

Marketing Material



CROCI Outlook 2023

The Battle of the Suitors

Authors: [Francesco Curto](#), [Colin McKenzie](#)

At the end of his long and wearisome travels, Odysseus eventually made it back to Ithaca. But after 20 years away, there were still difficult battles to be fought to regain his authority over the suitors vying for his throne. **Regaining their authority was one of the primary focuses for central banks in 2022.** Perceived to be late in their response to the rise in inflation, will central banks give in to those suitors arguing that their actions risk creating a recession and untold damage to global net worth? Opinions diverge, but we estimate that **at 4.6% the discount rate remains well below historical levels, suggesting that risk appetite remains too strong.**

In killing all of the grasping suitors trying to marry his wife, Odysseus risked starting a new war with their families. Central banks face similar risks. **If risk appetite remains high, the only way to eradicate the risks caused by inflation is to hike rates and tame risk appetite for good.**

In our models that means pushing the discount rate to 4.8% or 5.0%, which would imply between 13% and 23% downside for equity investors.

Of course, it doesn't need to be that way. Another approach would be to have low single-digit expected returns for a few years, or to find ways of significantly outperform falling markets. The latter was the story of value in 2022. After many years of 'irrational exuberance', value had a sterling year. Our bubble buster suggests

that there are still 30% of companies in CROCI coverage in bubble territory and the dispersion of value is healthy. Global value portfolios feature free cash flow yields in excess of 8%, with companies featuring high cash returns and little debt. However, getting exposure to these portfolios may require investors to accept a higher tracking error target than usual.

At an operational level, we have seen strong recent performance from European assets, but our fundamental analysis suggests that a transformation of European companies is required. Earnings have been flat for a decade in real terms, but growing assets and fading returns is not a sustainable mix.

At a sectoral level, all eyes will be on Energy. Climate change cannot really be considered a matter of opinion, but valuation is certainly supportive and we do not believe that the sector's new-found capital discipline will be broken. The biggest risk is one of litigation and there appears to be enough evidence that some oil majors had already correctly forecast the impact of CO2 emissions back in the 1970s, but kept the conclusions internal. Valuation also seems attractive for semiconductors, but we fear that the demise of cryptocurrency speculation may have an impact on their fundamentals.

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This paper is intended for Professional Investors only, who understand the strategies and views introduced in this paper and can form an independent view of them. CROCI represents one of many possible ways to analyse and value stocks. Potential investors must form their own view of the CROCI methodology and evaluate whether CROCI and investments associated with CROCI are appropriate for them.

Please see Glossary A for a brief introduction to CROCI and for definitions of key terms used throughout this piece and for risk considerations. Please see Glossary B for the definition of Real Value.

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In the data and charts presented throughout this document, "E" refers to financial years that are not yet reported. Forecasts of accounting data for these years are based on market's consensus estimates as reported by Bloomberg Finance L.P. CROCI metrics for the forecast years are calculated by applying the CROCI model to these consensus estimates. The CROCI team does not make any forecasts or projections of accounting data. Data for historical years are derived from company reports and other publicly available sources.

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30 January 2023

Summary View

The beginning of a new era

We expect changes in the discount rate to continue to be the primary driver in markets. Moves in the discount rate have been the primary driver of equity prices throughout the pandemic as well as in 2022. Between December 2019 and March 2020, the discount rate rose from 4.9% to 5.2%, prompting the initial decline in equities as investors pondered the potential negative impact of the new virus. Then, the discount rate fell from 5.2% to 4.4%, as central banks and governments flooded the market with liquidity to limit the effects of the pandemics. The result was a significant increase in risk appetite driving up speculative assets as well as risky assets. This was responsible for almost two-thirds of the 98% rally to the start of 2022 from the March 2020 lows. Since December 2022, the discount rate has been steadily increasing, translating into falling equity markets.

There is a strong behavioural element to the discount rate—it rises as investors' concerns increase and falls as investors become more optimistic. Understanding the discount rate is by no means a purely academic exercise, however. It not only affects asset prices, but also affects economic activity: the discount rate is the hurdle rate for return on capital when entrepreneurs are looking to create value with new capital projects. **Central banks are currently trying to curb economic activity, to tame what Keynes called *animal spirits*. In effect, they are trying to push up the discount rate—not a good omen for equity returns in the short term.** Most speculative asset classes have already seen a severe correction in prices, however and inflation rates are coming down, with markets already expecting central banks to stop the hiking process soon. Investors need to balance the risks. **Our estimates suggest that if the discount rate were to rise to 5.0%, equities would fall by about 25%. But a normalisation in the discount rate does not necessarily require a sharp adjustment in prices.** Higher-than-expected real growth and subdued returns for a few years are also a possibility, but it is rarely advisable to try and fight the Fed.

Within this context, **it is easy for investors to pay excessive attention to macro factors and this is why focusing on fundamentals is so important.** Let's start with earnings revisions and the associated risk of recession. Yes, **earnings downgrades matter, but what if you were to find out that the impact of a severe recession in 2023 and 2024, with earnings for major benchmarks falling to zero, would bring the price of equities down by just 9% (if the discount rate remains constant)?** Would one be as worried? Possibly not. **Our analysis suggests that there are other issues that ought to be of greater concern,** such as:

- **Revenues are keeping up with inflation, but earnings are not.** Equities, being real assets, ought to offer investors protection against rising inflation. They are better protection

than bonds (given their nominal nature), but they are not offering full protection at the moment

- **Productivity of fixed assets falls in a rising inflation environment,** which negatively weighs on free cash flow
- **There has been a complete absence of real earnings growth in Europe for a decade.** The lack of dynamism is a real problem for investors, as falling cash returns and increasing capital highlights that European industrial companies face structural problems and must reform.
- **Carbon intensive sectors are unable to absorb the costs of high carbon prices needed for a transition to a more sustainable economy.** The necessity of passing these costs to the consumer means that inflation will struggle to go below the 2% mark.

Investors may also wonder whether the strong performance of value is a flash in the pan and question whether growth will return to outperforming value. Difficult to say, but many IT stocks now feature in value screens. CROCI has never had a strong attachment to traditional value sectors that are often more expensive than they first appear. If Energy, Materials and Banks are still attractive, Semiconductor stocks are beginning to appear attractive on valuation. **In the end, value as measured by CROCI only struggled in the 2018-2021 period, which may go down in history books as characterised by irrational behaviour.** The other question is about value in a period of inflation. Again, history is supportive to value investors.

At this stage, I wish to make two points. First, fundamental predictive analysis is important but such analysis primarily aims to provide comfort. As a value investor, I also need to highlight that emotions and strong beliefs can be detrimental to performance. In fact, the strongest performance of value has come in months where macro factors would have suggested a more cautious approach and this highlights, in my view, the importance of running a systematic approach. It removes emotions and has delivered performance. **Second, most CROCI investment strategies currently have free cash flow yields over 7.5% (the highest with 12.6%), with low financial leverage and high cash returns. These are facts, upon which one can build a strong basis for investing. Everything else is noise.**

Francesco Curto

London, January 2023

Contributors

Virginie Galas

Head of CROCI Company Research

Dirk Schlueter

Head of CROCI Investment Strategies

Jay Joshi

DWS Research House

Mital Parekh

DWS Research House

Venkatrami-R Bijjaram

CROCI Company Research

Tathagat Kumar

CROCI Company Research

Bharat Shah

CROCI Company Research

Pragya Patwari

CROCI Investment Strategies

Vikash Sonika

CROCI Investment Strategies

Figure 1: Global Equities P&L and Valuation

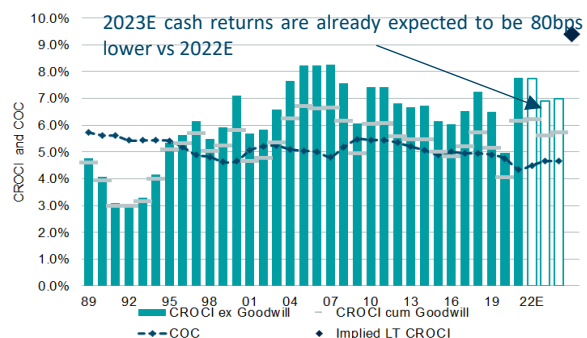
	2014	2015	2016	2017	2018	2019	2020	2021	2022E	2023E	2024E
Economic P / E (x)	26.0	29.3	29.6	28.9	27.5	30.8	42.2	32.3	28.0	28.2	25.9
Accounting P / E (x)	17.2	19.3	18.8	18.4	17.5	19.2	24.6	20.0	16.3	16.5	15.5
Yield (%)	2.6	2.6	2.6	2.6	2.5	2.3	2.1	2.0	2.2	2.2	2.3
P / BV (x)	2.6	2.7	2.6	2.7	2.9	2.9	3.1	3.6	3.1	2.7	2.4
EV / Sales (%)	144.1	166.0	168.4	178.7	179.8	191.6	223.5	231.8	193.8	187.1	176.4
EV / Adj. EBDIT (x)	9.0	9.9	9.7	10.1	10.1	10.5	12.2	11.5	9.8	9.5	8.8
EV / Free Cash Flow (x)	29.5	30.0	26.2	27.2	27.1	27.9	27.9	28.7	24.1	20.6	18.6
EV / Capital Employed (x)	1.7	1.8	1.7	1.8	1.9	1.8	1.9	2.3	2.1	1.9	1.9
Avg. Market Cap. (bn)	26,128	26,713	26,520	30,640	33,404	34,420	38,162	49,057	43,232	42,381	42,385
Enterprise Value (bn)	30,691	31,523	31,739	36,431	39,726	42,224	46,205	56,881	50,854	48,961	47,567
Key Ratios	2014	2015	2016	2017	2018	2019	2020	2021	2022E	2023E	2024E
Revenue Growth	-0.9	-10.8	-0.7	8.2	8.4	-0.3	-6.2	18.7	6.9	-0.3	3.0
Revenue Growth (Median)	4.1	1.7	1.6	6.3	5.2	2.1	-2.7	12.9	8.8	3.0	4.2
Adj. Net Profit Pre-Min. Growth	0.8	-9.0	2.3	18.3	14.1	-6.1	-13.2	57.7	7.6	-3.1	6.8
Adj. EBDIT Mgn	16.1	16.8	17.3	17.8	17.7	18.3	18.3	20.1	19.7	19.6	20.1
Adj. EBIT Mgn	10.9	11.0	11.3	12.0	12.2	11.8	11.1	13.8	14.0	13.6	14.0
Adj. Net Prof. Pre-Min. Mgn	7.4	7.5	7.8	8.5	8.9	8.4	7.8	10.4	10.4	10.1	10.5
Tax Rate	33%	35%	31%	30%	28%	28%	32%	26%	26%	25%	24%
Depreciation / Sales	5.7	6.9	6.5	6.1	5.8	7.0	8.2	6.5	5.9	6.0	6.1
Capex / Sales	8.0	8.5	8.0	7.8	7.7	8.7	9.0	8.4	8.0	8.0	7.9
Free Cash-Flow / Sales (Post-Tax)	4.9	5.5	6.4	6.6	6.6	6.9	8.0	8.1	8.1	9.1	9.5
Dividends / Sales	3.4	4.1	3.9	3.9	4.3	4.3	4.0	4.1	4.0	3.5	3.5
Interest Cover (x)	10.9	10.2	9.7	10.5	11.0	8.8	7.3	11.1	12.0	11.9	13.1
Net Debt (-) Cash (+) / Equity	-40.3	-44.6	-45.9	-44.4	-48.1	-58.9	-58.4	-53.4	-49.1	-36.1	-24.3
Return on Stated Equity	13.5	12.2	12.6	13.6	14.2	13.1	9.8	17.3	17.7	16.2	15.6
Return on Cap. Employed (Post-Tax)	9.3	8.5	8.5	9.2	9.9	9.1	7.6	10.8	11.4	11.0	11.4
P&L (USD bn)	2014	2015	2016	2017	2018	2019	2020	2021	2022E	2023E	2024E
Turnover	21,293	18,986	18,848	20,389	22,098	22,041	20,671	24,542	26,240	26,171	26,959
Adjusted EBDIT	3,418	3,182	3,265	3,622	3,920	4,035	3,780	4,929	5,180	5,143	5,413
Depreciation	1,217	1,301	1,228	1,240	1,283	1,544	1,698	1,606	1,539	1,579	1,640
Pre-Tax Profit	1,834	1,465	1,641	1,955	2,136	1,928	1,393	2,838	3,141	3,146	3,380
Income Tax	609	512	515	593	592	543	445	726	810	779	813
Adj. Net Profit Pre-Min.	1,573	1,431	1,464	1,731	1,976	1,856	1,611	2,541	2,736	2,652	2,832
Cash Flow (USD bn)	2014	2015	2016	2017	2018	2019	2020	2021	2022E	2023E	2024E
EBIT before stock options	2,263	1,925	2,088	2,449	2,712	2,556	2,161	3,440	3,790	3,754	3,979
Depreciation	1,217	1,301	1,228	1,240	1,283	1,544	1,698	1,606	1,539	1,579	1,640
NWC and Provisions	-94	3	-32	-268	-245	-125	58	-271	-264	18	-24
...Operating Cash Flow	3,385	3,229	3,283	3,420	3,750	3,975	3,917	4,775	5,065	5,352	5,596
Proceeds from Share Issues	-204	-214	-102	-116	-362	-307	-146	-509	-480	-2	0
Dividends Paid	-719	-786	-737	-801	-960	-940	-836	-1,014	-1,052	-925	-949
Capex	-1,695	-1,616	-1,510	-1,581	-1,704	-1,918	-1,859	-2,052	-2,094	-2,104	-2,127
Net Other Investments	-339	-478	-575	-480	-567	-1,531	-511	-444	-218	3	2
Change in Net Debt (-) Cash (+)	-150	-401	-278	-433	-552	-1,514	-227	61	414	1,312	1,483
Balance Sheet (USD bn)	2014	2015	2016	2017	2018	2019	2020	2021	2022E	2023E	2024E
Net Working Capital	575	442	366	444	473	437	152	193	332	282	278
Net Financial Debt (-) Cash (+)	-4,229	-4,641	-4,960	-5,393	-5,947	-7,464	-7,696	-7,636	-7,222	-5,910	-4,426
Gross Tangible Fixed Assets	19,274	19,454	20,025	21,669	22,010	24,512	25,874	26,128	26,112	27,167	28,201
Net Tangible Fixed Assets	9,353	9,326	9,506	10,183	10,328	11,651	12,063	12,208	12,319	12,841	13,317
Other LT Assets	1,395	1,452	1,499	1,675	1,761	1,850	2,037	2,231	2,230	2,260	2,289
Stated Shareholder's Equity	9,983	9,859	10,204	11,473	11,682	11,951	12,422	13,500	13,956	15,608	17,437
Minorities	508	550	596	684	688	713	766	789	767	775	781

Source: Company reports, Bloomberg Finance L.P., DWS and CROCI. The table shows aggregate data of companies in CROCI's global coverage. Data in USD as on 16 December 2022. "E" after a year indicates that the numbers are based on consensus forecasts. Forecasts are based on assumptions, estimates, views and or analyses, which might prove inaccurate or incorrect."

