CROCI®

IMPACT OF THE CRISIS ON VALUATIONS

May 2020

CONTINUING IMPACT OF THE CRISIS ON MARKETS

In this presentation, we examine:

1. The impact on earnings from the economic crisis
2. The dilution impact of the crisis
3. The impact on long-term asset returns
4. The tactical implications emerging from the proprietary ‘CROCI factors analysis’

2020 marks the 25th year of CROCI and the fifth economic crisis that the team has witnessed. Throughout its first quarter-century, its philosophy has remained the same, i.e. to assess the real level of earnings created by the capital invested of listed companies. This is based on the belief that, over the long term, fundamentals drive stock prices. CROCI’s objective analysis and bottom-up strategy allow us to focus on markets, themes and sectors without any emotional biases.

Source: DWS CROCI; Data as of 7th May 2020

1. IMPACT OF THE CRISIS ON EARNINGS

EARNINGS EXPECTATIONS VS REPRICING OF RISK

The common perception is that collapsing earning expectations during recessions drive share prices. However, **a collapse in earnings explain only a small part of the price move.** In the absence of any change in risk premium:

If earnings were to fall by 50% (a similar magnitude to 2008), then share prices should have fallen **by 5%**. If there were to be **a total loss of earnings** for the next two years, then share prices should have fallen **by 9%**. **The rest of the move in prices is the result of the repricing of risk**, which we can measure through changes in the discount rate.

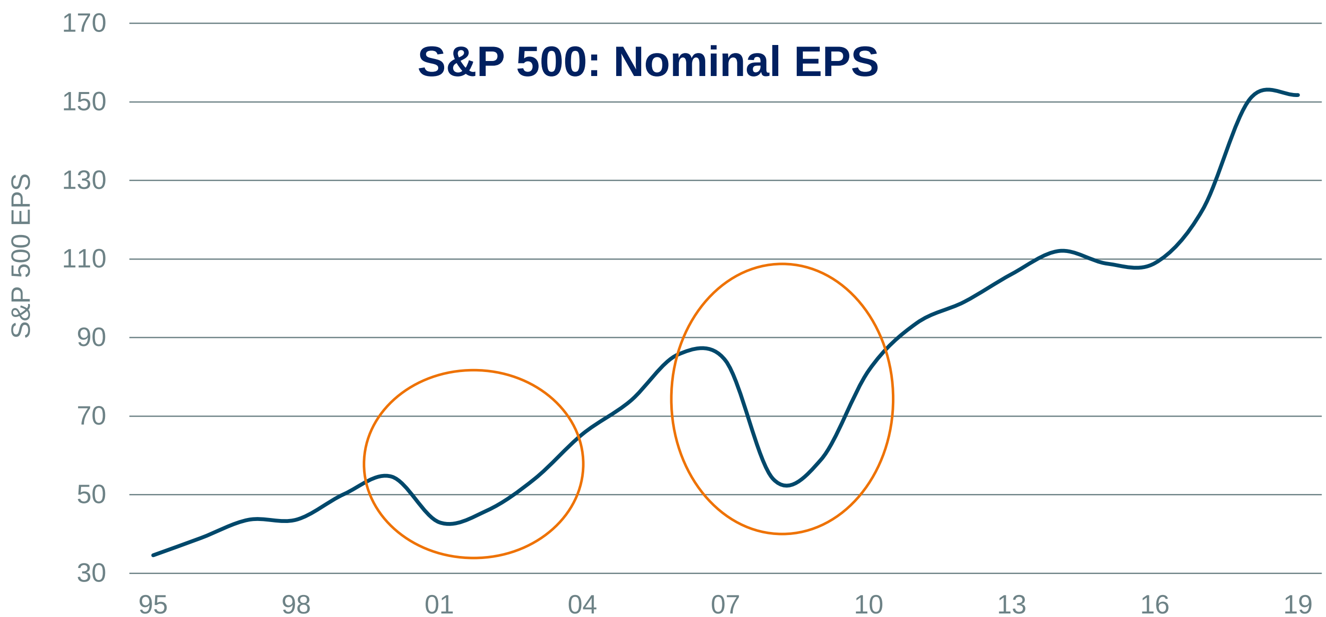
	Scenario A Pre- Covid	Scenario B A repeat of 2008 with a 50% fall in EPS for 2 years			Scenario C Worse than 2008 with no EPS for 2 years		
Long term Earnings	**100**	**100**	100	100	**100**	100	100
Earnings Estimates for 2020 & 2021	**100**	**50**	50	50	**0**	0	0
Discount Rate	**5%**	**5%**	6%	7%	**5%**	6%	7%
Fair Price	**2000**	**1907**	1575	1338	**1814**	1483	1248
Market Move		**-5%**	-21%	-33%	**-9%**	-26%	-38%

Source: DWS, CROCI. The table shows price changes that different earnings and discount rate scenarios should mathematically produce. Data as available on 16 March 2020.

FOCUS SHOULD BE ON FUTURE EARNINGS

The intervention of central banks and governments has **prevented a repeat of 2008-9 financial crisis**. Their early action has limited the crisis to an economic one.

