—	—
Total Liabilities	**10,980**	**11,116**	**15,661**	***17,004***	***17,070***
Preferred Stock	—	—	—	—	—
Common Stock	1,271	1,271	1,588	*1,588*	*1,588*
Additional Paid-in Capital	—	—	—	—	—
Retained Earnings (Deficit)	5,804	5,293	7,835	*8,236*	*8,662*
(Treasury Stock)	—	—	—	*-20*	*-40*
Other Equity	—	—	—	—	—
Shareholder's Equity	**7,075**	**6,564**	**9,423**	***9,804***	***10,209***
Minority Interest	378	214	245	*245*	*245*
Total Equity	**7,453**	**6,778**	**9,668**	***10,049***	***10,454***

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Last Price	Fair Value	Uncertainty	Economic Moat™	Moat Trend™	Stewardship	Industry Group
87.69 EUR	85.00 EUR	High	None	Stable	Standard	Chemicals

Morningstar Analyst Forecasts

Cash Flow (EUR Mil)

Fiscal Year Ends in December

	2013	2014	2015	Forecast 2016	Forecast 2017
Net Income	315	13	454	*801*	*824*
Depreciation	929	1,430	978	*992*	*889*
Amortization	—	—	—	—	—
Stock-Based Compensation	—	—	—	—	—
Impairment of Goodwill	—	—	—	—	—
Impairment of Other Intangibles	—	—	—	—	—
Deferred Taxes	—	—	—	—	—
Other Non-Cash Adjustments	-245	-213	-302	—	—
(Increase) Decrease in Accounts Receivable	335	-96	-197	*-197*	*176*
(Increase) Decrease in Inventory	155	-153	-447	*-178*	*-80*
Change in Other Short-Term Assets	53	532	1,037	—	—
Increase (Decrease) in Accounts Payable	-264	108	98	*148*	*67*
Change in Other Short-Term Liabilities	—	—	—	—	—
Cash From Operations	**1,278**	**1,621**	**1,621**	***1,566***	***1,877***
(Capital Expenditures)	-810	-987	-1,037	*-900*	*-1,000*
Net (Acquisitions), Asset Sales, and Disposals	-868	-283	-4,892	—	—
Net Sales (Purchases) of Investments	-73	619	43	—	—
Other Investing Cash Flows	19	1	-228	—	—
Cash From Investing	**-1,732**	**-650**	**-6,114**	***-900***	***-1,000***
Common Stock Issuance (or Repurchase)	28	-40	1,418	*-20*	*-20*
Common Stock (Dividends)	-373	-291	-323	*-360*	*-359*
Short-Term Debt Issuance (or Retirement)	—	-41	-57	—	—
Long-Term Debt Issuance (or Retirement)	1,071	-1,214	4,400	*1,194*	—
Other Financing Cash Flows	-54	-103	38	*-40*	*-40*
Cash From Financing	**672**	**-1,689**	**5,476**	***774***	***-419***
Exchange Rates, Discontinued Ops, etc. (net)	-53	37	29	—	—
Net Change in Cash	**165**	**-681**	**1,012**	***1,440***	***458***

Solvay SA SOLB (XBRU) | ★★★

Last Price	Fair Value	Uncertainty	Economic Moat™	Moat Trend™	Stewardship	Industry Group
87.69 EUR	85.00 EUR	High	None	Stable	Standard	Chemicals

Comparable Company Analysis

These companies are chosen by the analyst and the data are shown by nearest calendar year in descending market capitalization order.

Valuation Analysis

Company/Ticker	Price/Fair Value	Price/Earnings 2015	2016(E)	2017(E)	EV/EBITDA 2015	2016(E)	2017(E)	Price/Free Cash Flow 2015	2016(E)	2017(E)	Price/Book 2015	2016(E)	2017(E)	Price/Sales 2015	2016(E)	2017(E)
Basf SE BAS DEU	0.95	16.3	*16.6*	*16.2*	7.4	*7.9*	*7.7*	17.9	*10.4*	*17.6*	2.1	*2.0*	*1.9*	0.9	*1.1*	*1.1*
E.I. du Pont de Nemours & Co DD USA	1.00	23.3	*21.8*	*19.0*	12.4	*12.5*	*11.8*	84.5	*21.6*	*19.2*	5.8	*7.6*	*6.9*	2.3	*2.4*	*2.3*
Koninklijke DSM NV DSM NLD	1.16	23.6	*20.5*	*22.3*	8.0	*8.6*	*9.1*	NM	*21.1*	*11.5*	1.5	*1.7*	*1.7*	1.1	*1.2*	*1.2*
Average		21.1	*19.6*	*19.2*	9.3	*9.7*	*9.5*	51.2	*17.7*	*16.1*	3.1	*3.8*	*3.5*	1.4	*1.6*	*1.5*
Solvay SA SOLB BE	**1.03**	**12.2**	***11.4***	***11.8***	**6.0**	***5.7***	***6.0***	**17.5**	***13.7***	***10.4***	**1.1**	***0.9***	***0.9***	**0.9**	***0.7***	***0.7***