- A Valuations have compressed in 2022e. Accounting PE continues to understate the real economic valuation
- B Global revenue growth expected to flatten in 2023e
- C After multiple years of expansion, EBDIT margin estimated to contract in 2023e
- D Consensus capex forecasts for 2023e are still estimated at 2022e levels
- E At the aggregate level, corporate balance sheets are not stretched with lowest debt-to-equity ratio since 2019

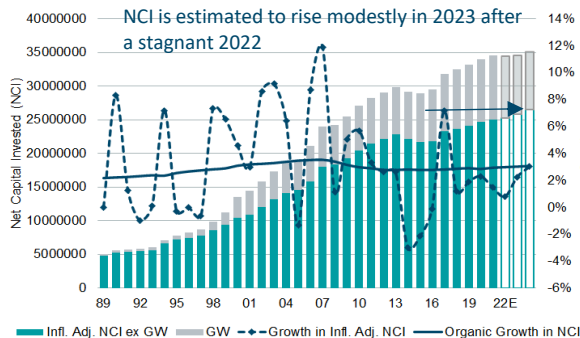
Figure 2: Global Equities CROCI

CROCI cum and ex Goodwill & Implied CROCI



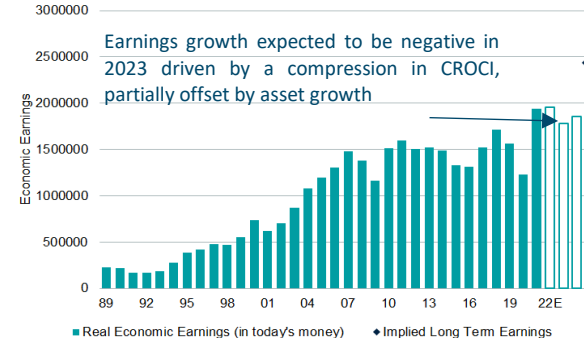
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Net Capital Invested*

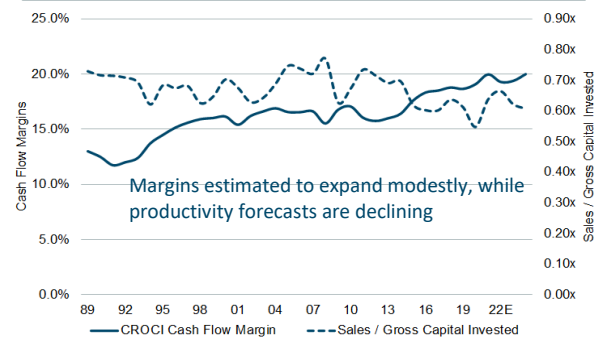


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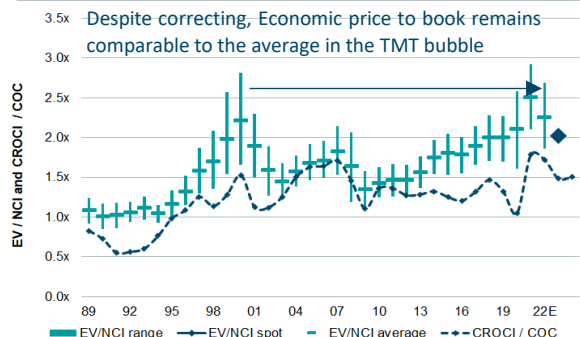
Economic Earnings & Implied Economic Earnings*



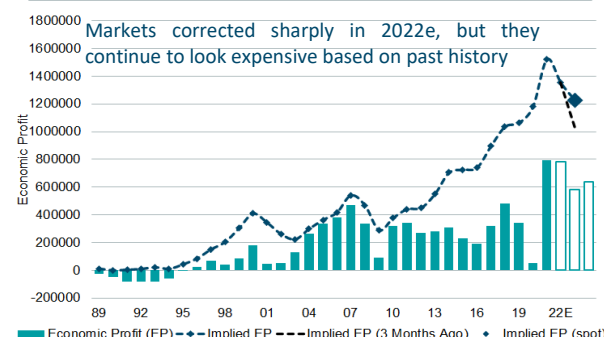
CROCI Drivers



Value & Returns ex Goodwill



Economic Profit & Implied EP ex Goodwill



	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022E	2023E	2024E
Enterprise Value (USD bn)	16188	17896	20234	24957	23276	20547	23302	25483	26591	29549	32518	33379	33645	38521	41927	43486	47484	58286	54176	52332	51033
Market Cap (USD bn)	12726	14498	16672	20763	17842	15075	17920	19605	20321	23378	26141	26724	26532	30654	33419	34439	38187	49087	45043	44096	44099
EV/NCI Ex. GW	1.57x	1.67x	1.71x	1.82x	1.63x	1.35x	1.42x	1.47x	1.46x	1.56x	1.75x	1.80x	1.79x	1.89x	2.00x	2.00x	2.10x	2.51x	2.25x	2.02x	1.87x
Economic PE	20.5x	20.4x	20.8x	22.1x	21.6x	22.2x	19.2x	19.7x	21.4x	23.3x	26.0x	29.3x	29.6x	28.9x	27.5x	30.8x	42.2x	32.3x	29.0x	29.3x	26.8x
Accounting PE	15.1x	15.1x	15.4x	16.5x	15.7x	15.7x	13.2x	13.1x	13.8x	15.7x	17.2x	19.3x	18.8x	18.4x	17.5x	19.2x	24.6x	20.0x	17.0x	17.1x	15.9x
Cost of Capital	5.10%	5.05%	5.00%	4.82%	5.18%	5.48%	5.45%	5.45%	5.35%	5.20%	5.07%	4.90%	5.00%	4.95%	4.95%	4.90%	4.75%	4.35%	4.50%	4.65%	4.65%
CROCI Ex. GW	7.7%	8.2%	8.2%	8.2%	7.6%	6.1%	7.4%	7.4%	6.8%	6.7%	6.7%	6.1%	6.0%	6.5%	7.3%	6.5%	5.0%	7.8%	7.7%	6.9%	7.0%
Implied CROCI	8.0%	8.5%	8.5%	8.8%	8.5%	7.4%	7.7%	8.0%	7.8%	8.1%	8.9%	8.8%	8.9%	9.3%	9.9%	9.8%	10.0%	10.9%	10.1%	9.4%	8.7%
Implied Economic Earnings/ Economic Earnings	104%	103%	104%	106%	112%	122%	105%	108%	115%	121%	132%	144%	148%	143%	136%	151%	200%	140%	131%	136%	124%

Source: Company reports, Bloomberg Finance L.P., DWS and CROCI. The table shows aggregate data of companies in CROCI's global coverage. Data in USD as on 18 January 2023. Forecasts are based on assumptions, estimates, views and or analyses, which might prove inaccurate or incorrect.

"E" after a year indicates that the numbers are based on consensus forecasts. *Displayed in today's money.

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Section 1:

A Bottom-Up View of Global Equities

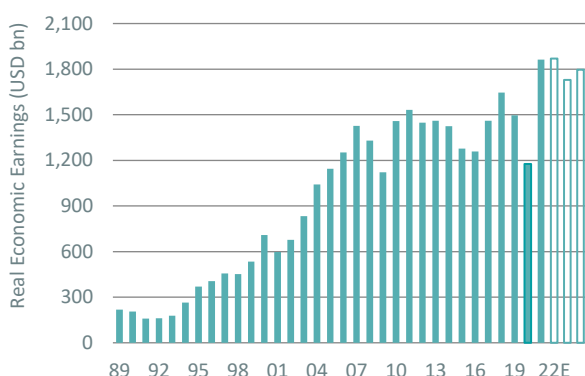
1.1 The top-down versus the bottom-up

2022 – Being real in a nominal world

Global equity benchmarks had their worst performance since the financial crisis in 2008 against a backdrop of higher inflation and higher interest rates. Higher inflation seemed only a remote possibility in the immediate aftermath of the pandemic, with central bankers talking about “transitory” inflation¹, but as the year went by, heightened inflation expectations became a focal point of discussion in markets.

Against this backdrop, 2022e economic PE contracted from 31.4x (for the 2022 outlook) to 28.0x, a decline of 11%. This took place while aggregate year-on-year real economic earnings grew by 0.4%. Over the same period, 2023e economic PE fell modestly by 3% to 28.2x, with real economic earnings estimates down nearly 7.5% compared to 2022².

Figure 3: Real Economic Earnings (USD bn)



Source: DWS, CROCI. Aggregate data of companies in CROCI’s global coverage. Data as available on 16 December 2022.

Within this section, we look at earnings and their dynamics in detail, but for investors looking at revisions, it is essential to assess the impact of a recession on the price of equities. The conclusion is ‘less than you expect’ as was highlighted in the paper that we wrote at the start of the pandemic³. As we pointed out then, the common misconception is that collapsing earnings expectations alone drive share prices.

As Figure 4 shows, if we were to see a fall of 50% in earnings in 2023 (similar magnitude to 2008), then share prices correct by just 5% (should discount rates remain unchanged). If there were to be a total loss of earnings for the next two years, even then the share price movement is in single digits. The rest of the price move is the result of the repricing of risk, which we can measure through changes in the discount rate.

Figure 4: Scenario analysis: impact of decline in EPS and change in discount rate on market fair value

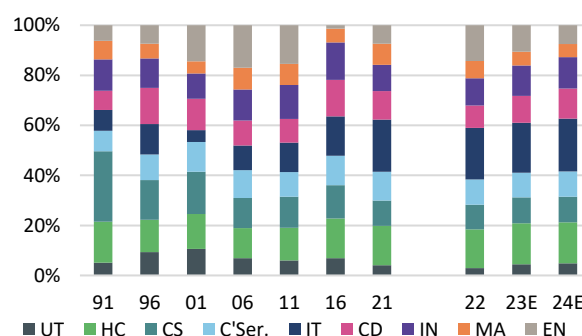
	Scenario A	Scenario B			Scenario C		
Long term Earning	100	100	100	100	100	100	100
Earnings Estimates for 2023 & 2024	100	50	50	50	0	0	0
Discount rate	5%	5%	6%	7%	5%	6%	7%
Fair price	2,000	1,907	1,575	1,338	1,814	1,483	1,248
Market move		-5%	-21%	-33%	-9%	-26%	-38%

Hypothetical Scenarios. **Scenario A** – Pre-recession; **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
Source: DWS CROCI Estimate

Having set this context, we now look at the evolution of real earnings expectations for the coming two years, across sectors and also the sensitivity of the global equity markets, to change in the discount rate.

The contribution from the Energy sector to the global real economic earnings pool doubled from 7% in 2021 to 14% in 2022, not far from its pre-financial crisis trend. At the same time, Technology and Health Care continue to remain the mainstay of the global economic earnings, with the two contributing nearly a third to the global pool since 2011⁴.

Figure 5: Share of real Economic Earnings by sector



Source: DWS, CROCI. Aggregate data of companies in CROCI’s global coverage. Data as available on 16 December 2022. UT - Utilities; HC - Healthcare; CS - Consumer Staples; C'Ser. - Communication Services; IT - Information Technology; CD - Consumer Discretionary; IN - Industrials; MA - Materials; EN - Energy.

¹ The week central banks got the chills about inflation (December 2021) – Financial Times

² Estimates as of 16 December 2022

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L.P. Company data is from the CROCI database. Unless stated this data is as of December 2022. Forecasts are based on assumptions, estimates, views and or analyses, which might prove inaccurate or incorrect.

