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## Structural Drivers of Value Creation in the Chemical Industry

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A long-term analysis of the chemical industry has revealed that many factors that are thought to increase value actually do not, and delivered interesting insights into the true drivers of value creation. The study shows that the primary driver of value creation in chemical companies is in actual fact the composition of their product portfolios. Strategies to improve return on invested capital (ROIC) as the primary value driver in each of the product segments should focus on capital efficiency as well as margins and take a cautious stance on trying to outgrow performance problems. On a corporate level, a rigorous approach to portfolio management can be a significant factor in value creation, if centered around improving long-term ROIC rather than on size and growth targets, and if it ensures that the different parts of the portfolio are managed in accordance with the type of business.

### 3.1

#### Introduction to the Study

With more than 70,000 product lines and dozens of geographic markets, the chemical industry of today is deeply complex. So many strategies – or combinations of strategies – have been developed over the years for so many markets that industry analysts and executives struggle to understand what really creates shareholder value.

While previous performance is of course no guarantee of future returns, we felt for several reasons that an examination of the historical patterns of value creation might deliver insights to support forward-looking strategy formulation. The industry reached maturity about 20 years ago, the evolution of supply and demand has become, on average, more or less predictable. Moreover, unlike pharmaceuticals or telecommunications, the industry is not likely to be transformed by technologies or regulations in the near future. Hence, historical trends are fairly likely to reflect the future development of the industry as well. In order to establish a sound basis, we compiled more than 40 years of financial and stock market data on 130 publicly traded chemical companies in Europe and the United

States<sup>1)</sup>, employing various performance metrics and detailed refinements to make the data as comparable as possible over geographies and time.

Since strategies are hard to classify, we chose to examine performance relative to some easily measurable dimensions. These dimensions, however, directly relate to important strategic choices for individual industry players. Our research suggests that, on the industry level, none of the factors commonly regarded as strategic levers for value creation in the industry – scale, geography, market position, or degree of focus – makes much difference. The performance of a chemical company correlates strongly only with its product portfolio – commodity, specialty, or diversified chemicals<sup>2)</sup>. Within each of these segments, distinct trends in the factors can be identified which yield valuable insights for chemical companies.

### 3.2

#### Mobility in a Mature Industry

The chemical industry is often regarded as sluggish and slow-growing – a reputation due partly to its maturity and partly to comparison between its shareholder returns and those of technology companies during the bubble of the late 1990s. However, the long-term data show that this reputation is largely unjustified.

To begin with, though the percentage of overall economic activity accounted for by the industry continues to shrink – in the United States, down from four percent to less than two percent over the past 25 years – shareholder returns were roughly on a par with those of the broad market indexes in the United States and Europe over the same period. In the United States, for example, both the chemical industry and the broad market returned roughly thirteen percent a year to shareholders,<sup>3)</sup> a more robust rate than that of other asset-heavy mature industries, such as steel, automotive, and pulp and paper. This is certainly quite an accomplishment.

Furthermore, the chemical industry stands apart from other commodity industries in that a wide gap separates the top and bottom performers. In November 2004, for example, the top quartile of chemical companies had a market-to-book ratio 3.1 times the bottom quartile's – a far wider spread than that of other asset-heavy industries, such as automotive (1.9), pulp and paper (1.8), and steel (1.6). Companies in those industries operate in more transparent and global commodity markets with fewer strategic options at the corporate level. By contrast, the far more complex chemical markets are fragmented into thousands of submarkets

1) Our database includes companies that have ceased to exist as independent entities as well as companies listed throughout the period covered by the research. The data for the European companies extend from 1988 to 2003. At the time of writing, not all the 2004 data have been published.

2) Diversified companies sell both commodity and specialty products, with neither

accounting for more than 70 percent of total revenues.