For investors, therefore, the focus should be on how the recession affects future earnings. Earnings fall in a recession, but eventually come back. **Modelling future earnings is a straightforward exercise and has limited impact on prices.**



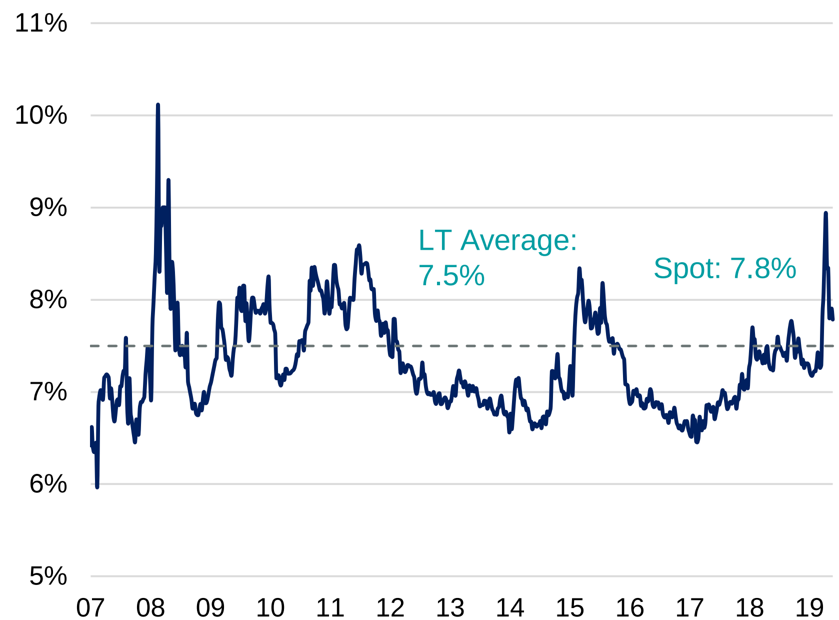
Source: Bloomberg Finance L.P. Data as available on 12 March 2020.

DISCOUNT RATE ROSE MATERIALLY THEN FELL BACK

The bulk of the price changes was driven by a significant increase in risk aversion (fear), pushing up the discount rate, which for financials rose from below 4.9% to over 5.2%. It has now moved back to 4.95%.
For banks, the cost of capital peaked at nearly 9%, but has now fallen back to 7.8%.

Global non-financial cost of capital since 2003, weekly

Global banks cost of capital since 2007, weekly



Source: DWS CROCI, Bloomberg Finance LP. Data as of 28th April 2020. Past performance is not necessarily an indicator of future performance

THE MEDIUM TO LONG TERM IMPLICATIONS

Eventually fear passes and markets rise, which has a significant impact on asset prices.

At the peak of fear, the marginal seller has already sold and everything looks dark. As ugly as the situation may be, though, there is simply too much value at the moment to ignore. This attracts contrarian deep value investors who are looking at the bigger picture and are not distracted by the ugliness of the situation.

When such investors become net buyers, prices start to rise despite negative news flow. Then when news flow turns positive, risk aversion fades. We observed this behavior in the cost of capital in 2008/9.

Source: DWS CROCI. Data as of 7th May 2020

2. THE DILUTION IMPACT OF THE CRISIS

WHY AVOIDING A CREDIT CRISIS MATTERS

The largest risk for any business is to run out of cash. This is why a credit crisis can be worse than a recession.

However, even without a credit crisis, companies may face significant losses requiring rights issues, which may dilute existing equity investors.

This section is about assessing the dilution risk.

“SPONGES & BRICKS”: EQUITY SHOCK ABSORBENCY

To analyse the impact of an economic crisis on listed companies’ balance sheets, we have divided them into two groups: the ‘sponges’ and the ‘bricks’.

The operations of some companies are more affected than others by such shocks.

The ‘**sponges**’ are companies that are able to absorb economic shocks without any additional capital.

The ‘**bricks**’ cannot easily absorb shocks. They break, and may need to tap their shareholders for additional capital (to repair their balance sheets). The demand for such capital generally depends upon the intensity of the shock, the nature of their operations and how prepared such companies were going into the crisis.

Source: Bloomberg LP; Data as of 6th April 2020. Past performance is not necessarily indicative of future performance.

LISTED EQUITIES HAVE BECOME MORE OF A SPONGE

The improved free cash flow profile for global equities means that most nonfinancial companies are actually sponges, not bricks.

- Free cash flow to sales for companies with long history has improved in aggregate from the trough of one recession to another.
- Newer companies also have lower operational gearing thanks to a greater use of intellectual capital.

FCF / Sales for Global Equities since 1989

Source: DWS, CROCI. The chart shows after tax free cash flow to sales of companies for which CROCI has comparable data going back to 1989. Data as available on 9 April 2020. For illustrative purposes only.