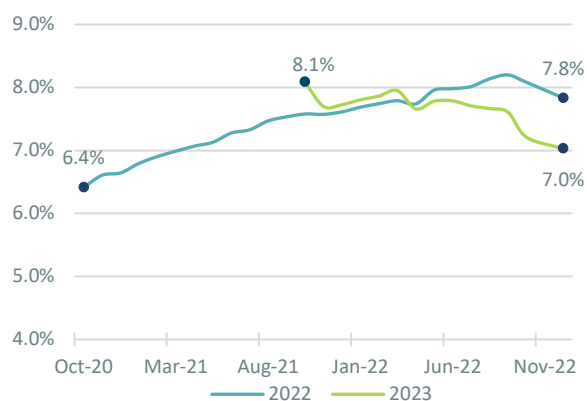
³ History lessons – why do markets sell off and then rebound (March 2020); Curto/Agrawal

⁴ Period considered is 2011 to 2022 (both years inclusive)

2022 estimates went up, but in 2023 they are coming down

Between October 2020 and December 2022, consensus estimates went up, resulting in a 150bps increase in 2022e CROCI⁵, but 2023e estimates have been coming down.

Figure 6: CROCI estimates



Source: DWS, CROCI. Aggregate data of companies in CROCI's global coverage. Data as available on 16 December 2022.

An important phenomenon in 2022 was the dramatic fluctuation in the FX market, which had a relevant impact on revenues.

As US interest rates rose faster than rates in other countries, the US dollar soared against almost every currency, with the euro and the yen trading at or near historic lows.

Currency fluctuations had important implications for European and Japanese companies, given the prominence of exports for many of them with about half of total revenues generated from exports for the two regions (Figure 7).

Figure 7: Domestic vs exports share in total revenues

Regional Aggregate	2021 revenue by geographic region				
	Japan	US	Europe	Asia ex Japan	Others
Japan	48%	20%	8%	17%	8%
US	1%	68%	12%	7%	12%
Europe	1%	21%	54%	12%	13%

Source: DWS and CROCI estimate. The table shows 2021 revenue share by regions for non-financial companies within the CROCI coverage. Data as available on 12 January 2023.

The effect of reporting currency depreciation is very apparent in the two regions' 2022 revenue growth (Figure 8, RHS column), significantly higher than expectations at the time of 2022 CROCI Outlook publication.

Figure 8: Revenue growth by region

	2020	2021	2022E	2023E	Δ in 2022 since Outlook
US	-1.9%	13.8%	6.9%	2.9%	1.6%
Europe	-6.7%	10.8%	12.3%	3.3%	7.4%
Japan	-4.5%	15.2%	13.3%	2.7%	9.8%
GEMs	3.0%	12.5%	7.2%	3.3%	2.1%
Global	-2.7%	12.9%	8.8%	3.0%	4.0%

Source: DWS and CROCI. The table shows median revenue growth forecasts of CROCI's coverage. Data as available on 16 December 2022.

The economic recovery and inflation propped up revenue growth in 2022, but it is a different story for the 2023 outlook, with modest expected growth in line with expectations from the IMF's World Economic Outlook (October 2022): *Global economic activity is experiencing a broad-based and sharper-than-expected slowdown, with inflation higher than seen in several decades. Global growth is forecast to slow from 6.0 per cent in 2021 to 3.2 per cent in 2022 and 2.7 per cent in 2023. This is the weakest growth profile since 2001 except for the global financial crisis and the acute phase of the COVID-19 pandemic.*

Still, what matters for investors is real earnings growth and here we note that good revenue growth did not translate into similar high earnings growth. Median real global earnings growth was softer in 2022 relatively speaking and is forecast to decline in 2023 (Figure 9).

Moving on to regional earnings, Japan is the region which particularly stands out, with growth expected in both 2022 and 2023. Even so, despite improved median real earnings, at the aggregate level Japan continues to earn sub-optimal earnings⁶.

Europe and the U.S., on the other hand, have cash returns above the cost of capital. However, real economic earnings in the European region only just beat the hurdle rate in 2022e and are now on the wane again. The U.S. has had a more prolonged history of generating solid economic profits. In section 1.2, we cover in more detail the contrasting trends of economic profit generation in the U.S. versus Europe.

Figure 9: Real earnings growth by region

	2020	2021	2022E	2023E
US	-1.4%	17.9%	-1.2%	-1.6%
Europe	-9.3%	15.3%	8.4%	-3.7%
Japan	-10.3%	40.7%	9.8%	5.0%
GEMs	10.6%	9.4%	-4.6%	1.4%
Global	-3.1%	17.3%	1.9%	-1.6%

Source: DWS and CROCI. The table shows median real earnings growth forecasts of CROCI's coverage. Data as available on 16 December 2022.

⁵ As of 16 December 2022

Past performance may not be a reliable indicator of future results. Market and index performance data is sourced from Bloomberg Finance L.P. Company data is from the CROCI database. Unless stated this data is as of December 2022. Forecasts are based on assumptions, estimates, views and or analyses, which might prove inaccurate or incorrect.

⁶ real returns have been below the global cost of capital since 2007

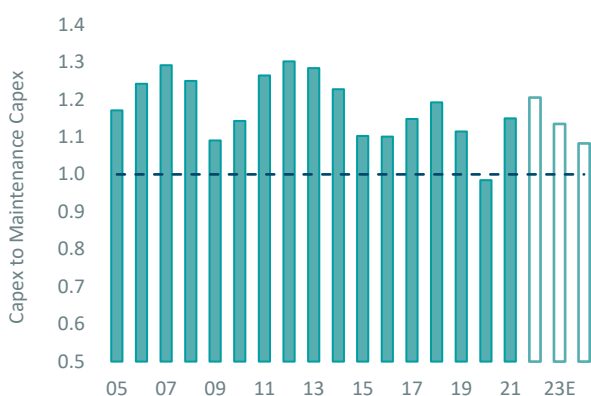
Two ways to understand the impact on economic earnings

There are two ways that a company's economic earnings can be improved.

1. an increase in the productivity ratio (sales to invested capital) while maintaining the margin, or
2. a widening of the margin (post-tax cash flow to sales) while maintaining the capital productivity.

Looking at productivity, we note that corporates are expanding their capital base, spending more than just maintenance capex. New capital investments are cyclical in nature and tend to be driven by the near-term economic outlook.

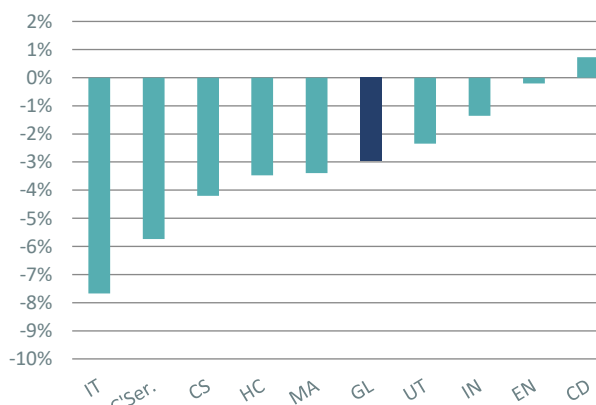
Figure 10: Global capex to inflation-adjusted depreciation



Source: DWS, CROCI. The chart shows the ratio of capex to inflation-adjusted depreciation. The latter is a proxy for maintenance capex that would be necessary to maintain production capacity. Aggregate data of companies in CROCI's global coverage. Data as available on 16 December 2022.

But if the absolute number is above replacement value, normal when global growth is above 2%, 2023 year-on-year growth estimates in inflation-adjusted capex are falling.

Figure 11: 2023E forecast global capex growth by sector



Source: DWS, CROCI. The chart shows year-on-year growth in aggregate inflation-adjusted capex of companies in CROCI's global coverage. Data as available on 16 December 2022. IT - Information Technology; C'Ser. - Communication Services; CS - Consumer Staples; HC - Healthcare; MA - Materials; GL - Global; UT - Utilities; IN - Industrials; EN - Energy; CD - Consumer Discretionary.

The IT sector stands out for showing the highest year-on-year estimated decline in its capex. Negative year-on-year inflation-adjusted capex growth is led by Semiconductors (c.-15%) and Tech. Hardware (c.-5%), whereas Software companies are expected to post marginal positive growth (c.+2%).

Corporate productivity expanded for two consecutive years up until 2022, which is normal given the low level of investment made in 2020 and the strong recovery. However, the medium-term trend is concerning, compounded by high inflation rates as history suggests that productivity tends to fall as inflation rises.

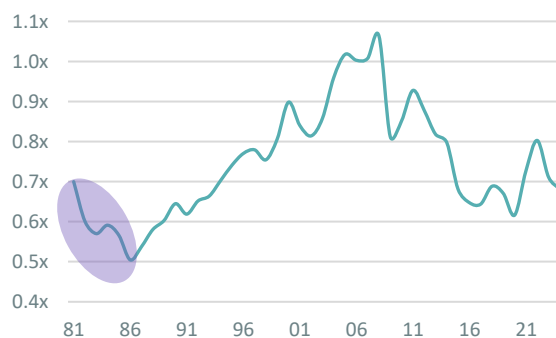
Figure 12: Sales to Gross Capital Invested for global equities



Source: DWS, CROCI. The chart shows median asset productivity (Sales to Gross Capital Invested) by region from 1996 to 2023E. Data as available on 16 December 2022.

If historical trends are any indication, our study of twenty U.S. companies during the inflationary period of the 1980s shows productivity contracting sharply. For this period, the onset of recession⁷ did have an impact on sales, but the invested capital (when adjusted for inflation) also grew significantly.

Figure 13: Sales to gross capital invested for selected U.S. companies*



Source: DWS, CROCI. The chart shows aggregate asset productivity (Sales to Gross Capital Invested) from 1981 to 2024E. Data as available on 16 December 2022. *twenty non-financial companies, for which we have data going back to 1981.

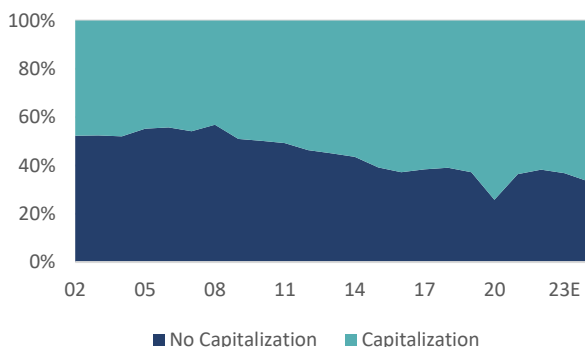
As a side note, asset-heavy businesses generally earn low rates of return—rates that often scarcely provide enough capital to fund the inflationary needs of the existing business, with nothing left over for real growth, for distribution to owners, or for the

⁷ Prior to the 2007-09 recession, the 1981-82 recession was the worst economic downturn in the United States since the Great Depression. Lasting Past performance may not be a reliable indicator of future results. Market and index performance data is sourced from Bloomberg Finance L.P. Company data is from the CROCI database. Unless stated this data is as of December 2022. Forecasts are based on assumptions, estimates, views and or analyses, which might prove inaccurate or incorrect.

from July 1981 to November 1982, this economic downturn was triggered by tight monetary policy in an effort to fight mounting inflation.

acquisition of new businesses. In contrast, the following chart shows that bulk of the economic earnings arose from ownership of operations that combined intangibles of lasting value with relatively minor requirements for tangible assets. We cover Intellectual Capital in Section 3.2, which provides exposure to such businesses.

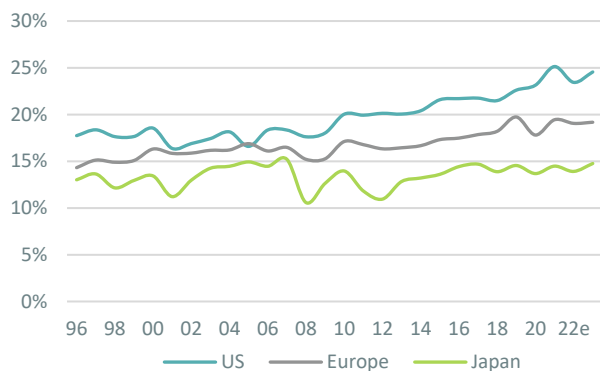
Figure 14: Earnings growth has come from companies with Intellectual Capital



Source: DWS, CROCI. The chart compares Economic Earnings share of companies with Intellectual Capital with those that don't have such assets. The earnings are adjusted for inflation. Data as available on 16 December 2022.

As for EBITDA margins, **years of low inflation since the financial crisis have allowed margins to improve across all developed regions. However, rising inflation typically weighs on margins.** Looking at the regional data, consensus currently expects margin expansion in 2023 within the U.S. and Japan, while in Europe they are expected to remain flat.

Figure 15: EBITDA margins for global equities



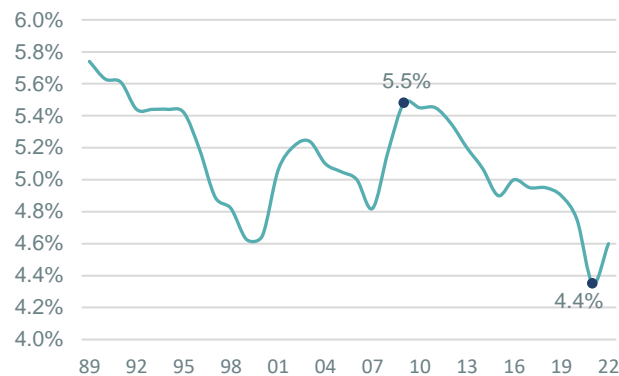
Source: DWS, CROCI. The chart shows median EBITDA margin by region from 1996 to 2023E. Data as available on 16 December 2022.

Inflation and its indirect impact on cost of capital

The price of an asset is defined by its earnings and the discount rate. Given that both can vary, there is a tendency amongst company analysts to fix the discount rate when forecasting, and instead focus only on the trajectory of earnings. But, as we mentioned above, **changes in the discount rate can have a much more dramatic impact on prices—all major bull and bear markets have been driven by such changes, as the discount rate itself is a function of risk appetite.**

In our 2022 CROCI Outlook, we highlighted how a rise in the discount rate was likely to take place, given its low starting point and the desire of central banks to tame 'animal spirits' and inflation.