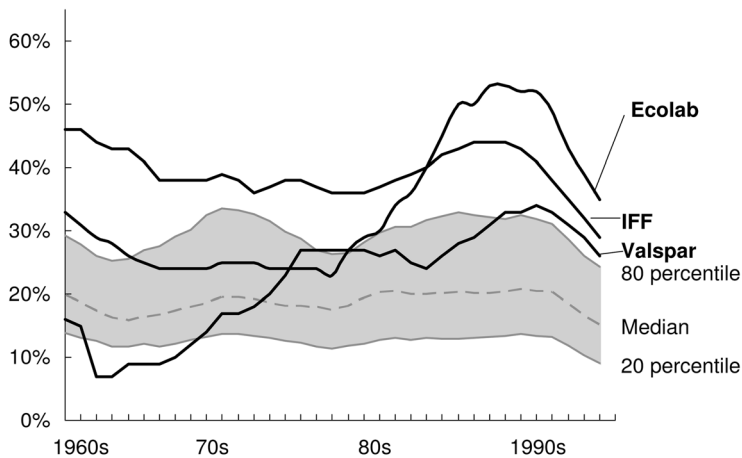
3) The exact values for the annualized Total Return to Shareholders are 12.9 percent for the chemical industry and 13.8 percent for the US market from 1980 until November 2004 (Source: Thomson Financial).

defined by product, geography, and customer industry. Although this complexity makes it difficult to identify industry-wide patterns of success, it offers a diverse range of opportunities to exploit niches and create shareholder value.

In addition, there is significant mobility between the upper and lower performance quartiles of the industry – demonstrating its potential for creating (and destroying) value and underscoring the fact that stock markets pay careful attention to the performance of individual companies. Fewer than half of today's top-quartile companies, for example, occupied the top quartile a decade ago. In fact, several of today's top-performing chemical companies – including Ecolab and Valspar – were formerly average or even below-average performers (Fig. 3.1). And as recently as a decade ago, 20 percent of today's bottom-quartile companies were above-average performers.<sup>4)</sup>

This mobility must be understood in the context of the maturity of the chemical industry. No imminent disruptions will transform it as a whole, but myriad changes, in factor prices and end-user demands, for example, will allow companies to redefine their products and services dynamically in specific markets and geographies. Companies in other mature industries, such as pulp and paper or metals and mining, find it much harder to reposition themselves competitively.

North American chemical companies, 7-year moving average ROIC before taxes



Source: McKinsey

**Fig. 3.1** Mobility in a mature industry.

4) This analysis is based on a subset of 60 European and North American companies

which were listed throughout the period between 1992 and 2003.

### 3.3

#### What Drives Performance?

What strategy, if any, correlates with strong performance? Unfortunately, chemical companies' strategies are hard to classify, since most compete in a range of product and geographic markets requiring a variety of approaches: one unit might strive to produce at low cost, another to innovate. Moreover, a degree of subjectivity is involved in the classification of one company as, say, innovative and another as not innovative.

We therefore chose to examine the performance of chemical companies in relation to some easily measurable dimensions of their corporate activity – such as product portfolio, scale, geography, market position, and product focus. By classifying companies this way, we were able to test a number of hypotheses about what drives the creation of value, measured by total return to shareholders (TRS), market-to-book value, and pre-tax return on invested capital (ROIC). Data from the last full commodity cycle (1992 to 2003) generated surprising insights.<sup>5)</sup>

- *Scale*: In the chemical industry, bigger is thought to be better. Nevertheless, given the highly fragmented nature of its various markets, size is not a primary influence on performance. Economies of scale do, however, provide benefits in the commodity and diversified segments.
- *Geography*: Although North American chemical companies are widely thought to perform better than their European competitors, our research showed that the gap has significantly narrowed over the past decade. North American chemical companies still have a higher market-to-book value. However, as there are virtually no differences in return on invested capital anymore, we believe that this primarily expresses a general valuation difference between the capital markets rather than something specific to the chemical industry.
- *Market position*: Most industry analysts believe that companies with market-leading positions – those that derive more than 50 percent of their revenues from businesses ranking first or second in global or regional sales – should exhibit better performance than second-line players. Yet one of our more surprising findings was that companies with market-leading positions had no significant performance advantage
- *Focus*: Conventional wisdom also holds that tightly focused companies – those deriving more than 80 percent of their revenues