Returns Analysis

Company/Ticker	Last Historical Year Total Assets (Mil)	ROIC % 2015	2016(E)	2017(E)	Adjusted ROIC % 2015	2016(E)	2017(E)	Return on Equity % 2015	2016(E)	2017(E)	Return on Assets % 2015	2016(E)	2017(E)	Dividend Yield % 2015	2016(E)	2017(E)
Basf SE BAS DEU	70,836 EUR	11.0	*11.0*	*11.5*	9.3	*9.3*	*9.6*	13.6	*12.4*	*12.3*	5.6	*5.5*	*5.6*	4.0	*4.2*	*4.3*
E.I. du Pont de Nemours & Co DD USA	41,166 USD	18.7	*22.7*	*23.8*	15.2	*18.0*	*18.9*	17.1	*28.2*	*40.8*	4.3	*6.2*	*8.4*	2.7	*2.5*	*2.5*
Koninklijke DSM NV DSM NLD	11,743 EUR	14.6	*19.1*	*19.3*	8.4	*10.3*	*10.1*	1.5	*9.7*	*8.6*	0.7	*4.0*	*3.5*	2.1	*2.9*	*2.9*
Average		14.8	*17.6*	*18.2*	11.0	*12.5*	*12.9*	10.7	*16.8*	*20.6*	3.5	*5.2*	*5.8*	2.9	*3.2*	*3.2*
Solvay SA SOLB BE	**25,329** EUR	**10.5**	***10.5***	***10.3***	**6.5**	***6.7***	***6.6***	**5.1**	***7.9***	***7.8***	**1.9**	***2.9***	***2.9***	**3.2**	***4.0***	***3.9***

Growth Analysis

Company/Ticker	Last Historical Year Revenue (Mil)	Revenue Growth % 2015	2016(E)	2017(E)	EBIT Growth % 2015	2016(E)	2017(E)	EPS Growth % 2015	2016(E)	2017(E)	Free Cash Flow Growth % 2015	2016(E)	2017(E)	Dividend/Share Growth % 2015	2016(E)	2017(E)
Basf SE BAS DEU	70,449 EUR	-5.2	*-15.7*	*2.2*	-18.1	*0.1*	*2.1*	-22.7	*-1.8*	*2.5*	44.6	*13.0*	*-39.2*	3.6	*1.7*	*1.7*
E.I. du Pont de Nemours & Co DD USA	25,130 USD	-11.5	*-0.4*	*5.5*	-27.6	*4.6*	*9.1*	-31.0	*11.4*	*14.8*	-50.6	*77.8*	*10.0*	-6.6	*3.0*	*3.0*
Koninklijke DSM NV DSM NLD	7,722 EUR	-15.9	*2.6*	*3.6*	-7.4	*25.4*	*-5.6*	-13.3	*41.4*	*-8.0*	-69.4	*591.7*	*64.6*	—	—	—
Average		-10.9	*-4.5*	*3.8*	-17.7	*10.0*	*1.9*	-22.3	*17.0*	*3.1*	-25.1	*227.5*	*11.8*	-1.5	*2.4*	*2.4*
Solvay SA SOLB BE	**11,047** EUR	**3.9**	***12.2***	***2.5***	**0.7**	***34.5***	***-1.8***	**8.8**	***-4.7***	***-3.4***	**-697.8**	***-119.8***	***25.9***	**3.1**	***3.0***	—

Solvay SA SOLB (XBRU) | ★★★

Last Price	Fair Value	Uncertainty	Economic Moat™	Moat Trend™	Stewardship	Industry Group
87.69 EUR	85.00 EUR	High	None	Stable	Standard	Chemicals

Comparable Company Analysis

These companies are chosen by the analyst and the data are shown by nearest calendar year in descending market capitalization order.