Figure 16: Annual global cost of capital since 1989



Source: DWS, CROCI. Data as available on 16 December 2022.

We estimate that the discount rate has risen from 4.40% to 4.60%. But this compares with 5.00% before the financial crisis and 5.50% seen in 2009. This implies that equity markets remain between 20% and 40% overvalued respectively.

Changes in the discount rate are behavioural in nature, so forecasting future moves is particularly challenging. As things stand, normalization to higher long-term average levels suggests further downside.

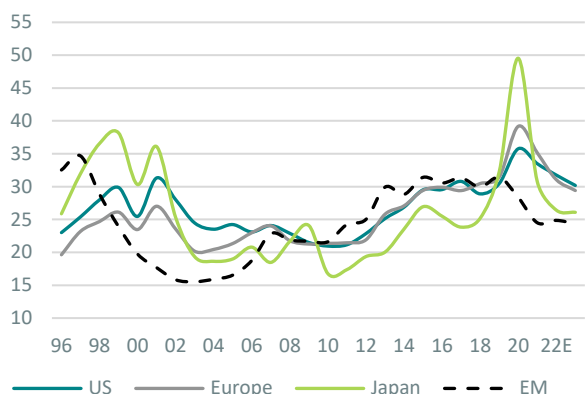
Figure 17: Sensitivity of global equity values to the changes in cost of capital

COC	EV/NCI	EV move	MV move
5.50%	1.01	-35%	-42%
5.25%	1.11	-28%	-34%
5.00%	1.25	-19%	-23%
4.80%	1.38	-11%	-13%
4.60%	1.54	0%	0%
4.50%	1.64	6%	7%
4.30%	1.87	21%	25%

Source: DWS, CROCI. Sensitivity is calculated using agglomerated data of companies in CROCI's coverage globally. EV is Enterprise Value; MV is Market Value. Data as available on 16 December 2022.

Looking at the median economic PE profile across regions, some cooling-off in the EV/NCI is evident, likely offset by compression in the CROCI for next year. However, the bigger picture shows the U.S. and Europe trading at similar 2023e median economic PEs, in line with pre-pandemic valuations. Japan continues to trade at a discount to the U.S., although more or less in line with Emerging Markets.

Figure 18: Median Economic PE by region

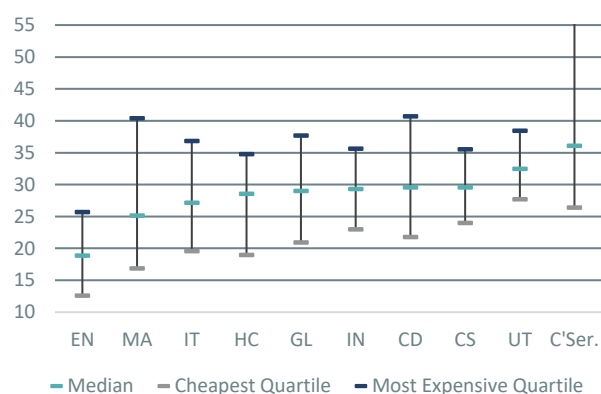


Source: Source: DWS, CROCI. The chart shows median economic PE by region from 1996 to 2023E. Data as available on 16 December 2022

At the Economic Sector level, Energy and Materials are the cheapest sectors on 2023e economic PE, almost 35% and 15% respectively below global median economic PE. For the second year in a row, supportive commodity prices have helped keep valuations favourable for the two sectors. We cover the evolving economic characteristics of the Energy sector in detail in section 2.1. **By contrast, Communication Services appears the most expensive, almost a third higher than the global median economic PE.**

In last year's CROCI Outlook, the median valuation of the IT sector was at a premium to that of the broader coverage universe. That valuation premium has now disappeared and the sector trades at a discount to the broader market.

Figure 19: 2023E Economic PE by sectors

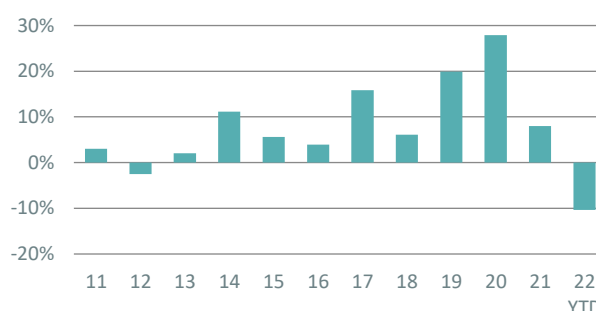


Source: DWS, CROCI. The chart shows the economic PE by sector for 2023E. Data as available on 16 December 2022. EN - Energy; MA - Materials; IT - Information Technology; HC - Healthcare; GL - Global; IN - Industrials; CD - Consumer Discretionary; CS - Consumer Staples; UT - Utilities; C'Ser. - Communication Services.

This has happened against the backdrop of an underperforming IT sector during 2022, the first time this has happened in a

decade. We look at the sector, especially Semiconductors, in section 2.2.

Figure 20: MSCI World IT sector Outperformance vs MSCI World

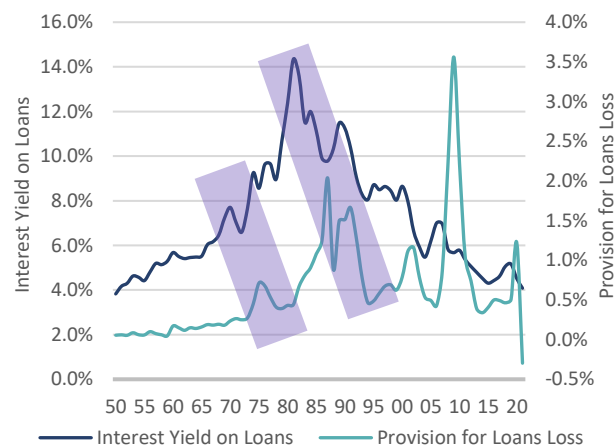


Source: DWS, Bloomberg Finance L.P., MSCI, YTD 2022 data as of 16 December 2022.

Bankers' Check

Global financials performed marginally better than the non-financial benchmark during 2022. As interest rates ticked upwards, the income outlook for banks improved. However, higher interest rate cycles are almost inevitably followed by higher credit losses.

Figure 21: Interest Yield and Loan Loss for US Commercial Banks



Source: DWS, CROCI, U.S. FDIC. The chart shows for FDIC insured US Commercial Banks, Interest Yield on Gross Loans and Provision for Loan Losses from 1950 to 2021.

During 2021, average yield on loan book for the US Commercial banks was at its lowest since 1950 (Figure 21). Also, except for a spike during the most acute COVID year, provisions for loan losses have been consistently low since the global financial crisis. Both these trends were partly reversed during 2022 and this reversal may be extended further during 2023. Please see section 2.3 for more on Banks.

1.2 European Transformation

Bottom-up perspective gives a sense of the urgency

DWS Research Institute recently published a detailed report on the “Framework for European Transformation⁸”. In this section, we include an excerpt from the report which uses CROCI as a toolkit for comparing European listed companies with their global peers.

When looking at a representative sample of European listed companies to assess whether they are fit for the transformational challenges that the continent faces, we conclude that European companies are yet to recognise most of the structural challenges which lie ahead. This has important implications for investors who are looking at European equities as a long-term alternative to fixed income, or as a proxy for long-term exposure to real growth.

A health check of European corporate equities

A more detailed analysis of the state of the European corporate sector shows how, when adjusted for inflation, real earnings (pre-financing costs) have been flat since 2007 for the non-financial part of the market (Figure 22).

Figure 22: EU (non-financial) – real earnings (EUR bn)



Source: DWS CROCI. Data as of 16 December 2022, includes CROCI’s coverage universe within European Union (ex UK)

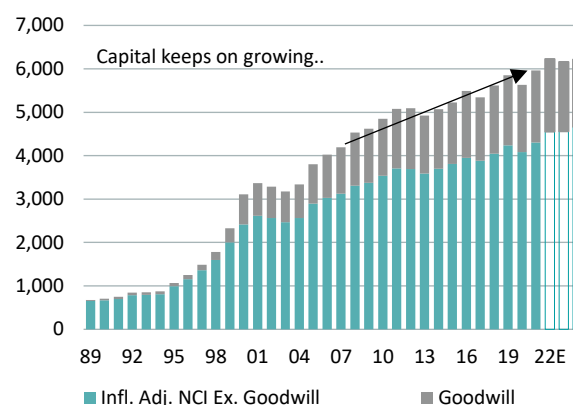
Earnings are a function of capital employed (CE) and cash returns ((ROCE*CE = Operating Earnings). Looking at the drivers of operating earnings (Figure 23 and Figure 24), we note that capital has steadily increased, but cash returns are fading.

This is not a healthy picture for businesses, especially compared to the U.S. market, where we see much higher cash returns, growing capital and higher earnings.

While there are certainly oligopolistic considerations that may justify the high level of cash returns for the U.S. market, we note that:

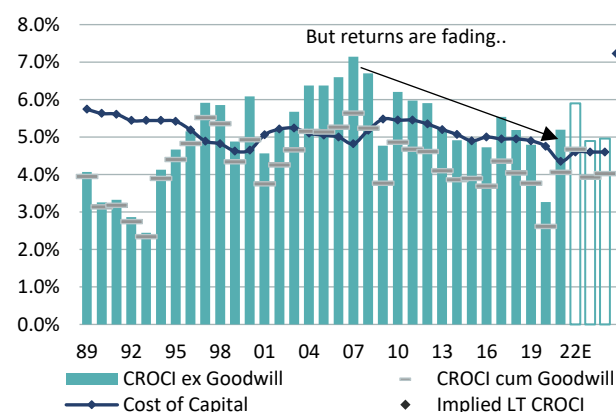
- cash returns are a measure of regional competitive advantage
- fading cash returns and increasing capital are an early sign of capital misallocation and that fading cash returns will eventually hamper the ability of companies to create a return for debt and equity holders, since all available cash is used to maintain capital.

Figure 23: Net Capital Invested* (EUR bn)



Source: DWS CROCI. Data as of 16 December 2022, includes CROCI’s coverage universe within European Union (ex UK). *Displayed in today’s money

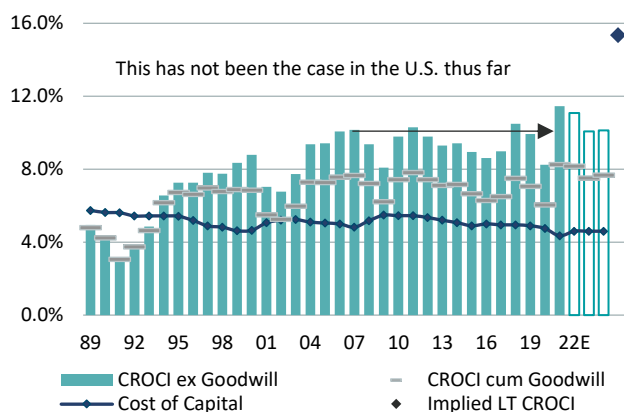
Figure 24: EU CROCI against long-term cost of capital



Source: DWS CROCI. Data as of 16 December 2022, includes CROCI’s coverage universe within European Union (ex UK). *Displayed in today’s money

⁸ A Framework for European Transformation (Dec 2022) – DWS Research Institute <https://www.dws.com/en-gb/insights/global-research-institute/a-framework-for-european-transformation/>

Figure 25: US – CROCI against long-term cost of capital



Source: DWS CROCI. Data as of 16 December 2022, includes CROCI's coverage universe within European Union (ex UK). *Displayed in today's money

Capital productivity is fading for European stocks

Falling productivity of fixed capital is another pressure point for operating returns. The two simple drivers of operating returns are operating margins and revenues over capital—the former has been increasing but the latter has been steadily declining since 2006.

Valuation is not reflecting the challenge

One would expect the headline valuation of European companies to reflect these regional challenges and be at a significant discount to global peers. However, our analysis suggests that there is no such material discount. Figure 26 shows the aggregated valuation for some of the main countries and regions. Significant differences exist when using headline or Accounting Price to Earnings ratios, but disappear when using economic PE or FCF Yield, suggesting that investors are rightly looking at cash-based valuations.

Figure 26: Valuation across regions

Region	Accounting PE	Economic PE	FCF yield
US	19.3x	30.1x	3.9%
EU	12.8x	26.6x	4.5%
Germany	10.7x	32.4x	3.4%
UK	10.3x	20.0x	6.3%
Japan	12.9x	30.7x	2.0%
EM	12.4x	24.6x	5.0%

Source: DWS CROCI data for 2022. Data as of 16 December 2022.

The troubles for European listed firms run deep

It is possible that an aggregated returns picture may be misleading and hence Figure 27 looks at ratios that aim to highlight how deep the problem of low profitability amongst European companies is. We note that 39% of our sample of European companies have cash returns below the cost of capital, compared to 18% for the U.S. European companies also have a higher level of financial leverage to their U.S. peers, 31% vs 22%. That European companies have both lower profitability and higher financial leverage is a cause

for concern. As a starting point, they will struggle to make the necessary investments to transition to the new low-carbon economy in a stagflationary environment with rising interest rates.

Figure 27: Cash return and financial leverage

Region	Ratio of companies with cash returns below cost of capital	Financial Leverage
US	18.3%	22.2%
EU	38.9%	31.0%

Source: DWS CROCI data for 2022. The sample companies represent CROCI's coverage in the U.S. and European Union. Financial Leverage is calculated as Financial Liabilities divided by Market Capitalisation using CROCI database. Data as of 16 December 2022.