5) These metrics were selected in order to capture different aspects of value creation: TRS measures the realized value creation for shareholders. The market-to-book value is a proxy for the capital market's expectations on future value creation. And ROIC is, in an

industry without significant growth, the key driver of fundamental value creation. We are using pre-tax returns to allow for better comparability over time and between different countries.

from only two kinds of businesses – tend to have better performance. In reality, again, there are no significant performance differences between focused and unfocused companies on an industry level. What is more, large diversified companies have been able to generate the highest total return to shareholders.<sup>6)</sup> However, after a long period of insignificant differences in performance, focused specialty players nowadays appear to be performing better in terms of current ROIC and also future expected performance (market-to-book) than unfocused specialty chemical companies. Of course, we can enter a caveat here: the definition of focus as “product focus” may be over-simplified and fail to do justice to the complexity of the markets. A focused company may, for example, apply the same core competence in all it does (e.g., technology/production, the same customers, the same business model or approach). In other senses, therefore, the correlation between focus and success may still be valid.

North American and European chemical companies, average, 1992 - 2003, percent

Possible factors in value creation	Category	Median total return to shareholders, CAGR* Percent	Median market-to-book** Ratio	Median ROIC before taxes Percent
Product portfolio	Commodity	4.7	1.3	11.8
	Diversified	8.7	1.5	12.4
	Specialty	7.2	1.8	17.4
Scale Largest to smallest by scale	Quintile 1	8.9	1.6	13.2
	Quintile 2	11.4	1.6	14.7
	Quintile 3	7.3	1.5	15.1
	Quintile 4	4.0	1.6	15.7
	Quintile 5	3.2	1.5	14.0
Geography	Europe	8.3	1.2	12.2
	North America	7.2	1.7	16.0
Market position	Global leader***	6.6	1.8	16.4
	Regional leader***	10.2	1.3	14.0
	Second line***	7.9	1.7	14.9
Focus	Focused	6.4	1.6	14.6
	Not focused	8.5	1.4	13.0

\* Compound annual growth rate

\*\* Operating enterprise value / invested capital

\*\*\* Global and regional leaders derive >50% of revenues from business ranking first or second in global or regional sales respectively

Source: McKinsey

Fig. 3.2 Product portfolio matters most.

By the definitions applied, however, our analysis showed that the only statistically significant characteristic that correlated with the measures of performance –

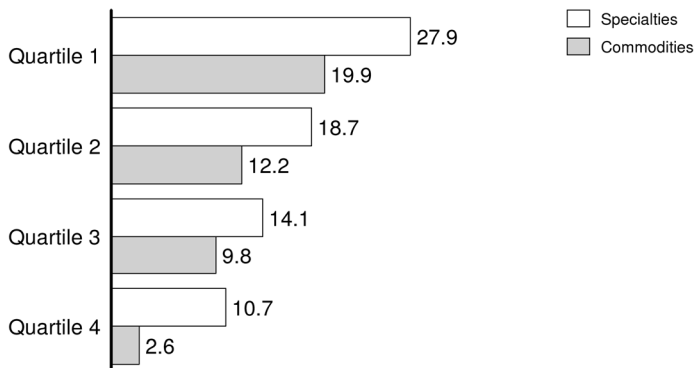
- 6) Although this only means that they have been able to improve their performance better than other chemical companies.

total return to shareholders, market-to-book value, and pre-tax return on invested capital – was a company’s product portfolio: commodity chemicals, specialty chemicals, or diversified (Fig. 3.2). In the period we studied (1992 to 2003), diversified companies generated higher total returns to shareholders (8.7%) than did specialty companies (7.2%), which in turn outperformed commodity companies (4.7%). As measured by return on invested capital and market-to-book value, specialty companies performed best. The diversified companies’ higher TRS over this period can be explained by the expectations of shareholders, who thought, in an extrapolation of past performance, that specialty companies but not diversified ones would perform well financially. When diversified companies did better than expected, their shares rose considerably. Meanwhile, the specialty companies had to perform well merely to keep their total returns to shareholders stagnant.<sup>7)</sup>

Although the performance of companies in the chemical industry correlates well with their product segments, they should not rush to modify their portfolios, since some specialty companies perform much worse than some commodity players (Fig. 3.3). Besides, the wide range of performance within each segment proves that portfolio choices alone do not guarantee success. However, a diverse set of opportunities, some relatively overlooked, seems to be available for creating value in market niches.