Profitability Analysis

Company/Ticker	Last Historical Year Net Income (Mil)	Gross Margin % 2015	2016(E)	2017(E)	EBITDA Margin % 2015	2016(E)	2017(E)	Operating Margin % 2015	2016(E)	2017(E)	Net Margin % 2015	2016(E)	2017(E)	Free Cash Flow Margin % 2015	2016(E)	2017(E)
Basf SE BAS DEU	3,987 EUR	27.1	28.4	28.4	15.2	16.5	16.5	8.9	10.5	10.5	5.7	6.6	6.6	5.2	10.5	6.1
E.I. du Pont de Nemours & Co DD USA	2,569 USD	38.0	38.9	39.3	20.7	21.1	21.2	14.9	15.7	16.2	10.2	10.9	11.3	2.7	11.2	11.9
Koninklijke DSM NV DSM NLD	343 EUR	31.7	28.8	28.0	16.5	17.6	16.1	7.4	9.1	8.3	4.4	6.1	5.4	-1.3	5.9	10.5
Average		32.3	32.0	31.9	17.5	18.4	17.9	10.4	11.8	11.7	6.8	7.9	7.8	2.2	9.2	9.5
Solvay SA SOLB BE	**680** EUR	**25.0**	***26.8***	***25.8***	**17.7**	***19.7***	***18.2***	**9.7**	***11.7***	***11.2***	**6.2**	***6.6***	***6.2***	**5.3**	***5.4***	***6.9***

Leverage Analysis

Company/Ticker	Last Historical Year Total Debt (Mil)	Debt/Equity % 2015	2016(E)	2017(E)	Debt/Total Cap % 2015	2016(E)	2017(E)	EBITDA/Interest Exp. 2015	2016(E)	2017(E)	Total Debt/EBITDA 2015	2016(E)	2017(E)	Assets/Equity 2015	2016(E)	2017(E)
Basf SE BAS DEU	15,197 EUR	49.2	47.3	45.5	33.0	32.1	31.3	16.8	17.1	17.4	1.4	1.5	1.5	2.3	2.2	2.2
E.I. du Pont de Nemours & Co DD USA	8,807 USD	88.1	110.8	100.4	46.9	52.6	50.1	15.2	14.2	15.1	1.7	1.7	1.6	4.1	4.9	4.6
Koninklijke DSM NV DSM NLD	2,810 EUR	50.7	58.0	56.7	33.7	36.7	36.2	9.2	13.0	11.4	2.2	2.4	2.5	2.1	2.2	2.2
Average		62.7	72.0	67.5	37.9	40.5	39.2	13.7	14.8	14.6	1.8	1.9	1.9	2.8	3.1	3.0
Solvay SA SOLB BE	**6,520** EUR	**69.2**	***78.7***	***75.6***	**40.9**	***44.0***	***43.0***	**19.6**	***13.7***	***12.0***	**3.3**	***3.2***	***3.3***	**2.7**	***2.8***	***2.7***

Liquidity Analysis

Company/Ticker	Market Cap (Mil)	Cash per Share 2015	2016(E)	2017(E)	Current Ratio 2015	2016(E)	2017(E)	Quick Ratio 2015	2016(E)	2017(E)	Cash/Short-Term Debt 2015	2016(E)	2017(E)	Payout Ratio % 2015	2016(E)	2017(E)
Basf SE BAS DEU	64,863 EUR	2.44	5.97	6.65	1.73	1.82	1.88	1.04	1.23	1.28	0.55	1.35	1.50	66.8	69.2	68.7
E.I. du Pont de Nemours & Co DD USA	60,538 USD	5.89	4.19	5.15	1.72	1.55	1.63	1.12	0.96	1.03	4.55	3.07	3.62	79.2	61.3	45.0
Koninklijke DSM NV DSM NLD	9,896 EUR	3.80	7.57	10.71	1.62	1.89	1.96	0.94	1.19	1.39	2.63	5.22	7.38	370.2	59.6	64.8
Average		4.04	5.91	7.50	1.69	1.75	1.82	1.03	1.13	1.23	2.58	3.21	4.17	172.1	63.4	59.5
Solvay SA SOLB BE	**9,100** EUR	**2.10**	***15.29***	***19.66***	**1.53**	***1.88***	***1.93***	**1.10**	***1.43***	***1.47***	**0.20**	***1.81***	***2.33***	**68.9**	***47.3***	***45.8***