Public equities in EU must finance transformative projects

Public equities ought to be a risky asset, providing capital at risk for long-term projects. The simple reality is that European listed equities in the current format are not the most appropriate mechanism for financing long-term projects. Equities are thought of as a perpetuity, however it is best to say that equity benchmarks are a perpetuity, but their components are not. If one were to look at the DJIA components over the past 100 years, one would, for example, note how few companies still there. Figure 28 shows the top 10 companies by market cap in the U.S. and in the EU.

Figure 28: Top 10 companies by market cap in both the regions

USA	EU
Apple (IT)	LVMH (CD)
Microsoft (IT)	Novo-Nordisk (HC)
Alphabet (C'Ser.)	ASML (IT)
Amazon.com (CD)	L'Oreal (CS)
Tesla Motors (CD)	Hermes (CD)
J&J (HC)	TotalEnergies (EN)
Visa (IT)	Unilever (CS)
Exxon Mobil (EN)	SAP (IT)
Nvidia (IT)	AB InBev (CS)
Wal-Mart (CS)	Sanofi (HC)

Source: DWS CROCI. Based on the CROCI coverage in both US and EU (ex-Financials), data as of 16 December 2022.

It is evident that on average the U.S. components are younger entities than their EU counterparts. The dynamism in U.S. equity benchmarks has provided long-term investors access to the growth in the U.S. economy. The U.S. also has a functioning framework for sourcing capital for risk taking, compared to the EU where it is still nascent.

Figure 29, for example, shows how European investors have already missed the boat when it comes to the IT-led transformation of the world economy.

Figure 29: 10 years total return breakdown by sectors

Sectors	MSCI USA		MSCI Europe	
	Weights	Total return contribution	Weights	Total return contribution
C'Ser.	10.1%	7.5%	3.5%	2.9%
CD	12.6%	63.2%	11.5%	20.8%
CS	5.7%	24.4%	12.8%	23.6%
EN	2.5%	1.1%	4.6%	3.9%
FN	10.5%	45.6%	15.7%	23.9%
HC	13.1%	47.3%	14.6%	27.6%
IN	7.8%	29.0%	15.4%	26.6%
IT	29.9%	141.6%	8.6%	12.1%
MA	2.5%	8.4%	8.0%	14.8%
RE	2.9%	2.7%	1.2%	0.1%
UT	2.4%	6.7%	4.2%	7.5%
Total	100.0%	377.5%	100.0%	163.9%

Source: DWS, Bloomberg, MSCI, Weights as of 31 December 2021, Total Returns contribution based on DWS calculation. C'Ser. - Communication Services; CD - Consumer Discretionary; CS - Consumer Staples; EN - Energy; FN - Financials; HC - Healthcare; IN - Industrials; IT - Information Technology; MA - Materials; RE - Real Estate; UT - Utilities.

IT has more than three times the weight in the U.S than in Europe, which explains 60% of the outperformance of U.S. vs. Europe. If Amazon and Tesla sat in the IT sector rather than in Consumer Discretionary, then the ratio would be even higher.

An ex-post 200% differential in performance between Europe and the U.S. is a gap big enough to highlight the risks of not embarking on transformative projects, especially given the poor micro dynamics highlighted above.

Financing private ventures to scale up before bringing them to the market has been decisive in the U.S. Venture capital has been growing slowly in Europe and is currently estimated to be just 0.1% of EU GDP⁹, a disconnect that needs to be addressed.

And even when Europe may have had an innovative edge, it has failed to capitalise on it. Take the example of the world wide web.

It was developed by a British scientist while working at CERN¹⁰, but US-based businesses were able to make the most out of it. Another example is the mp3-audio format, developed by Germany's Fraunhofer institute.

The need for transformation is quite evident, for revamping Europe and its business environment and making it fit for the future. This is all the more urgent in the face of regional challenges ranging from changes in the geopolitical landscape, demographics, competitive dynamics and climate transition. Readers keen to understand this topic in further detail can refer to our report titled "A Framework for European Transformation"¹¹.

⁹ European Commission (July 2022) CMU Progress
¹⁰ Cern (1989) The birth of the Web

¹¹ A Framework for European Transformation (Dec 2022) – DWS Research Institute <https://www.dws.com/en-gb/insights/global-research-institute/a-framework-for-european-transformation/>

1.3 Carbon price impact on listed equities

Accounting for further mainstreaming of the carbon cost

Equities are thought to provide protection against rising inflation, but so far the story has been one of little earnings growth and, for European stocks, static earnings with structural challenges. What are the risks to investors beyond the short term dynamics? **Within this section, we assess the potential risks to earnings from rising carbon prices.**

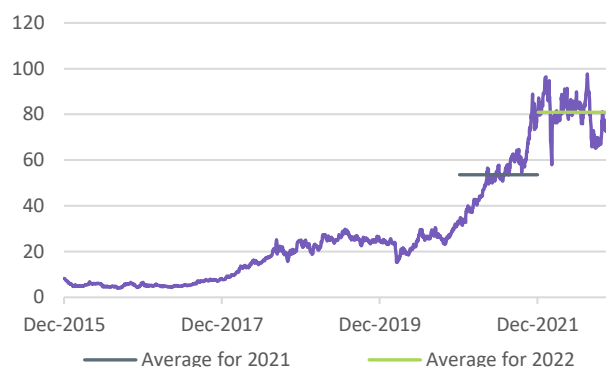
Following years of limited growth, prices in carbon taxes and Emissions Trading Systems (ETSS) have seen a sharp acceleration across multiple jurisdictions. This was driven by more ambitious climate policies, as well as broader economic factors such as global energy commodity prices. The rapid rise in ETS carbon prices, in conjunction with the operation of new ETSS, has seen ETS revenue surge, surpassing carbon tax revenue for the first time¹². Despite this, carbon prices in most jurisdictions remain below what is needed to meet the goals of the Paris Agreement. Meanwhile, jurisdictions are increasingly looking toward cross-border policies and initiatives that enable higher carbon prices while ensuring the continued competitiveness of their economies. In this section, we update and build on our analysis¹³ of the impact of hypothetical carbon cost and its impact on listed equities. Before setting out the analysis, we reiterate the working assumptions we used last year.

Assumption 1: defining the boundaries of emissions - Three sectors—Energy, Materials and Utilities— account for more than four fifths of Scope 1 as well as Scope 1 & 2 carbon emissions of CROCI’s coverage universe. Only once Scope 3 is added, the level of emission of these three sectors goes down to 60% of carbon emissions. Energy will represent nearly half of the 60%. For the analysis in this paper, **we restrict ourselves to Scope 1 and 2 emissions only.**

Assumption 2: inability to pass-on carbon cost to the customers - the ability to absorb or pass on will depend on a number of factors, supply, demand, competition, regulation, profitability. At this stage, we assume **companies will not be able to pass on the cost of their emissions to their customers.** However, we relax this assumption at the end of this section, to assess possibly inflationary impact.

Assumption 3: global reference point for carbon cost - The EU ETS is the most liquid carbon market globally. More than 15 years since the EU ETS scheme was launched, carbon prices are now ~80 euros per tonne¹⁴, [Figure 30](#)

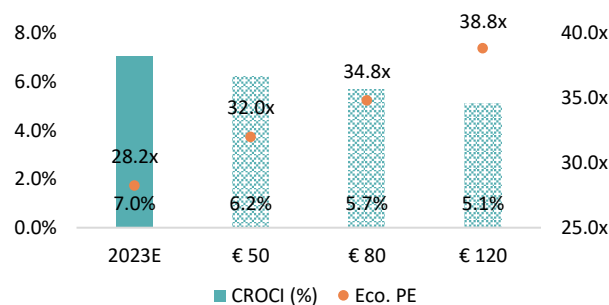
Figure 30: EU ETS price evolution (EUR per tonne)



Source: DWS, Bloomberg. Data as of 30 December 2022.

Using CROCI as a basis, we model how profitability, valuation and other fundamentals of specific companies would change under different assumptions regarding the increased expense to companies when bearing the cost of their carbon externalities in part or full¹⁵. In the following figure, we show the sensitivity for non-financial coverage universe. When we assume a global carbon cost of €80 (close to last year’s average EU ETS price), the base case 2023e aggregate cash return shrinks from 7.0% to 5.7%. Incremental impact on cash return and Economic PE can be seen in the following exhibit.

Figure 31: Sensitivity of 2023E CROCI and Economic PE to carbon prices



Source: DWS CROCI. Data as of 16 December 2022, includes CROCI’s non-financial coverage universe.

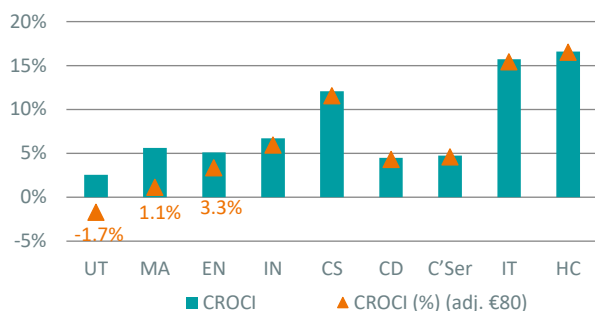
We also break our analysis down by sector. Unsurprisingly, the cash returns of Utilities, Materials and Energy are the most impacted due to implicit carbon cost. For the remaining sectors, the compression in CROCI is not more than 50 bps.

¹² State and Trends of Carbon Pricing 2022 (May 2022) – World Bank

¹³ Outlook 2022 – Homeward bound to Ithaca - <https://www.dws.com/en-gb/capabilities/active-investments/croci/the-croci-way/croci-insights/>

¹⁴ Carbon dioxide, or the equivalent amount of two more powerful greenhouse gases, nitrous oxide (N₂O) and perfluorocarbons (PFCs)

Figure 32: Sensitivity of 2023E sector CROCI to €80 carbon cost



Source: DWS CROCI. Data as of 16 December 2022, includes CROCI's non-financial coverage universe. UT: Utilities; MA: Materials; EN: Energy; IN: Industrials; CS: Consumer Staples; CD: Consumer Discretionary; C'Ser.: Communication Services; IT: Information Technology; HC: Health Care.

Translating the compression in cash returns into the change in economic earnings, the following table shows the decline in economic earnings driven by the carbon cost of €80 per tonne.

Figure 33: €80 carbon cost & economic earnings (USD bn)

Sectors	Economic Earnings		Change in earnings	
	2023E	2023E adj. for €80 carbon price	Amount	%
UT	80.0	-53.4	-133.4	-167%
MA	108.2	21.7	-86.5	-80%
EN	187.5	122.6	-64.9	-35%
IN	214.9	190.6	-24.2	-11%
CS	189.6	181.3	-8.3	-4%
CD	194.6	186.4	-8.2	-4%
C'Ser.	177.3	172.0	-5.3	-3%
IT	351.4	345.1	-6.3	-2%
HC	292.8	291.1	-1.6	-1%
Global	1,796.3	1,457.4	-338.9	-19%

Source: DWS, CROCI, data as of 16 December 2022, UT: Utilities; MA: Materials; EN: Energy; IN: Industrials; CS: Consumer Staples; CD: Consumer Discretionary; C'Ser.: Communication Services; IT: Information Technology; HC: Health Care.

Possible impact on inflation should companies be able to pass on carbon cost

We began this section with one of the assumptions being the companies are not able to pass on the carbon cost to their customers. If we were to relax this assumption to gauge the relationship between total carbon cost and the underlying revenues, we can get a sense of the pricing adjustment required to protect the existing the cash returns of the sectors. We can see the prime emitters are the most impacted and hence will need to adjust their pricing significantly to protect their economic earnings. **Given the businesses of these sectors become part of the upstream supply chain of the overall global economy, passing on these costs could potentially generate inflation.** However, at the aggregate global level we see that impact of the carbon cost appears relatively less alarming.

Figure 34: Carbon cost and economic earnings as a % of 2023E aggregate revenues

Sectors	Carbon Cost			Economic Earnings
	€50	€80	€120	2023E
UT	5.1%	8.2%	12.3%	6.8%
MA	3.4%	5.4%	8.1%	5.7%
EN	1.1%	1.7%	2.6%	5.1%
IN	0.4%	0.7%	1.0%	5.3%
CS	0.2%	0.3%	0.5%	5.7%
CD	0.1%	0.2%	0.3%	4.0%
C'Ser.	0.2%	0.3%	0.4%	7.9%
IT	0.2%	0.2%	0.4%	11.9%
HC	0.1%	0.1%	0.2%	14.3%
Global	0.8%	1.2%	1.9%	6.8%

Source: DWS, CROCI, data as of 16 December 2022, the table includes carbon cost net of taxes. UT: Utilities; MA: Materials; EN: Energy; IN: Industrials; CS: Consumer Staples; CD: Consumer Discretionary; C'Ser.: Communication Services; IT: Information Technology; HC: Health Care.

As most technologies to capture carbon become viable at €150 plus¹⁶, we expect that energy prices to remain high and policymakers struggling between whether to allow companies to pass the higher costs of our current un-sustainable economic system to consumer or asking companies to bear the brunt through lower earnings. In both situations, the outcome is not a positive one for investors.