Reduced operational leverage this time around

USA	Δ Revenue	Δ EBITDA Mgn
1989-1991	11.0%	-296 bps
2000-2001	4.3%	-187 bps
2007-2009	-7.4%	-76 bps

Source: DWS, CROCI. The table shows fall in aggregate revenue and EBITDA Margins of U.S. companies in CROCI's database with comparable data back to 1989. Data as available on 15 April 2020.

BUT NOT ALL COMPANIES ARE SPONGES…

DWS

Banks are perhaps the best example of bricks, and suffer much more than the rest of global equities during a recession. Banks do not have capex or working capital that they can liquidate. There is great rigidity in their operations with costs changing slowly.

Companies with a high fixed cost structure, high debt levels, and low cash returns make up most of the “bricks” amongst non-financial stocks, including Energy and Industrials.

Performance, profitability and leverage of various sectors in the S&P 500

	Gross YTD TR	Cash Return	Net Fin. Liability/ M Cap	S&P 500 Wt
Energy	-46.1%	0.4%	70.9%	2.8%
Financials	-30.9%	4.3%	na	10.9%
Industrials	-26.1%	5.5%	48.7%	8.1%
Materials	-23.5%	4.5%	34.5%	2.5%
C. Discretionary	-16.7%	4.7%	28.6%	9.9%
Comm. Services	-14.9%	8.7%	22.5%	10.8%
Utilities	-14.7%	3.7%	102.9%	3.4%
Health Care	-11.2%	18.7%	17.5%	15.3%
C. Staples	-9.7%	12.2%	22.0%	7.9%
IT	-9.4%	21.3%	5.2%	25.5%

Source: DWS, CROCI, Factset. Profitability and leverage are for the companies in CROCI’s coverage. Such companies represent over 80% by weight of the S&P 500 index. Data at the close of business on 7 April 2020. Past performance is not a reliable indicator of future returns.

ESTIMATING DILUTION BY REGION – A SCENARIO ANALYSIS

We present two alternative scenarios, 2009-Repeat & Three-Sigma:

- **2009-Repeat.** In this scenario, we assume that the ongoing crisis would be of a similar magnitude to the great financial crisis, affecting listed companies' revenue and margins in a way similar to that experienced during that crisis.
  - Economically this is likely to be a much worse recession than 2009. DWS estimates global GDP to fall by 2.6% in 2020 (and then rise by 5.6% in 2021).
  - But improved FCF generation overall suggests that equity markets should fall by less than they did at the worst of the great financial crisis. The "2009 repeat" analysis could therefore reflect the reaction of equities to the expected decline in global GDP in 2020.

- **Three-Sigma.** This is a once-in-a-century scenario, possibly associated with either a longer lockdown or a second wave of lockdowns. The latter could result in significant economic disruption in the second half of 2020 if it occurs. Under such a scenario, global GDP could fall by 5% or more.

Source: DWS, CROCI. The table shows the impact of an economic recession similar to the great financial crisis (Scenario 1) and a 3-standard deviation event (Scenario 2) on key profit & loss and balance sheet figures of non-financial companies in CROCI's coverage. Aggregate data as available on 2 April 2020. For Illustrative purposes only. Due to various risks, uncertainties and assumptions made in our analysis, actual events or results or the actual performance of the markets covered may differ materially from those described.

ESTIMATING DILUTION BY REGION – A SCENARIO ANALYSIS

- The net profit of companies more than halves under the first scenario.
- Scenario 2 is more extreme, with net profits collapsing across the three regions.
- Europe and Japan are much more affected than the US under both scenarios.
- There is no meaningful increase in net debt under scenario 1, and only a comparatively small increase under scenario 2.

Potential impact of an economic recession on profit & loss and balance sheet of non-financial companies this year

	USA			Europe			Japan		
	2019	Scen. 1	Scen. 2	2019	Scen. 1	Scen. 2	2019	Scen. 1	Scen. 2
Revenue Growth (y-o-y)	1.6%	-11.4%	-19.9%	2.9%	-13.2%	-20.3%	-3.9%	-13.4%	-24.0%
EBITDA Margin	20.7%	20.2%	16.2%	17.5%	16.2%	13.7%	13.2%	11.5%	7.3%
Net Profit Margin	10.9%	6.4%	2.5%	7.1%	3.0%	0.5%	5.8%	2.5%	-1.7%
Net profit growth (y-o-y)	-1.2%	-47.7%	-81.5%	-0.4%	-63.0%	-94.6%	-14.0%	-62.6%	-122.1%
Capex growth (y-o-y)	13.2%	-13.8%	-13.8%	16.6%	-4.6%	-4.6%	6.4%	-23.7%	-23.7%
Increase in Net Debt (y-o-y)	22.6%	-4.2%	-5.4%	26.7%	0.4%	6.2%	8.2%	-5.9%	42.7%
Net Financial Liabilities to M.Cap	24.6%	26.3%	26.0%	46.3%	54.1%	56.3%	44.5%	43.7%	59.5%

Source: DWS, CROCI. The table shows the impact of an economic recession similar to the great financial crisis (Scenario 1) and a 3-standard deviation event (Scenario 2) on key profit & loss and balance sheet figures of non-financial companies in CROCI’s coverage. Aggregate data as available on 2 April 2020. For Illustrative purposes only. Due to various risks, uncertainties and assumptions made in our analysis, actual events or results or the actual performance of the markets covered may differ materially from those described.