Research Methodology for Valuing Companies

MORNINGSTAR®

Overview

At the heart of our valuation system is a detailed projection of a company's future cash flows, resulting from our analysts' research. Analysts create custom industry and company assumptions to feed income statement, balance sheet, and capital investment assumptions into our globally standardized, proprietary discounted cash flow, or DCF, modeling templates. We use scenario analysis, in-depth competitive advantage analysis, and a variety of other analytical tools to augment this process. Moreover, we think analyzing valuation through discounted cash flows presents a better lens for viewing cyclical companies, high-growth firms, businesses with finite lives (e.g., mines), or companies expected to generate negative earnings over the next few years. That said, we don't dismiss multiples altogether but rather use them as supporting cross-checks for our DCF-based fair value estimates. We also acknowledge that DCF models offer their own challenges (including a potential proliferation of estimated inputs and the possibility that the method may miss short-term market-price movements), but we believe these negatives are mitigated by deep analysis and our long-term approach.

Morningstar, Inc. and its affiliates ("Morningstar", "we", "our") believes that a company's intrinsic worth results from the future cash flows it can generate. The Morningstar Rating for stocks identifies stocks trading at a discount or premium to their intrinsic worth—or fair value estimate, in Morningstar terminology. Five-star stocks sell for the biggest risk-adjusted discount to their fair values, whereas 1-star stocks trade at premiums to their intrinsic worth.

Four key components drive the Morningstar rating: (1) our assessment of the firm's economic moat, (2) our estimate of the stock's fair value, (3) our uncertainty around that fair value estimate and (4) the current market price. This process ultimately culminates in our single-point star rating.

1. Economic Moat

The concept of an economic moat plays a vital role not only in our qualitative assessment of a firm's long-term investment potential, but also in the actual calculation of our fair value estimates. An economic moat is a structural feature that allows a firm to sustain excess profits over a long period of time. We define economic profits as returns on invested capital (or ROIC) over and above our estimate of a firm's cost of capital, or weighted average cost of capital (or WACC). Without a moat, profits are more susceptible to competition. We have identified five sources of economic moats: intangible assets, switching costs, network effect, cost advantage, and efficient scale.

Companies with a narrow moat are those we believe are more likely than not to achieve normalized excess returns for at least the next 10 years. Wide-moat companies are those in which we have very high confidence that excess returns will remain for 10 years, with excess returns more likely than not to remain for at least 20 years. The longer a firm generates economic profits, the higher its intrinsic value. We believe low-quality, no-moat companies will see their normalized returns gravitate toward the firm's cost of capital more quickly than companies with moats.

To assess the sustainability of excess profits, analysts perform ongoing assessments of the moat trend. A firm's moat trend is positive in cases where we think its sources of competitive advantage are growing stronger; stable where we don't anticipate changes to competitive advantages over the next several years; or negative when we see signs of deterioration.

2. Estimated Fair Value

Combining our analysts' financial forecasts with the firm's economic moat helps us assess how long returns on invested capital are likely to exceed the firm's cost of capital. Returns of firms with a wide economic moat rating are assumed to fade to the perpetuity period over a longer period of time than the returns of narrow-moat firms, and both will fade slower than no-moat firms, increasing our estimate of their intrinsic value.

Our model is divided into three distinct stages:

Stage I: Explicit Forecast

In this stage, which can last five to 10 years, analysts make full financial statement forecasts, including items such as revenue, profit margins, tax rates, changes in working-capital accounts, and capital spending. Based on these projections, we calculate earnings before interest, after taxes (EBI) and the net new investment (NNI) to derive our annual free cash flow forecast.

Stage II: Fade

The second stage of our model is the period it will take the company's return on new invested capital—the return on capital of the next dollar invested ("RONIC")—to decline (or rise) to its cost of capital. During the Stage II period, we use a formula to approximate cash flows in lieu of explicitly modeling the income statement, balance sheet, and cash flow statement as we do in Stage I. The length of the second stage depends on the strength of the company's economic moat. We forecast this period to last anywhere from one year (for companies with no economic moat) to 10–15 years or more (for wide-moat companies). During this period, cash flows are forecast using four assumptions: an average growth rate for EBI over the period, a normalized investment rate, average return on new invested capital (RONIC), and the number of years until perpetuity, when excess returns cease. The investment rate and return on new invested capital decline until a perpetuity value is calculated. In the case of firms that do not earn their cost of capital, we assume marginal ROICs rise to the firm's cost of capital (usually attributable to less reinvestment), and we may truncate the second stage.