¹⁶ Carbon markets: The why, what & where (February 2022) - <https://www.dws.com/en-gb/insights/global-research-institute/carbon-markets-the-why-what-where/>

Section 2: Sector Insights

2.1 Energy Sector

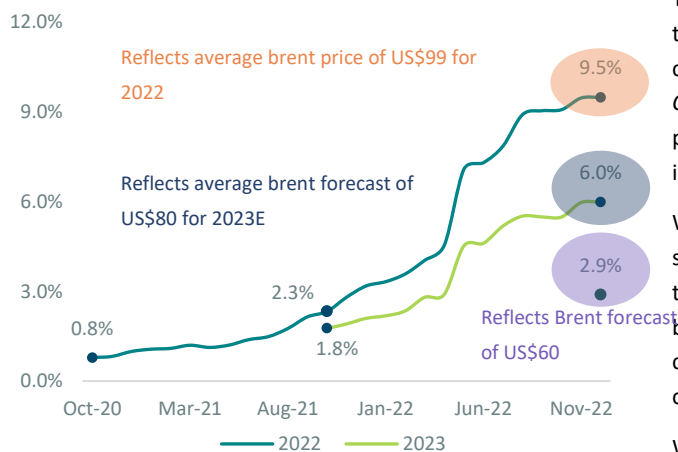
Three ways equity shareholders benefit from a turnaround

For a shareholder exposed to an improving business cycle, there are generally three stages of benefits¹⁷:

- ➔ First stage: shareholder benefits from an underlying corporate return on equity which is undergoing a significant improvement.
- ➔ Second: a major portion of the returns are reinvested by the business at rates which are trending up.
- ➔ Third: such a business is rewarded with an escalating appraisal of underlying equity capital as the first two benefits are widely recognized.

In the case of the energy sector, the first stage is panning out courtesy of buoyant oil and gas prices. In the following chart, we look at the economic characteristics of the energy sector¹⁸ which have improved significantly. The 2022e CROCI scaled from a lowly level of 0.8% in October 2020 to 2.3% by Oct-21. The recovery in CROCI since then has been quite dramatic to 9.5%, characterised by the average Brent price rising by 40% over 2022 to US\$99. The story for 2023e CROCI strikes an optimistic tone as well, expanding from 1.8% on Oct-21 to 6.0% as on Oct-22.

Figure 35: Energy sector CROCI estimates

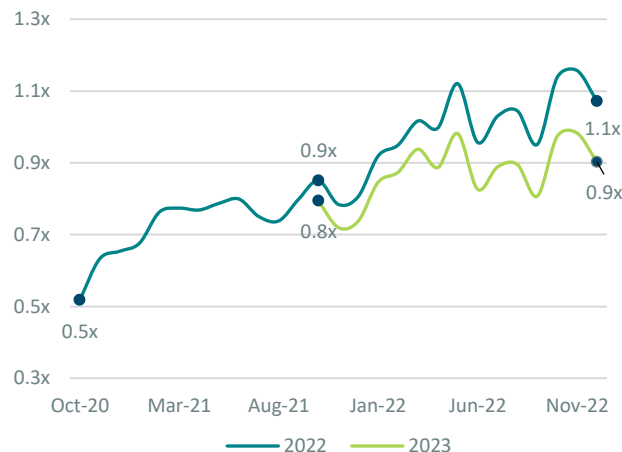


Source: DWS, CROCI. Aggregate data of companies in CROCI's global Energy sector coverage. Data as available on 16 December 2022.

The second stage (reinvestments) is conspicuous by its absence so far. Looking at the third stage (escalating appraisal), we start with 2022e Tobin's Q (EV/NCI) for the sector. This has more than doubled over the past two years to go past parity. Despite such significant expansion in the asset multiple, the expansion in the economic returns has had a greater impact on the Economic PE.

The 2022e Economic PE has contracted by over two-thirds, from 36.6x (in October 2021) to 11.3x (in December 2022). Also, the 2023e economic PE saw an almost identical cut, falling from 45.1x to 15.1x over the same period.

Figure 36: Energy sector EV/NCI



Source: DWS, CROCI. Aggregate data of companies in CROCI's global Energy sector coverage. Data as available on 16 December 2022.

This brings us back to the second stage. Energy is a sector where the final product is largely undifferentiated. As a result, aggregate capital reinvested by the sector usually results in a supply glut. *Ceteris paribus*, significant supply addition lowers the energy prices and as a result hampers the profitability of the overall industry.

We have seen this pattern play out in the past. The following chart shows the relationship between aggregate capex of the sector and the energy price (Brent). There is a meaningful correlation between the two. This makes some economic sense because new capacity additions happen when the oil price rises, making deep offshore projects profitable, for example.

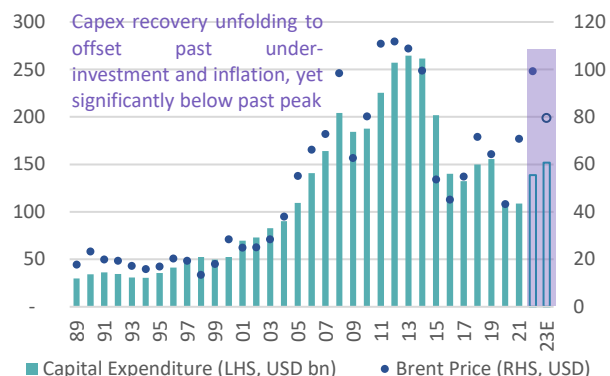
We consider the years from 2007 to 2014 as a peak period, when Brent averaged USD 93 per barrel. Whether built organically or through business acquisitions, asset growth during this period naturally reflected the high oil price in the expectation that it would continue. Diverging from the previous high oil price trend, this time around the sector in aggregate has significantly dialled back on reinvestment.

¹⁷ How Inflation Swindles the Equity Investor (May 1977) Warren E Buffett

¹⁸ of the whole energy value chain, the E&P segment is the largest source of EBITDA generation and the largest consumer of capital invested. The subsequent analysis therefore includes the companies from the U.S. and Europe that are primarily involved in E&P activities, including some large integrated

operators. In all there are 21 such companies in the CROCI database, of which 20 are part of MSCI World Energy Index and represent 65 percent of the Index weight as on 30th December 2022. Unless stated otherwise, the aggregate of these 21 companies will be referred to as "The Energy Sector" for the remaining portion of this section

Figure 37: Capital expenditure of the Energy sector along with Brent price (1989-2023E)

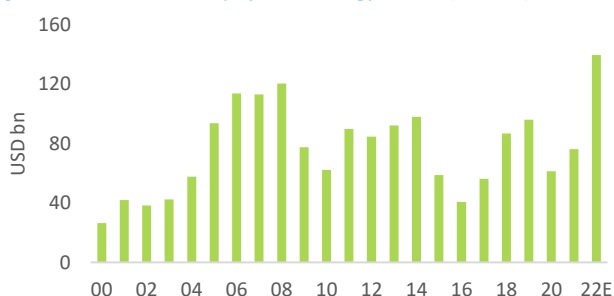


Source: DWS, CROCI. Aggregate data of companies in CROCI’s global Energy sector coverage. Data as available on 16 December 2022. The Brent forecast for 2023E sourced from Bloomberg.

Redistribution over reinvestments

Between 2007 and 2014, cumulative capex made up roughly 60% of cash from operations. In contrast, in 2021 and 2022, that figure tracked below 30%. Recent trends suggest that, instead of reinvesting the excess cash flow in business, companies have given priority to increasing shareholder pay-out (in the form of buybacks and dividends) and to strengthening balance sheets.

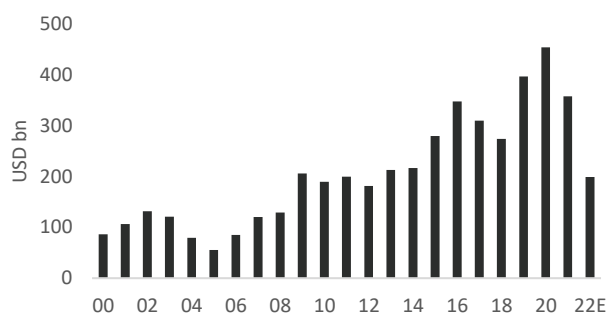
Figure 38: Shareholders pay-out: Energy sector (00-22E)



Source: DWS, CROCI. Aggregate data of companies in CROCI’s global Energy sector coverage. Data as available on 16 December 2022. Includes share buybacks and dividends.

Leverage peaked during the COVID pandemic and is undergoing a significant reversal. Net debt is estimated to have reduced by over half from 2020 peak levels, moving from a net debt-to-equity of 52.3x in 2020 to 17.7x on 2022e numbers.

Figure 39: Net financial debt of the Energy sector (2000-2022E)



Source: DWS, CROCI. Aggregate data of companies in CROCI’s global Energy sector coverage. Data as available on 16 December 2022.

This capex discipline should be seen in the context of structural demand for oil and gas. Global fossil fuel use has risen in line with GDP since the start of the industrial revolution during 18th century. Net Zero requires this historical relationship to be reversed even as the global economy continues to expand. The energy sector has already experienced cyclical demand destruction during the pandemic, which resulted in impairments to the tune of five per cent of the overall capital base¹⁹. The net effect is that oil companies have structural demand uncertainties to weigh before making investment decisions. Apart from potentially structurally lower demand, regulatory risks remain for the economic earnings of the sector, in the form of carbon and/or windfall taxes.

In short, the longevity of the cash return expansion phase and the multiple expansion phase depends upon the absence of the second stage (lack of significant capacity expansion). So long as the sector remains disciplined about new capacity additions, its economic characteristics are likely to remain healthy. Of course, there are other factors beyond the control of the sector. Amongst these, 1) Net Zero is likely to lead to structural demand destruction and 2) regulatory risks are likely to have a far-reaching impact on the sustainable economic characteristics of the sector. In addition to that, there is fresh substantial litigation risk for the oil majors, and Exxon in particular, on the back of a campaign summarised by #Exxonknew. This comes out of a discovery by investigative journalists in 2015 suggesting that Exxon has known since the late 1970s about the risk fossil fuels posed to global warming, whilst at the same time working to cover this fact up.

Should any of these scenarios materialise, there will be implications for the relative value attractiveness of the sector. As highlighted in Figure 35, if Brent declines to \$60, the CROCI could shrink to 3%, which is also a risk for the sector’s valuation.

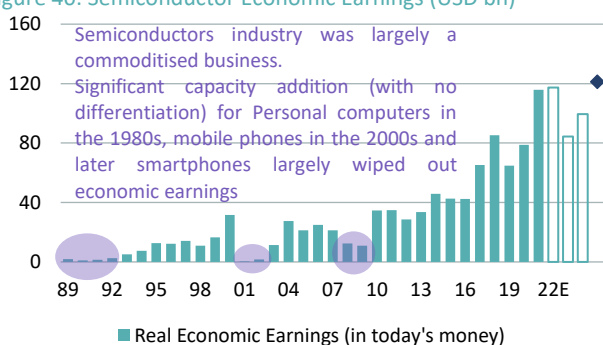
¹⁹ Discussed at length in the CROCI Outlook 2022 <https://www.dws.com/en-gb/capabilities/active-investments/croci/the-croci-way/croci-insights/>

2.2 Semiconductors

Cheap as chips?

The semiconductor industry exhibits great cyclicity. The rapid evolution of consumer products such as PCs in the 1980s, mobile phones in the 2000s and later smart phones and other consumer devices meant that the industry had to expand capacity aggressively. This eventually resulted in supply exceeding demand, incentivising players to indulge in fierce price wars, driving down the entire industry’s earnings.

Figure 40: Semiconductor Economic Earnings (USD bn)

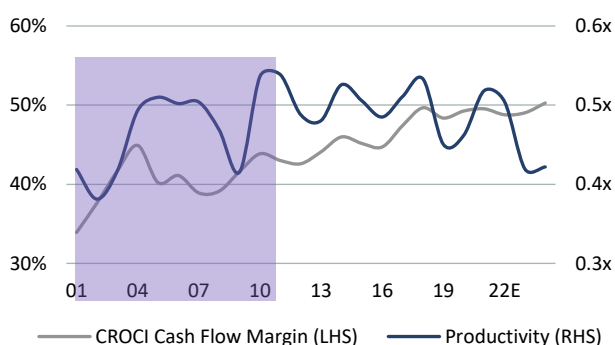


Source: DWS, CROCI. Aggregate data of companies in CROCI’s global Energy sector coverage. Data as available on 16 December 2022.

Structural expansion in the business cycle

The ebb and flow of the semiconductor industry’s cash returns mirrors the cyclicity of the underlying business. This pattern was more pronounced during the first decade of the century (2001-10) than following one (2011-20). The cash flow margins point to a significant expansion, however.

Figure 41: Margins and productivity



Source: DWS, CROCI. Aggregate data of companies in CROCI’s global Energy sector coverage. Data as available on 16 December 2022.

Consistent economic earnings generation since 2010 can be attributed to three factors:

1. Broadening of the client base: over the years the industry has diversified away from retail-focused end-user markets such as consumer electronics to newer market areas such as automobiles, robotics, artificial intelligence and cloud computing. Most of the newer markets have longer product cycles than consumer electronics, thereby lowering cyclical drawdowns. For example, according to some estimates, semiconductors are forecast to account for more than 20% of the total premium vehicle material costs by 2030²⁰.

2. Consolidation: after a wave of consolidations across the semiconductor industry in the past decade, the sector now exhibits more of an oligopolistic structure with higher barriers to entry and significant pricing power (the number of large semiconductor companies has decreased to 97 in 2020 from about 160 ten years earlier). Also, customers and governments are increasingly funding (in the form of upfront payments and subsidies) the burgeoning cost of setting up new state of the art technology fabs.