#### Median ROIC before tax by product portfolio

North American and European chemical companies, average, 1992 - 2003, percent



Source: McKinsey

**Fig. 3.3** Operating performance is relative.

7) The higher market expectations can be seen in the specialty segment’s higher average market-to-book values.

### 3.4

#### A Closer Look at Value Creation in the Segments

The data sent some clear messages about how commodity and specialty companies could improve their performance. For diversified companies, the results were more ambiguous.

##### 3.4.1

#### Commodity Companies

Although commodity companies<sup>8)</sup> performed less well than their specialty and diversified counterparts from 1992 to 2003, plenty of evidence suggests that they can find the right strategy to create shareholder value – or at least to avoid destroying it. Many of our findings confirm accepted beliefs about what makes commodity companies successful, but few companies seem to heed them.

One significant phenomenon of the commodity segment is that this subindustry segment earns a margin above its cost of capital only on average over a full commodity cycle, usually a period of seven to eight years (see also Chapter 6).

The first finding for the commodity segment is that size does matter. Larger companies had less cyclical (though not higher) returns on invested capital, and the less cyclical returns correlated, albeit mildly, with higher total returns to shareholders. These companies were not only able to cut their production costs, but also had sufficiently diversified offerings – and therefore sufficiently stable cash flows – to weather cycles for individual products.

We also found that commodity players cannot simply grow into market appreciation, i.e., increase their valuations through strong top line growth, since sustainable growth is almost impossible for the markets to detect. The modest amount of nominal, volume-based growth we found was heavily masked by the industry's largely self-imposed pricing cycles, not by broader macroeconomic trends. As a result, investors have not rewarded companies that tried to grow, either organically or through acquisitions, at below-average profitability. In our sample, such companies had paltry median market-to-book ratios of around one.

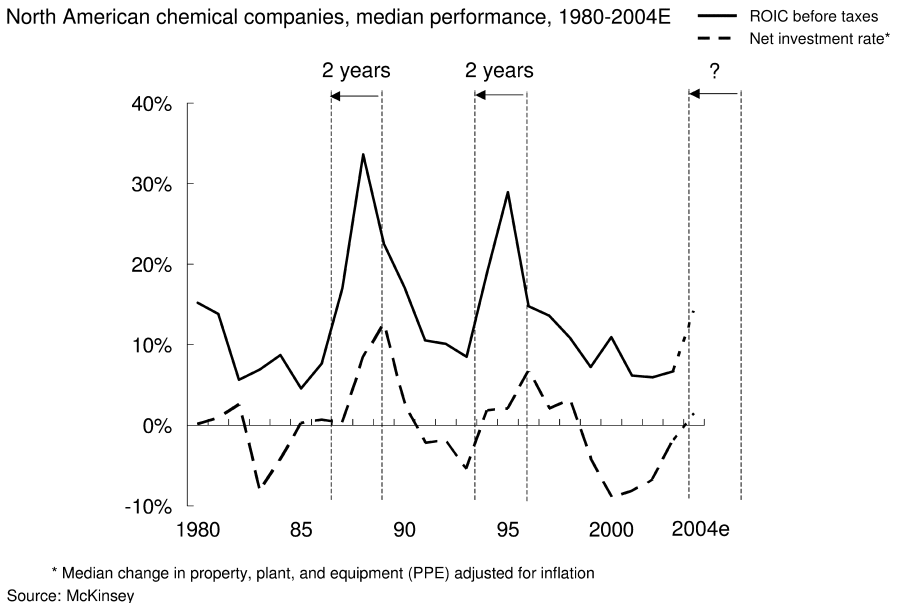
There are two problems around growth in the commodity chemicals segment.

First, too many companies have sought to achieve scale without paying enough attention to the return on their invested capital. The clearest finding of our research reinforces this basic point: return on invested capital matters far more than revenue growth. Even those companies with above-average returns on invested capital had the same market-to-book ratios, no matter whether they were growing quickly or slowly. This is, as we believe, due to the commodity markets' inherent cyclicity, which makes it impossible for investors to tell real growth from temporary price driven fly-ups.