Stage III: Perpetuity

Once a company's marginal ROIC hits its cost of capital, we calculate a continuing value, using a standard perpetuity formula. At perpetuity, we assume that any growth or decline or investment in the business neither creates nor destroys value and that any new investment provides a return in line with estimated WACC.

Because a dollar earned today is worth more than a dollar earned tomorrow, we discount our projections of cash flows in stages I, II, and III to arrive at a total pres-

Morningstar Research Methodology for Valuing Companies

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ent value of expected future cash flows. Because we are modeling free cash flow to the firm—representing cash available to provide a return to all capital providers—we discount future cash flows using the WACC, which is a weighted average of the costs of equity, debt, and preferred stock (and any other funding sources), using expected future proportionate long-term, market-value weights.

3. Uncertainty around that fair value estimate
Morningstar's Uncertainty Rating captures a range of likely potential intrinsic values for a company and uses it to assign the margin of safety required before investing, which in turn explicitly drives our stock star rating system. The Uncertainty Rating represents the analysts' ability to bound the estimated value of the shares in a company around the Fair Value Estimate, based on the characteristics of the business underlying the stock, including operating and financial leverage, sales sensitivity to the overall economy, product concentration, pricing power, and other company-specific factors.

Analysts consider at least two scenarios in addition to their base case: a bull case and a bear case. Assumptions are chosen such that the analyst believes there is a 25% probability that the company will perform better than the bull case, and a 25% probability that the company will perform worse than the bear case. The distance between the bull and bear cases is an important indicator of the uncertainty underlying the fair value estimate.

Our recommended margin of safety widens as our uncertainty of the estimated value of the equity increases. The more uncertain we are about the estimated value of the equity, the greater the discount we require relative to our estimate of the value of the firm before we would recommend the purchase of the shares. In addition, the uncertainty rating provides guidance in portfolio construction based on risk tolerance.

Our uncertainty ratings for our qualitative analysis are low, medium, high, very high, and extreme.

- ►**Low:** margin of safety for 5-star rating is a 20% discount and for 1-star rating is 25% premium.
- ►**Medium:** margin of safety for 5-star rating is a 30% discount and for 1-star rating is 35% premium.
- ►**High:** margin of safety for 5-star rating is a 40% discount and for 1-star rating is 55% premium.
- ►**Very High:** margin of safety for 5-star rating is a 50% discount and for 1-star rating is 75% premium.
- ►**Extreme:** Stock's uncertainty exceeds the parameters we have set for assigning the appropriate margin of safety.

4. Market Price
The market prices used in this analysis and noted in the report come from exchange on which the stock is listed which we believe is a reliable source.

For more detail information about our methodology, please go to http://global.morningstar.com/equitydisclosures

Morningstar Star Rating for Stocks
Once we determine the fair value estimate of a stock, we compare it with the stock's current market price on a daily basis, and the star rating is automatically re-calculated at the market close on every day the market on which the stock is listed is open. Our analysts keep close tabs on the companies they follow, and, based on thorough and ongoing analysis, raise or lower their fair value estimates as warranted.

Please note, there is no predefined distribution of stars. That is, the percentage of stocks that earn 5 stars can fluctuate daily, so the star ratings, in the aggregate, can serve as a gauge of the broader market's valuation. When there are many 5-star stocks, the stock market as a whole is more undervalued, in our opinion, than when very few companies garner our highest rating.

We expect that if our base-case assumptions are true the market price will converge on our fair value estimate over time, generally within three years (although it is impossible to predict the exact time frame in which market prices may adjust).

Our star ratings are guideposts to a broad audience and individuals must consider their own specific investment goals, risk tolerance, tax situation, time horizon, income needs, and complete investment portfolio, among other factors.