3. Outsourced manufacturing: over the past three decades, the global semiconductor industry has experienced rapid technological changes, rising capital intensity and declining prices of final products (per transistor basis). The industry was dominated by the US and Europe in the 1990s. Over the subsequent 30 years, hundreds of “fabless” semiconductor firms entered the market that pioneered the foundry business model, which rely on contract manufacturers to produce their designs. As a result, the regional distribution of semiconductor manufacturing capacity shifted significantly towards low-cost countries. East Asia emerged as the main manufacturing hub with three-quarters of the world’s chip production.

COVID-19 exposed the potential risks and vulnerability of the current electronics and semiconductor supply chain because of the concentration of manufacturers and the large regional dependency. Given the challenging geopolitical context and conflicts between nations over technological advancements, there are signs of new production capacity shifting away from offshore factories towards the regions where they are consumed. The extent to which this will lead to a potential unwinding of the

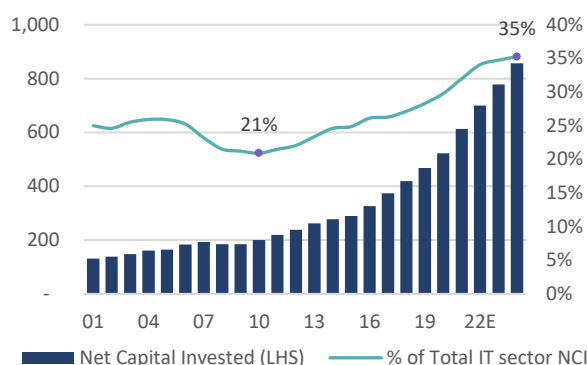
²⁰ Source: Roland Berger Computer of Wheels, McKinsey, Intel (September 2021)

outsourcing impact margin remains to be seen. Meanwhile, investments within the industry are likely to pick up on the back of demand for near-shoring.

Significant investments pick-up relative to the IT sector

Unlike the Energy sector, the economic earnings generation has improved on the back of incrementally higher investments. Benefiting from the triple benefits described above, the semiconductor industry has significantly increased its investment base relative to the rest of the IT sector.

Figure 42: Capital Invested: Semis Industry (USD bn)



Source: DWS, CROCI. Aggregate data of companies in CROCI’s global Energy sector coverage. Data as available on 16 December 2022.

Despite accounting for a considerable proportion of the IT sector’s total capital base, coupled with improved cash returns, the semiconductor industry continues to remain at a material discount to the IT sector. The 2023e semiconductor economic price-to-book trades at 3.2x, almost a third cheaper than the wider IT sector.

Addressing the Behemoth bias

Any analysis of the IT sector is easily skewed by the presence of trillion-dollar market cap companies. Of the three industries, semiconductors is the least concentrated, so behemoth companies within subsector are not large enough to distort its economic characteristics.

Looking at median valuation, the economic PE for Semiconductors is at a significant discount to the Software business, while being marginally below the Hardware industry.

Figure 43: IT Industry Group Valuation and CROCI Drivers

	Software	Hardware	Semiconductor
Number of Companies	41	44	26
Total Market Cap. (\$ bn)	4,729	3,310	2,462
of which largest company	39%	65%	17%
of which top three companies	55%	79%	43%
Economic PE	30.7	23.2	21.6
EV / NCI	8.0	1.6	4.2
CROCI (%)	28.6%	8.7%	20.6%
Dividend Yield	0.9%	2.3%	1.9%
Sales / GCI	1.2	0.9	0.7
CROCI CF Margin (%)	36.4%	22.2%	44.9%

Source: DWS, CROCI. 2023E Median data of companies in CROCI’s global IT sector coverage grouped by respective Industry Group. Data as available on 16 December 2022.

Despite having underperformed in 2022, the IT sector in aggregate trades at a premium to the global equity market. However, looking at the median valuation, the sector now trades at a discount to the CROCI’s global coverage universe. The median cheapness of the sector is driven by semiconductor companies. Despite improved economic characteristics flowing from the sector’s competitive positioning and reduced cyclicality, the Semiconductor industry continues to trade at a significant discount to the wider IT sector.

A simple model for estimating growth and capacity in the semiconductor industry

A few years ago, we developed a simple model for estimating earnings growth and capacity within the semiconductor sector. This model looks at the revenues of semiconductor equipment manufacturers to estimate where we are in the tech cycle at any point of time.

The theory is simple: as semiconductor companies become more optimistic about future demand, they invest in capacity which shows up as revenue for the equipment manufacturers. The useful life of semiconductor equipment is typically around eight years. So, by comparing a trailing eight-year sum of semiconductor equipment manufacturer revenues with forecast revenues, we can derive a good understanding of where we are in the Tech cycle and therefore its likely course.

Figure 44: Technology cycle model (USD bn)



Source: DWS, CROCI. Aggregate data of companies in CROCI's global semi equipment sector coverage. Data as available on 6 January 2023.

What we note is that since 2017 there has been a change in gradient with capacity increasing by over 70% by 2022 instead of closer to 15%. One can rationalise the structural change with the wider use of chips in the global economy as well as on geopolitical matters. We also note, however, that there have been speculative assets that have led to the increase in demand (crypto) and one should not under-estimate the significant innovations delivered in the past. The conclusion is that a normalisation might well be expected in the sector.

Current valuations look attractive for the sector based on its current trajectory, and this could well be sustainable for the medium term given how ubiquitous semiconductor chips have become as digitalisation has touched all aspects of the economy. But we urge caution on investors given the step change in capacity growth in past years combined with the recent demise of cryptocurrency speculation as a driver for chip consumption.

2.3 Global Banks

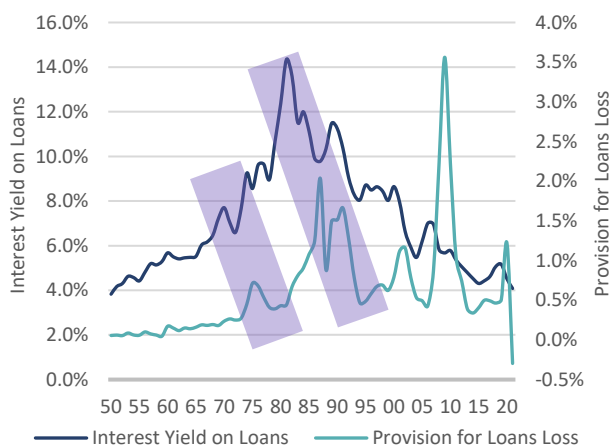
Make hay while the sun shines..

Interest Rate tailwind boosts margins

At the start of 2022, the US Federal Reserve board’s median interest rate forecast was 0.9% (the highest estimate was 1.1%). Towards the end of the year, the actual effective Fed rate was in excess of 4.3%. Higher interest rates also took hold in Europe and emerging markets. The Bank of Japan was the last major central bank to join the monetary policy tightening bandwagon by completely surprising the markets at its December policy meeting.

Higher interest rates are usually good for banks as they improve their treasury income on a large portion of non-interest bearing liquidity they hold for their clients. However, as highlighted in section 1.1 through the following chart, higher interest rates are generally followed by higher provisions for loan losses.

Figure 45: Interest yield and loan loss for US Commercial Banks



Source: DWS, CROCI, U.S. FDIC. The chart shows for FDIC insured US Commercial Banks, Interest Yield on Gross Loans and Provision for Loan Losses from 1950 to 2021.

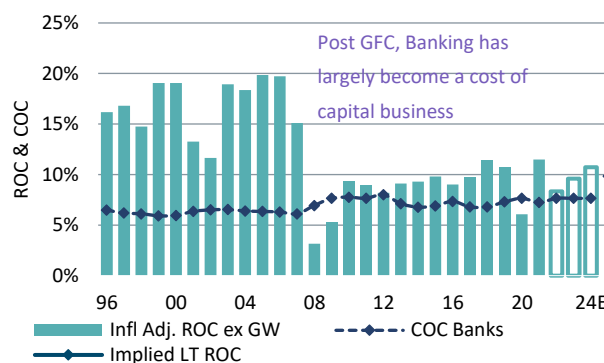
In 2022, banks reported lower year-over-year profits, as their loan loss provisions increased. This was in stark contrast to 2021, when banks released provisions they had accumulated in anticipation of loan losses tied to the pandemic that didn’t quite materialise to the extent anticipated. **Banks have been less aggressive in provisioning this time around but given the global economic slowdown and poor market sentiment, they are likely to continue with higher provisioning in 2023, albeit well below the peak levels seen during the pandemic.**

Banks’ return on capital and valuation – pre and post GFC

Clear differences can be observed in the return on capital (ROC) for Banks between the pre- and post-financial crisis periods. Prior to 2008, our global banks aggregate generated 16.8% average ROC while the average tier 1 capital ratio was around 8%. Even worse,

core tier 1 capital (just the equity portion) averaged less than 6% of RWA; implying capital was levered more than 16 times over risk assets.

Figure 46: Global Banks’ Return on capital & cost of capital



Source: DWS, CROCI. Data as available on 16 December 2022

Since 2010, the average ROC of our global banks aggregate has been 9.4%, nearly 45% lower. The decline can almost entirely be explained by the higher capital requirement globally for Banks. Since then, the CET1 ratio for our global aggregate has more than doubled to 12.3%.

The pre-GFC economic value generated by banks was reflected in their valuation as well. In the following chart, we compare the valuation of global banks to the CROCI ex-banks coverage universe, across three distinct periods. During the pre-GFC period, banks easily beat the non-banks universe in terms of economic profit generation by a margin of almost ten percentage points. As a result, the markets were happy to value the banking business at almost three times book value.

Post GFC, excess economic profits have flattened out and so has the exuberant valuation for the banks. During the past decade, global banks traded at a discount to non-banks (based on price-to-book). Notwithstanding the tailwinds from the rising interest rates, markets continue to remain cautious. This can be seen in the price-to-book during the post-pandemic period: 1.1x for banks versus 2.0x for ex-banks. On an economic PE basis, banks trade at a significant discount to ex-banks. However, this discount appears reasonable should we compare it to the period following the financial crisis.

Figure 47: Valuation Versus Non-Financials

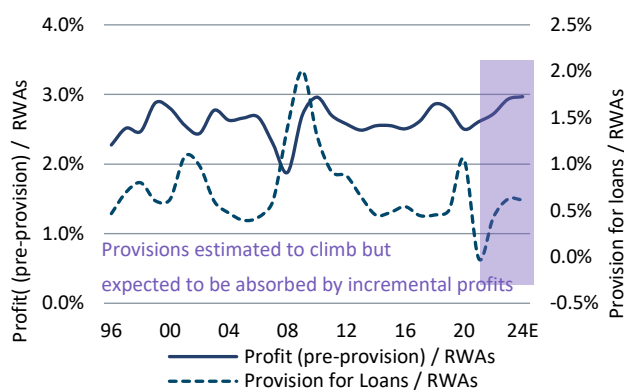
		Pre GFC (00-07)	Post GFC (10-19)	Post pandemic (22E-24E)
Price to book	Non-Financial	1.7x	1.8x	2.0x
	Global Banks	2.7x	1.4x	1.1x
Return on Capital spread over Cost of Capital	Non-Financial	2.5%	1.6%	2.5%
	Global Banks	12.2%	2.3%	1.9%
Economic PE	Non-Financial	22.0x	26.8x	28.0x
	Global Banks	19.7x	20.6x	19.9x

Source: DWS, CROCI. Data as available on 16 December 2022. The values indicate median annual readings for the time period mentioned. Economic PE for Financials is adjusted for cost of capital PE. The financial sector excludes Insurance but includes Banks and Diversified Financials

Well-positioned to absorb higher provisions

The cautious valuation assigned to Global Banks is unlikely to reflect impending sector-wide trouble. For the banks under CROCI coverage, the consensus estimate for 2023 loan losses is half of the average during the financial crisis (2008 to 2010). If loan losses were to rise to this financial crisis level, we measure that the 2023e Economic PE would rise from 19.9x to 51.2x. However, in aggregate, the sector is far better capitalized and less leveraged than in the past. We do not expect any systemic crisis in the sector even despite potentially higher loan losses.

Figure 48: Global Banks' return drivers



Source: DWS, CROCI. Data as available on 16 December 2022

Regional valuation

The outlook for U.S. Banks' cash returns is significantly higher than that of Europe and Japan. It is also the only region to have ROC forecast to be above the sector's cost of capital (7.7%). As a result, the U.S. is the only developed region to trade almost 40% above

parity (based on adjusted price-to-book). On the other hand, the potential dividends from European banks appear attractive relative to the valuation of the region.

Figure 49: Global Banks' valuation summary (2023E)

	Global	USA	Europe	Japan
Adj. P/B	1.1	1.4	0.7	0.6
Adj. PE	19.9	20.3	18.1	17.1
Adj. ROC	9.6%	11.5%	6.8%	5.9%
Dividend Yield	4.1%	3.1%	6.3%	4.8%
Pre-Prov.Profit / RWAs	2.9%	2.9%	3.2%	1.5%
Prov. for Loans / RWAs	0.6%	0.6%	0.9%	0.2%
CET1 Ratio (%)	12.3%	11.1%	13.8%	12.7%

Source: DWS, CROCI. Adjusted P/B, Adjusted PE and Adjusted ROC represents EV / Tier 1 Capital, Cost of Capital Adjusted Price-to-Earnings Ratio and Bank's Return on Capital as per CROCI Bank's model. Data as available on 16 December 2022.