8) Our study did not include the integrated petrochemical activities of the large oil companies.

Second, our research also confirmed the idea that the timing of capital investments, rather than strong fluctuations in demand, is to blame for the industry's volatile cycles. An industry-wide herd instinct for capital investment decisions has created large supply-and-demand swings (see Nattermann, P.). Since companies make most of their capital investments during the cycle's upswings (Fig. 3.4), prices fall quickly as new supply floods the market about two years later.

Interestingly, the industry appears to be, in its current upswing, once again at one of these critical decision points. Executives with the courage to defy conventional wisdom and withstand pressure from their boards, investors, and bankers by investing in new capacity countercyclically (or at least independently of cycles) could generate substantial returns. Indeed, a McKinsey study estimates that companies might double their return on new capital investments by pursuing an independent approach (see Copeland, T. et al.). One might speculate that privately held commodity companies, which are free to buck the pressure to conform, stand a better chance than others of breaking out of the industry's self-destructive investment cycles.



**Fig. 3.4** ROIC and investment rate in commodity chemicals.

3.4.2  
Specialty Companies

In the 1990s, there were two distinct periods for specialty companies: 1990 to 1997 was a time of good performance and significant expectations on value creation; after 1997, valuations fell sharply (Fig. 3.5). Despite continuing evidence of an industry slump, however, specialty companies have ample opportunities to create value in the thousands of product and geographic markets in which they compete.

During the boom years of the early to mid-1990s, specialty companies enjoyed real and sustained sales growth, higher returns on invested capital, and greater total returns to shareholders. Yet they did not deliver these strong results through higher margins – a somewhat counterintuitive finding, since specialties are thought to have higher average margins than commodities. In fact, notwithstanding higher prices and lower depreciation rates than commodity companies can boast, specialty companies turned out to have a higher cost base in R&D, marketing, technical support, and the like. Over full commodity cycles, their margins are thus roughly comparable to those of commodity companies.

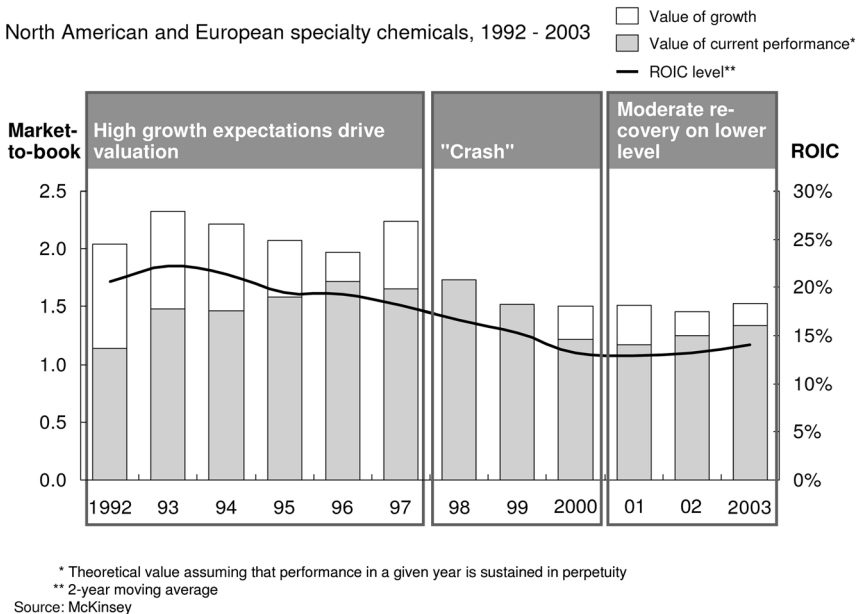


Fig. 3.5 Evolution of specialty chemicals' valuation.