BANKS' ROE MAY FALL TO -16% IN SEVERE STRESS

For banks we have again modelled two scenarios, one modelling an economic crisis of a similar magnitude to the financial crisis and the other an even more extreme scenario, which would see US ROE fall to -16%.

European and Japanese banks are even more exposed, because of their lower profitability. They are more financially geared and have lower profitability than US banks.

U.S. Banks' profitability under a severely adverse scenario (a three standard deviation event)

	2018	Scen. 1	Scen. 2
Leverage (Tangible Assets / Tangible Equity)	11x	11x	11x
Earnings before provisions (% of Tangible Assets)	1.98%	1.45%	1.45%
Provisions for loan losses (% of Gross Loans)	0.46%	2.70%	5.70%
Nominal Return on Tangible Equity (ROE)	14.8%	-0.8%	-16.1%

Source: U.S. Federal Deposit and Insurance Corporation (FDIC) data for commercial banks, DWS and CROCI. Data as available on 2 April 2020. For Illustrative purposes only. Due to various risks, uncertainties and assumptions made in our analysis, actual events or results or the actual performance of the markets covered may differ materially from those described.

European and Japanese banks face bigger challenges

2019 data	US	Europe	Japan
Leverage (Tangible Assets / Tangible Equity)	13.3	21.2	20.7
Earnings before provisions (% of Tangible Assets)	1.87%	0.75%	0.33%
Provisions for loan losses (% of Gross Loans)	0.71%	0.49%	0.18%
Nominal Return on Tangible Equity (ROE)	16.0%	9.4%	5.9%
CET1 Ratio	11.2%	13.5%	13.5%
Loans / Deposit	69.1%	92.7%	58.6%
Dividend Yield	2.8%	2.9%	4.5%
Dividend payout	30.1%	33.0%	45.5%
Price-to-Earnings	18.5x	17.1x	17.7x

Source: DWS, CROCI. The table shows selected operational and valuation characteristics of banks under CROCI's coverage. Data as on 15 April 2020.

3. THE IMPACT ON LONG-TERM ASSET RETURNS

ESTIMATING THE IMPACT ON LT CAPITAL MARKET ASSUMPTIONS

A bottom up approach to estimating the potential impact of COVID-19 on expected returns. This is how the crisis affects expected various asset classes, based on our 2009-repeat scenario.

Equities:

- Valuation: a dilution in expected long-run annualised returns ranging from 60bps in the US through to 100bps in Europe (see next slide)
- Dividend Yield: a decline from quarter-end yields of over 60bps for MSCI World
- Dilution/share buyback: equities need to issue very little additional capital in aggregate (around -4% in the US; 0.4% in Europe; and -5.9% in Japan)
- Long-term earnings growth is expected to be 25bps lower than the previous trend

Fixed Income:

- Default Losses: likely to increase and prove to be a drag on expected returns
- Yields: there is a stark contrast between developed and emerging sovereign bond returns, with EM Sovereigns repricing significantly to reflect growth risks.

Source: DWS, CROCI. The table shows the impact of an economic recession similar to the great financial crisis (Scenario 1) and a 3-standard deviation event (Scenario 2) on key profit & loss and balance sheet figures of non-financial companies in CROCI's coverage. Aggregate data as available on 2 April 2020. For Illustrative purposes only. Due to various risks, uncertainties and assumptions made in our analysis, actual events or results or the actual performance of the markets covered may differ materially from those described.

THREE SCENARIOS FOR LONG-RUN ASSET RETURNS

DWS

We looked at the status quo, and two alternative scenarios which change economic growth, dividend, and credit risk assumptions with one assuming the ongoing crisis to be of the same magnitude as the 2008 financial crisis and the other assuming a once-in-century type event.

10-year forecast returns across equity and fixed income markets for our status quo and alternative scenarios