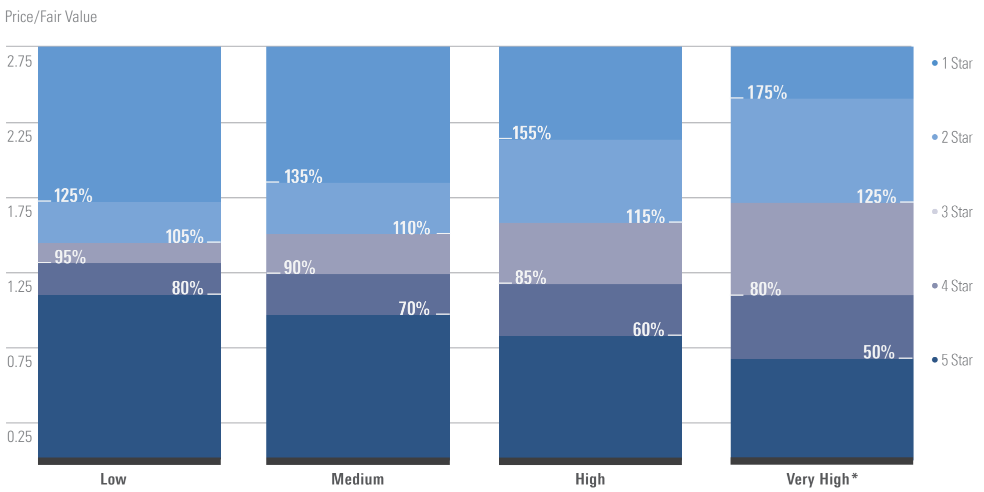
The Morningstar Star Ratings for stocks are defined below:

Five Stars ★★★★★
We believe appreciation beyond a fair risk-adjusted return is highly likely over a multiyear time frame. Scenario analysis developed by our analysts indicates that the current market price represents an excessively pessimistic outlook, limiting downside risk and maximizing upside potential.

Four Stars ★★★★
We believe appreciation beyond a fair risk-adjusted return is likely.

Three Stars ★★★
Indicates our belief that investors are likely to receive a fair risk-adjusted return (approximately cost of equity).

Morningstar Research Methodology for Valuing Companies



* Occasionally a stock's uncertainty will be too high for us to estimate, in which case we label it Extreme.

Research Methodology for Valuing Companies

Two Stars ★★
We believe investors are likely to receive a less than fair risk-adjusted return.

One Star ★
Indicates a high probability of undesirable risk-adjusted returns from the current market price over a multiyear time frame, based on our analysis. Scenario analysis by our analysts indicates that the market is pricing in an excessively optimistic outlook, limiting upside potential and leaving the investor exposed to Capital loss.

Other Definitions:

Last Price: Price of the stock as of the close of the market of the last trading day before date of the report.

Stewardship Rating: Represents our assessment of management's stewardship of shareholder capital, with particular emphasis on capital allocation decisions. Analysts consider companies' investment strategy and valuation, financial leverage, dividend and share buyback policies, execution, compensation, related party transactions, and accounting practices. Corporate governance practices are only considered if they've had a demonstrated impact on shareholder value. Analysts assign one of three ratings: "Exemplary," "Standard," and "Poor." Analysts judge stewardship from an equity holder's perspective. Ratings are determined on an absolute basis. Most companies will receive a Standard rating, and this is the default rating in the absence of evidence that managers have made exceptionally strong or poor capital allocation decisions.

Quantitative Valuation: Using the below terms, intended to denote the relationship between the security's Last Price and Morningstar's quantitative fair value estimate for that security.

- **Undervalued:** Last Price is below Morningstar's quantitative fair value estimate.
- **Farily Valued:** Last Price is in line with Morningstar's quantitative fair value estimate.
- **Overvalued:** Last Price is above Morningstar's quantitative fair value estimate.

Risk Warning
Please note that investments in securities are subject to market and other risks and there is no assurance or guarantee that the intended investment objectives will be achieved. Past performance of a security may or may not be sustained in future and is no indication of future performance. A security investment return and an investor's principal value will fluctuate so that, when redeemed, an investor's shares may be worth more or less than their original cost. A security's current investment performance may be lower or higher than the investment performance noted within the report. Morningstar's Uncertainty Rating serves as a useful data point with respect to sensitivity analysis of the assumptions used in our determining a fair value price.

Solvay SA SOLB (XBRU) | ★★★

Last Price	Fair Value	Uncertainty	Economic Moat™	Moat Trend™	Stewardship	Industry Group
87.69 EUR	85.00 EUR	High	None	Stable	Standard	Chemicals

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Solvay SA SOLB (XBRU) | ★★★

Last Price	Fair Value	Uncertainty	Economic Moat™	Moat Trend™	Stewardship	Industry Group
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Solvay SA SOLB (XBRU) | ★★★

Last Price	Fair Value	Uncertainty	Economic Moat™	Moat Trend™	Stewardship	Industry Group
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