Specialty companies have achieved higher returns than commodity companies through higher levels of capital productivity – the result of the smaller facilities needed to produce smaller quantities of chemicals that command higher prices. The specialty segment's higher levels of capital productivity have generated higher

returns on invested capital, which (coupled with revenue growth) have created shareholder value. Since high capital productivity drives shareholder value in this segment, specialty players have to preserve it.

Thus, the massive decline in the specialty segment's capital productivity during the mid-1990s came as an unpleasant surprise. The decline was due in part to rising levels of invested capital, most notably from a string of acquisitions laden with goodwill, such as Clariant's purchase of BTP and ICI's acquisition of Unilever's specialty chemical businesses, attempts to gain scale in market segments deemed to be particularly attractive, i.e., life sciences, and a general expansion of capacity in the quest for growth which did not materialize. Moreover, as specialty products have come to face increased competition and commoditization from low-cost producers in China and India, prices have fallen, and the resulting decline in revenues has not helped. The fate of vitamin C is a good example: from 1990 to 2002 the global market share of Chinese producers rose from zero to 24 percent; meanwhile, prices per kilo dropped by 63 percent, to USD 4.7 from USD 12.7.

In the late 1990s, when investors noticed the combination of declining growth and declining capital productivity, many lost faith in the segment. While fears of repercussions from the Asian crisis proved unfounded, other structural factors such as Asian competition and the commoditization of many former specialty products took effect in their stead.

Currently, specialty chemical players too are benefiting from better industry conditions, significant cost improvement efforts by many players, and a very cautious stance on investments and acquisitions over the last few years. However, we predict that the pre-1997 glory days will never return. Rapid commoditization of parts of the portfolio and relentless price pressure will continue to endanger business models. For some players, a rigorous focus on cost will be the path to success, others – and these businesses will still earn a substantial premium on industry average profitability – will develop true customer solutions.

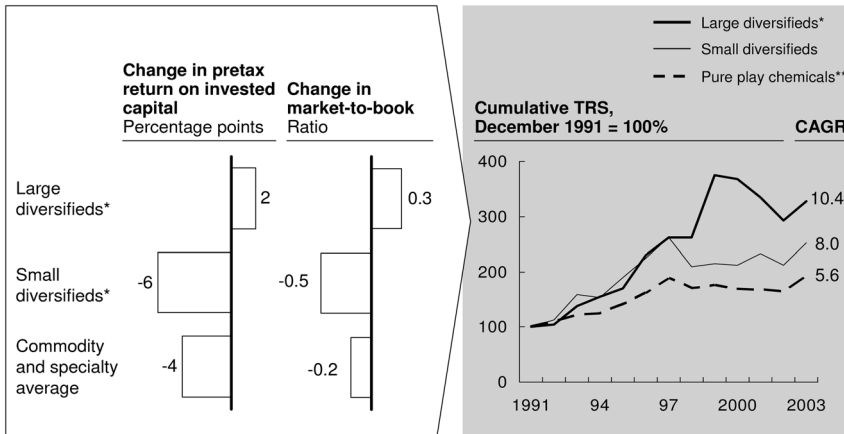
Some highly successful companies, Ecolab for instance, have already focused on organic growth through new business models and the extension of capital-light service lines, such as cleaning services for the food industry. For other companies with less favorable positions, tough choices on their portfolios of businesses will lie ahead. We are not necessarily advocating a focused business model, but many specialty chemicals companies with broad portfolios will need to explore every option to deal with the number of already-disadvantaged businesses, suffering from structural overcapacity and continuous price pressure. Companies that avoid overinvesting will have an advantage in maintaining their capital productivity rates and positioning themselves for stronger performance.

### 3.4.3

#### **Diversified Companies**

Diversified companies presented a much more puzzling picture during the last cycle. In terms of total return to shareholders, surprisingly, diversified chemical companies performed best among the industry subgroups from 1992 onwards.