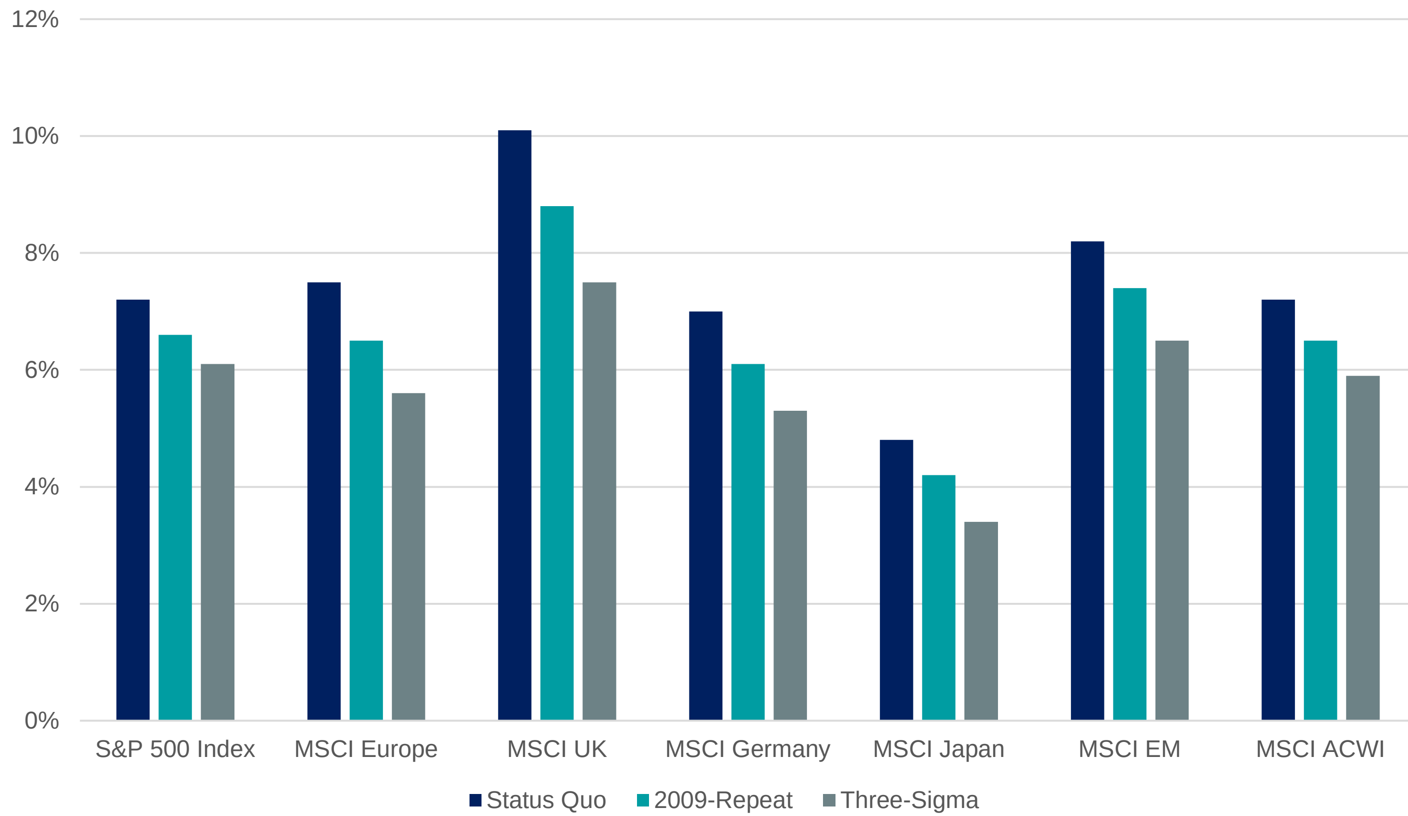
Local currency	31 Dec 2019	Status Quo	2009 Repeat	Three Sigma
S&P 500 Index	5.5%	7.2%	6.6%	6.1%
MSCI Europe	5.1%	7.5%	6.5%	5.6%
MSCI UK	7.4%	10.1%	8.8%	7.5%
MSCI Germany	4.5%	7.0%	6.1%	5.3%
MSCI Japan	3.5%	4.8%	4.2%	3.4%
MSCI EM	6.5%	8.2%	7.4%	6.5%
MSCI ACWI	5.5%	7.2%	6.5%	5.9%
US Treasuries	2.1%	0.7%	0.8%	0.4%
US Corporates	2.5%	3.3%	3.2%	2.6%
Euro Agg Corp.	0.5%	1.5%	1.4%	1.1%
Pan-Euro HY	2.2%	7.7%	7.3%	5.0%
US HY	3.5%	7.0%	6.4%	3.4%
EM Sovereigns	5.9%	9.0%	9.1%	8.2%

Scenario	Assumptions
Status Quo	Assumes fundamentals will be unaffected by COVID-19. Return forecasts are improved based on market repricing in Q1.
2009 Repeat	Utilizes long-term inputs observed in 2009. Dividends fall and normalize over a 5-year window. Corporate credit experiences modest negative ratings migration and default losses while sovereign bonds perform modestly better than in the status-quo.
Three Sigma	Dividend cuts are more severe and take the full 10-year period to normalize. Credit migration and losses are more severe, based upon observation in only 2009. Sovereign bonds experience a synthetic shock scenario that embeds asymmetric default and downgrade probabilities.

Source: DWS Investments UK Limited. Data as of 3/31/20. Due to various risks, uncertainties and assumptions made in our analysis, actual events or results or the actual performance of the markets covered may differ materially from those described.

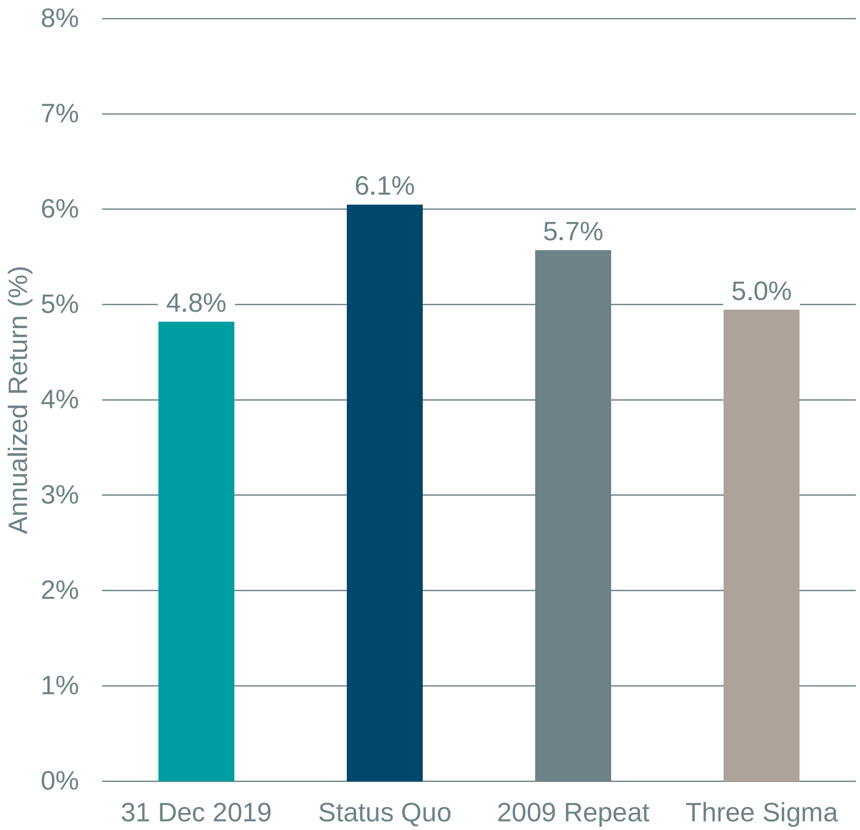
LONG TERM EXPECTED RETURNS FOR EQUITIES

Based on the different scenarios – 10 year forward return analysis



Source: DWS Investments UK Limited. Data as of 3/31/20. Due to various risks, uncertainties and assumptions made in our analysis, actual events or results or the actual performance of the markets covered may differ materially from those described.

STRATEGIC ASSET ALLOCATION
10Y FORECAST RETURNS



- The return outlook has improved significantly from where we started the year under the *Status-Quo* scenario. This is driven by cheapening in prices across risk markets such as equities and corporate credit.

- Even accounting for significant downside risks across dividends, earnings growth, buybacks, and corporate default losses, the *2009-Repeat* scenario compares favorably to the beginning of the year.

- In the *Three-S*igma scenario, portfolio returns are comparable to returns forecasted at the start of the year.

Source: DWS Investments UK Limited. Data as of 31 March 2020.

DIVIDEND CUTS UNDER 3-SIGMA SCENARIO

DWS

- **We have used bottom-up analysis, looking at over 900 listed stocks to estimate the impact on dividend yield and DPS growth over the next decade.**

The DPS cuts under the *2009-repeat* scenario are not that severe with most industries expected to see a less than 30% cut to their trailing twelve months dividends for the next two years.

Under the *three-sigma* scenario, the cuts are much more significant, however.

Estimates of the magnitude of dividend cuts under Three-Sigma scenario

Moderate cuts (up to 30%)	Significant cuts (50% or more)
Commercial & Prof. Services	Auto & Components
Food & Staples Retailing	Banks
Food Beverage & Tobacco	Capital Goods
Health Care Equip. & Services	Consumer Durables & Apparel
Household & Personal Products	Consumer Services
Pharma and Biotech	Diversified Financials
Semiconductors	Energy
Software & Services	Materials
Tech. Hardware & Equipment	Media & Entertainment
Telecom	Real Estate
	Transportation

Source: DWS Investments UK Limited. Data as of 3/31/20. Forecasts are based on assumptions, estimates, views and hypothetical models or analyses, which might prove inaccurate or incorrect.

CROCI FACTOR ANALYSIS OVER THE FINANCIAL CRISIS

- Top global performers in 2008 included large numbers of quality factors
- In 2009, valuation factors took the lead.
- Economic PE was the only factor to feature amongst the top factors in both years.