North American and European chemical companies, 1992 vs. 2003



\* Large diversified companies in top quintile of industry sales on average 1992 - 2003; all others are classified as small

\*\* Commodity and specialty chemicals

Source: McKinsey

**Fig. 3.6** Large diversified outperformed other chemical companies.

This seems hard to explain, because one would expect a performance between the specialty and commodity players, reflecting the diversified companies' business portfolios. Their high total returns to shareholders were driven, as we have seen, by their strong financial performance against low market expectations in the early 1990s. Although not all of them did well, from 1992 to 2003 the large ones (defined as those in the top quintile of sales) actually had significantly higher returns than either commodity or specialty companies (Fig. 3.6). In fact, large diversified companies also exhibit a trend in fundamental performance which has been different from the other subindustries. In the early 1990s their ROIC at best matched that of more focused commodity-based players. Diversified companies improved performance in the mid 1990s, and they have been able to sustain some of this performance improvement against the industry trend of declining return on capital. Consequently, their valuation levels have followed the improvements in fundamental performance which in turn led to exceptional returns to shareholders until the late 1990s. The smaller diversified companies, by contrast, have not recovered from the combined effects of an industry downturn and the 1997 Asian economic crisis, and our research did not identify clear performance drivers for this segment.

We feel there are several underlying fundamental factors in this development:

- Some diversified players (e.g., BASF, DSM) thrived as a result of rigorous portfolio rationalization which allowed them to concentrate on segments where they could be major players while avoiding overpaying to rush into specialties. At the same time, other

now-specialty chemical companies destroyed significant value and a single-segment focus for the sake of short-term capital market applause.

- Additionally, diversified players have often been able to build advantages of scale and scope in their businesses (in particular in commodities) and use globalization as an opportunity rather than a risk, while still coping successfully with the conflicts of running fundamentally different businesses within one organization.
- Although market position was not found to be a value driver for the industry in general, within the diversified segment it correlated moderately with higher returns. A focus on achieving market leadership by a well-targeted portfolio strategy may have helped transform these companies' fundamental financial performance over the past decade: DuPont, for example, almost doubled its pretax returns on invested capital from 1992 to 2003, driving up its capital market valuation by 40 percent over the same period.

Having improved their performance from a very low level to industry average, the large diversified companies now need to seek new ways to create value. Many could still pursue a much more rigorous portfolio strategy and performance management. While stabilizing returns against the industry trend is an achievement, rejuvenating the above-average shareholder returns will require diversified companies to make a further quantum leap in the continuous race for performance. It will be interesting to see how the large players here live up to the expectations underlying their higher valuations.

### 3.5 Summary

The highly fragmented and complex chemical industry is more dynamic than many people think. The performance difference between the top and bottom quartile is larger than in other asset-heavy, mature industries and mobility between the quartiles is significant over time. A thorough review of the past decade of the industry's value creation reveals that there are no generic textbook formulas or cookbook recipes for sustainable, value-creating strategies in the chemical industry. The industry's inherent complexity and obfuscating dynamics require tailor-made strategies for each situation and player which incorporate specific insight into these factors. The long proclaimed "death of strategy" certainly does not hold true for chemicals. However, a close examination of the interaction of fundamental value creation and capital market perception has created a clearer view of how commodity and specialty companies can and should manage capital productivity, growth, and portfolio structures to create shareholder value in the years ahead.

- On the business unit level, regardless of the type of business, chemical companies should focus on capital productivity as the key value driver of ROIC besides margins.
  - In addition to operational EBIT improvement levers, capital-light strategies and focus on the management of capital investments and net working capital are also means to this end.
  - For the extremely capital-intensive commodity segments, particular attention should be paid to the right timing of investments.
  - Even though the industry environment may now be geared towards more growth than in the past few years, chemical companies should in general take a cautious stance on trying to outgrow their performance problems. A strategy focused on growth will only be successful if based on a profitability clearly above the cost of capital by some margin in order to compensate for the considerable risk of growth strategies in asset-heavy industries.
- On the corporate level, there is evidence that portfolio management can be a significant driver of value creation for chemical companies, both for good and ill.
  - Portfolio transformations should be centered around improving long-term ROIC rather than size, growth targets, or a misperceived superiority of some business segments, such as the view of specialty chemicals in the past.
  - Furthermore, corporate centers which choose to stay diversified should recognize the substantially different nature of commodity and specialty chemical businesses. They hence need to manage them differently and in doing so bridge the chasm this will almost certainly create within their organizations.

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