Best Factor	2008	Best Factor	2009	Worst Factor	2008	Worst Factor	2009
Low Volatility	-18.4%	Small Cap	112.2%	Econ. Earn. Growth	-50.5%	Low Volatility	12.1%
CROCI Stability	-21.0%	Economic P/BV	79.5%	CROCI Growth	-49.8%	Price Momentum	16.5%
Equity Earnings	-29.1%	FCF Yield	67.7%	Small Cap	-45.3%	Equity Earnings	24.1%
FCF/Sales	-29.9%	Dividend Yield	65.6%	Sales Growth	-45.2%	CROCI Stability	25.2%
CROCI	-32.5%	Economic PE	63.3%	Economic P/BV	-44.2%	CROCI Momentum	25.7%
Economic PE	-34.3%	Low Leverage	53.2%	EPS Momentum	-43.3%	Sales Growth	26.3%
Div Yld	-35.0%	EPS Momentum	53.1%	CROCI Momentum	-42.2%	Revisions	27.8%

Best factors: US

2008	2009
CROCI Stability	Small Cap
Low Volatility	Economic P/BV
Economic PE	FCF Yield
Equity Earnings	Economic PE
FCF/Sales	Dividend Yield

Best factors: Europe

2008	2009
Low Volatility	Small Cap
FCF/Sales	Economic P/BV
CROCI Stability	Dividend Yield
CROCI	Economic PE
Equity Earnings	Leverage

Best factors: Japan

2008	2009
Low Volatility	Economic P/BV
FCF/Sales	Small Cap
CROCI Stability	Economic PE
Price Momentum	Dividend Yield
Dividend Yield	Leverage

Source: DWS CROCI, Bloomberg Finance LP. Data as of 6th May 2020. Past performance is not necessarily an indicator of future performance. CROCI factors are based on the performance of the top decile of stocks by factor in global and US analysis. For Europe, it is the performance of the top quintile of stocks, and in Japan the top tercile. Only CROCI related factors have been included amongst the fundamental factors, leading to a total of 20 factors under consideration.

APPENDIX: BOTTOM-UP VALUATION

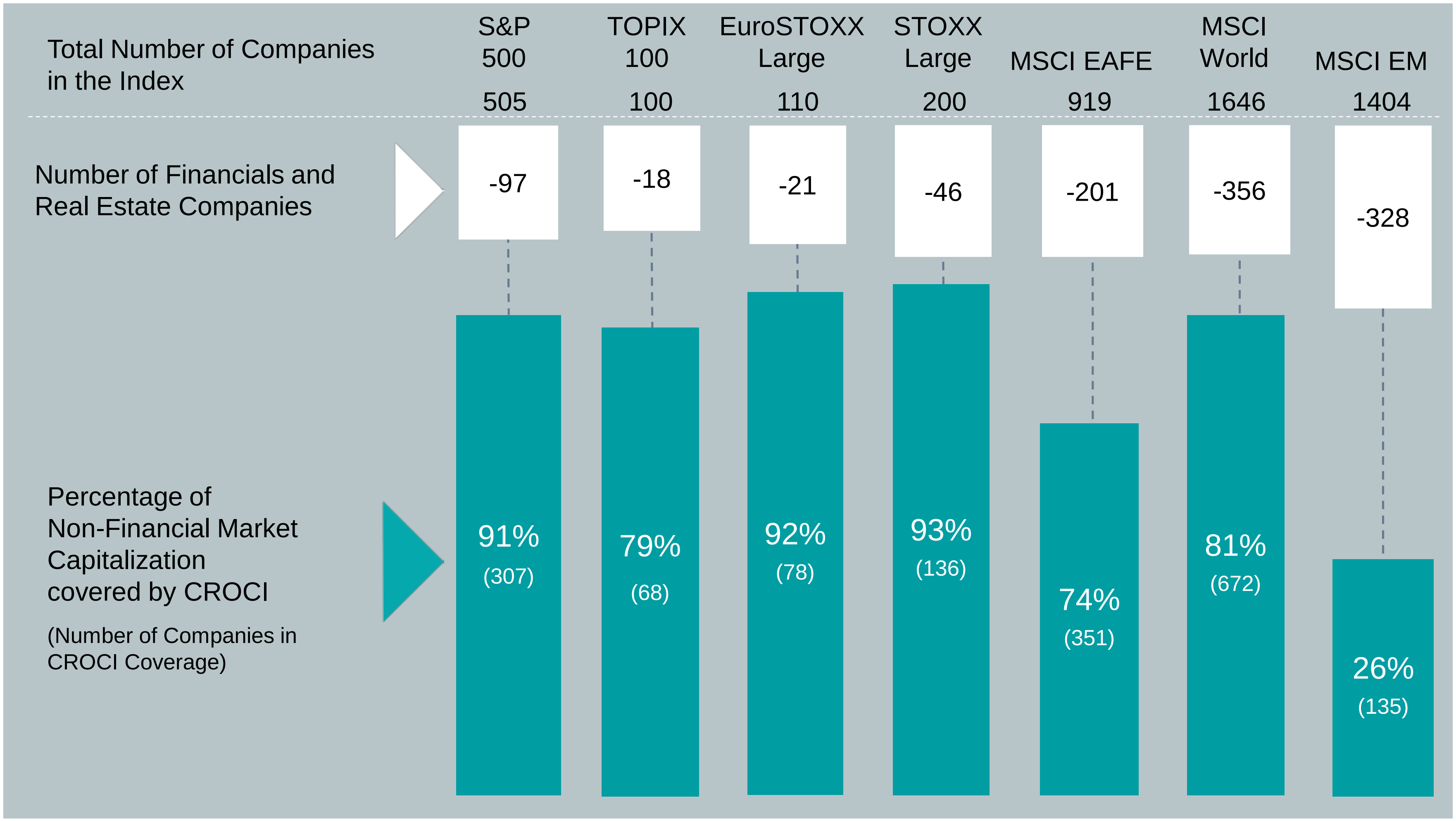
APPENDIX: VALUATION OF REGIONS AND SECTORS

	Economic PE				CROCI			
	FY	01/01/20	Today		FY	01/01/20	Today	
	2019	**2020e**	**2020e**	**2021e**	**2019**	**2020e**	**2020e**	**2021e**
Global Equities	**30.7**	**28.97**	**43.2**	**30.5**	**6.2%**	**6.7%**	**4.2%**	**5.7%**
US Equities	**30.3**	**29.23**	**40.4**	**30.6**	**9.9%**	**10.3%**	**7.2%**	**9.0%**
European Equities	**31.5**	**29.36**	**52.1**	**33.8**	**5.2%**	**5.7%**	**2.9%**	**4.3%**
Japanese Equities	**34.1**	**28.67**	**55.2**	**27.7**	**2.8%**	**3.3%**	**1.6%**	**3.0%**
Pharmaceuticals Biotechnology & Life Sciences	21.8	21.0	22.3	19.5	15.1%	16.2%	15.6%	16.6%
Semiconductors & Semiconductor Equipment	24.8	29.2	29.7	24.1	12.8%	12.6%	11.6%	13.2%
Technology Hardware & Equipment	25.3	28.5	30.9	24.4	9.0%	9.6%	8.4%	10.0%
Media & Entertainment	29.0	26.5	32.9	25.7	19.2%	20.4%	16.0%	17.8%
Food Beverage & Tobacco	29.9	27.3	32.2	27.6	14.3%	15.7%	11.9%	13.5%
Consumer Durables & Apparel	29.0	27.0	51.2	28.3	9.0%	10.2%	4.5%	7.8%
Health Care Equipment & Services	32.2	29.5	37.9	28.4	14.7%	16.4%	12.2%	15.0%
Transportation	27.8	25.7	nm	28.9	5.1%	5.4%	0.0%	4.1%
Capital Goods	28.9	26.6	41.9	29.3	7.4%	8.3%	4.3%	5.9%
Materials	30.6	28.6	43.3	29.5	4.3%	4.8%	2.8%	3.9%
Food & Staples Retailing	30.9	29.9	36.7	30.7	7.0%	7.4%	6.0%	6.9%
Utilities	32.7	31.1	33.6	31.9	3.0%	3.2%	2.8%	2.9%
Household & Personal Products	33.5	30.8	36.6	31.9	15.1%	16.2%	13.2%	14.6%
Software & Services	38.0	34.8	38.5	33.5	25.1%	26.3%	23.7%	24.9%
Commercial & Professional Services	36.0	35.4	45.3	36.5	11.8%	12.5%	8.8%	10.4%
Telecommunication Services	38.0	35.4	38.9	37.5	2.9%	3.1%	2.6%	2.6%
Retailing	37.7	37.3	59.7	41.4	11.5%	11.0%	7.4%	9.8%
Consumer Services	34.9	32.7	nm	43.6	11.4%	11.3%	0.3%	7.5%
Automobiles & Components	39.7	33.9	nm	51.2	1.9%	2.3%	-1.3%	1.3%
Energy	34.0	30.5	nm	nm	2.3%	2.6%	-0.7%	0.4%

Source: DWS CROCI, Bloomberg Finance LP. Data as of 6th May 2020. Past performance is not necessarily an indicator of future performance. Forecasts are not a reliable indicator of future performance. Forecasts are based on assumptions, estimates, views and hypothetical models or analyses, which might prove inaccurate or incorrect. Years with an “e” after them are based on forecasts.

THE CROCI COMPANY DATABASE

Comprehensive Coverage Across Major Markets



Source: DWS, Bloomberg

Data as of 31 Dec. 2019

CROCI GLOSSARY

CROCI Economic P/E	Calculated as (EV/NCI) / CROCI, Economic P/E is a measure of valuation, calculated according to the CROCI methodology, that seeks to allow a fair comparison of the market valuation of companies regardless of industry or sector
CROCI EV/ NCI	Used as the economic version of an asset multiple, e.g. Price-to-Book Value. Over time, this ratio should converge to 1x, according to economic theory (Tobin) — CROCI Enterprise Value (EV) A measure of the market value of the firm, which includes not only financial liabilities (eg debt) but also operational liabilities (e.g. warranties, pension funding, specific provisions, etc.) — CROCI Net Capital Invested (NCI) An approximation of the replacement value (at current costs) of net assets
CROCI	Cash Return On Capital Invested, the economic version of Return on Equity. A measure of cash earnings yield, standardised for all companies, regardless of their business or location. Also described as the Cash IRR

Source: DWS CROCI; Data as of 31 Dec. 2019

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