To conclude, while the sector does trade at a significant unadjusted discount to the global average, there is a strong underlying reason for it. The rising interest rate scenario bodes well for the net interest margins of the sector. However, Figure 45 suggests this factor alone is unlikely to change the inherent characteristics of the business, of generating a percentage or two of aggregate economic earnings above its long term cost of capital.

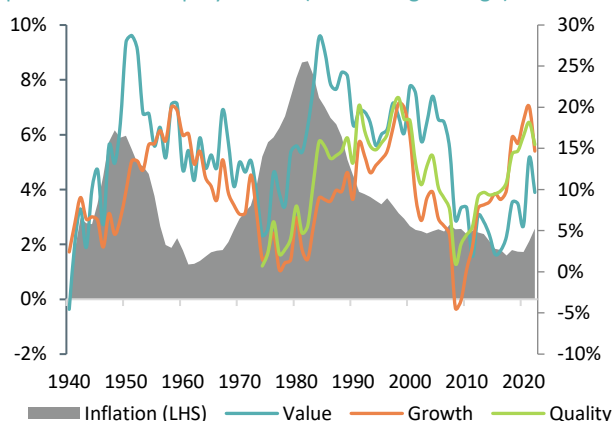
Section 3: Investment Insights

3.1 Inflation and Equity

Joined at the hip

For much of 2022, higher inflation drove capital markets. While there are welcome signs of headline inflation cooling-off, levels are still materially higher than the previous decade. In this section, we look at the performance of the major equity factors (value, growth, quality) through the multiple inflation cycles seen since the 1930s. As CROCI was only developed in the mid 1990s, we need to use traditional accounting ratios as the basis for most of our analysis.

Figure 50: U.S. Consumer Price Inflation overlayed with performance of equity factors (10Y trailing average)



Source: DWS, Federal Reserve Economic Data, Fama French Three Factor Asset Pricing Method. Value is the bottom decline and growth is the top decile in price to book ratios, of U.S. stocks. Quality is the top decile in terms of ROE. Period on the x axis refers to the preceding decade. 1940 refers to 1931 to 1940 and so on. Years covered 1930 to 2022.

To look back at the performance of value over the very long term, we use low price-to-book value as a proxy for the broader value factor and high price-to-book as a proxy for the broader growth factor. In addition, the Quality factor is represented by companies in the top decile in terms of overall profitability (or ROE). The data for this factor is available from 1964 so 10Y trailing return is shown from 1974 in Figure 50.

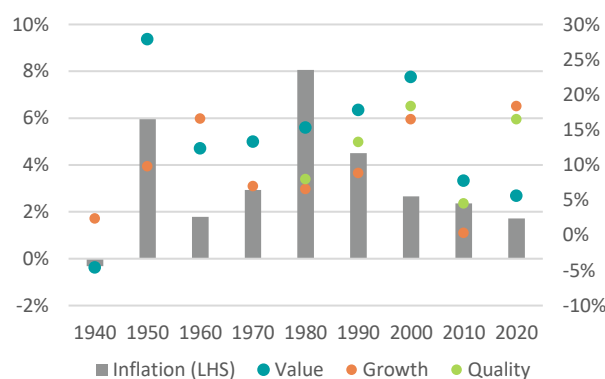
High inflationary period

Out of the nine decades we have the data for, Value outperformed in six and underperformed in three decades., and specifically outperformed in each decade between 1970 and 2010. Amongst the six outperforming decades, three decades can be termed high inflationary decades (1941-50, 1971-80 and 1981-90), when trailing ten-year inflation remained above 4%.

Value substantially outperformed during these three high inflationary decades, and Quality outperformed Growth in two of them (we do not have data to comment on the third decade, 1941-50).

While it may be common knowledge that Value tends to outperform during expectations of high inflation, Quality has also tended to outperform Growth during high inflationary periods.

Figure 51: U.S. Consumer Price Inflation by each decade with major equity factors (10Y trailing average)



Source: DWS, Federal Reserve Economic Data, Fama French Three Factor Asset Pricing Method. Value is the bottom decline and growth is the top decile in price to book ratios, of U.S. stocks. Quality is the top decile in terms of ROE. Period on the x axis refers to the preceding decade. 1940 refers to 1931 to 1940 and so on. Years covered 1930 to 2022.

Moderate to Low inflationary period

Looking at inflation more in details, there is a distinction to be drawn between decades when inflation was sustained between 2% and 4% (moderate inflation) and the decades when inflation sustained below 2% (low inflation).

During moderate inflationary decades (1961-70, 1991-00 and 2001-10), Value outperformed Growth. During two of these decades, Quality also outperformed Growth, and we do not have data for the third decade.

During the three low inflationary decades (1931-40, 1951-60 and 2011-20), Growth outperformed Value.

The data for Quality is only available for the 2011-20 period and it also outperformed Value and only marginally lagged behind Growth.

The odds are against 2021-2030 being a low inflation decade, but whether inflation on average is moderate (2%-4%) or high (>4%) is of course yet to be seen. In either case, it will be interesting to see whether history repeats itself.

Quality certainly is certainly not restricted to ROE alone and ideally should cover other aspects (Figure 55). In fact, Quality as a factor provides exposure to aspects of both Value and Growth.

Blending the favourable aspects of Value and Growth

The traditional definition of Value anchored to price to book alone to differentiate value from growth gives only an incomplete picture. Within the CROCI team, we prefer the Economic PE as a measure of Value, which combines the price to book with the return on the book of the business (p/b/ROE or EV/NCI/CROCI). The CROCI equivalent of the price to book ratio is the EV/NCI.

In the following exhibit, we look at annual aggregate valuation based on EV/NCI during the recent past. This table would highlight sectors such as Energy, Utilities and Materials as the value-oriented or cheap sectors and Healthcare, Staples and IT as the growth-oriented or expensive sectors.

Figure 52: Sectoral EV/NCI trend 2016-2023E (ascending order from top to bottom)

2016	2017	2018	2019	2020	2021	2022E	2023E	Median
EN	UT	UT	EN	EN	EN	UT	EN	UT
0.9x	1.0x	1.0x	0.9x	0.7x	0.8x	1.0x	0.9x	1.0x
UT	EN	EN	UT	UT	UT	EN	UT	EN
0.9x	1.0x	1.0x	1.0x	1.0x	1.1x	1.0x	1.0x	1.0x
MA	MA	MA	MA	MA	MA	MA	MA	MA
1.2x	1.4x	1.4x	1.3x	1.4x	1.7x	1.4x	1.3x	1.3x
CD	CD	CD	CD	CD	C'Ser.	C'Ser.	C'Ser.	OD
1.5x	1.5x	1.7x	1.6x	1.8x	2.2x	1.6x	1.4x	1.6x
GL	GL	C'Ser.	C'Ser.	C'Ser.	IN	OD	CD	C'Ser.
1.8x	1.9x	1.9x	1.9x	1.9x	2.3x	1.8x	1.7x	1.9x
IN	C'Ser.	GL	IN	IN	OD	IN	IN	GL
1.8x	1.9x	2.0x	2.0x	1.9x	2.3x	2.1x	2.0x	1.9x
C'Ser.	IN	IN	GL	GL	GL	GL	GL	IN
1.9x	2.0x	2.0x	2.0x	2.1x	2.5x	2.2x	2.0x	1.9x
IT	HC	HC	HC	CS	CS	CS	CS	HC
3.3x	3.4x	3.6x	3.7x	3.8x	4.1x	3.9x	3.5x	3.5x
HC	CS	CS	CS	HC	HC	HC	HC	CS
3.3x	3.7x	3.7x	3.8x	3.9x	4.3x	4.1x	3.8x	3.7x
CS	IT	IT	IT	IT	IT	IT	IT	IT
3.6x	3.8x	4.2x	4.5x	5.4x	6.8x	5.6x	4.8x	3.8x

Source: DWS, CROCI, data as of 16 December 2022, EN - Energy; UT - Utilities; MT - Materials; CD - Consumer Discretionary; C'Ser. - Communication Services; IN - Industrials; GL - Global; HC - Healthcare; CS - Consumer Staples; IT - Information Technology.

The last decade was a low inflation period with the constituents of traditional Value (Energy and Materials) significantly underperforming until 2020. It was only post-pandemic, with the resurgence of inflation, that the low economic value of Energy and Materials led to outperformance. In the following table, we show annual aggregate valuation based on Economic PE during the recent past.

Figure 53: Economic PE trend 2016-2023E (ascending order from top to bottom)

2016	2017	2018	2019	2020	2021	2022E	2023E	Median
HC	IT	IT	HC	HC	MA	EN	EN	IT
23.0x	23.7x	23.7x	24.7x	26.3x	18.5x	12.8x	16.8x	23.7x
IT	HC	HC	IN	MA	EN	MA	HC	HC
23.0x	23.9x	24.4x	29.2x	32.1x	20.9x	19.0x	23.0x	24.0x
IN	MA	MA	IT	CS	HC	HC	MA	EN
27.1x	25.1x	24.5x	30.0x	32.2x	24.7x	24.0x	24.5x	25.0x
CD	CD	IN	CS	C'Ser.	CS	GL	GL	MA
27.3x	28.0x	27.2x	30.7x	35.0x	31.3x	28.0x	28.2x	25.4x
UT	GL	GL	GL	UT	GL	C'Ser.	IN	IN
27.8x	28.9x	27.5x	30.8x	35.1x	32.3x	29.1x	29.3x	27.8x
MA	IN	EN	MA	IT	IT	IT	C'Ser.	GL
29.1x	29.8x	28.8x	31.1x	35.3x	35.2x	30.4x	29.7x	28.9x
GL	UT	CS	C'Ser.	GL	C'Ser.	CS	CS	CD
29.6x	30.7x	29.8x	32.1x	42.2x	36.5x	30.8x	29.8x	29.5x
CS	CS	CD	UT	CD	IN	IN	IT	CS
31.3x	31.7x	30.6x	32.9x	66.0x	37x	31.8x	30.3x	30.7x
C'Ser.	C'Ser.	C'Ser.	CD	IN	UT	CD	CD	UT
34.7x	34.2x	31.2x	35.3x	71.6x	40.1x	43.2x	37.0x	30.7x
EN	EN	UT	EN	EN	OD	UT	UT	C'Ser.
199.2x	43.6x	31.2x	39.9x	NM	44.3x	54.8x	38.3x	34.2x

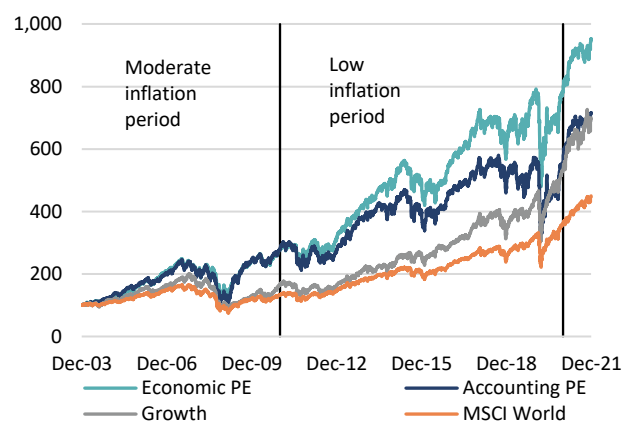
Source: DWS, CROCI, data as of 16 December 2022, FN - Financials; HC - Healthcare; IT - Information Technology; MT - Materials; CS - Consumer Staples; IN - Industrials; UT - Utilities; C'Ser. - Communication Services; CD - Consumer Discretionary; EN - Energy.

Performance of Economic PE vs traditional PE

To the extent that we have the data, we prefer to analyse the performance of Economic value or Economic PE instead of conventional or accounting PE. We also use the performance of our sales growth factor as an indicator of the performance of growth stocks.

The chart below contains these three timeseries as well as the benchmark. It is important to bear in mind that the performance in the following chart is in the backdrop of moderate inflation (2% to 4%) between 2003-10 and low inflation (<2%) between 2011-20.

Figure 54: Performance of Economic PE versus Growth, Accounting PE and MSCI World 2003-21 (indexed to 100)



Source: DWS CROCI, Bloomberg Finance LP. Series between 31 December 2003 and 31 December 2021. Data as available on 31 December 2021. EcPE, AcPE and Growth represent the performance of portfolios based on respective factor's 1st decile between 2004 and 2021. Portfolios are equally weighted. All in local currency (net of withholding tax on dividends).

The outperformance of both Economic PE and traditional value was significant versus Growth during the period of moderate inflation. However, the Economic PE's outperformance accelerated during the period of low inflation.

The difference in performance is possibly due to fundamental differences in the characteristics of the two Value (Accounting vs Economic) approaches. Quality provided a tailwind in periods where conventional value has substantially underperformed, driven by its correlation between Quality and Growth in the low inflation period.

Figure 55: Profitability and leverage by portfolio type

	Economic PE	Accounting PE
Profitability & FCF Conversion		
EBITDA Margin	25.5%	20.3%
CROCI	15.2%	5.5%
FCF / Sales	14.5%	7.6%
Growth		
Sales Growth	19.6%	14.0%
Leverage		
Financial Liabilities / Mcap	25.1%	84.9%
Valuation		
Economic PE	13.9x	19.7x
Price/Book	2.3x	1.3x
Accounting PE	9.0x	7.2x

Source: DWS CROCI. Weighted Average for the portfolios (best decile by each factor) as of 31 December 2021. Portfolios are equally weighted. CROCI coverage is excluding Banks.

We end this section with two pertinent excerpts from Mr. Warren Buffet's Letter to Shareholders (1992) on the topic of value versus growth, steering towards Quality (without explicitly mentioning "Quality").

"Typically, [value] connotes the purchase of stocks having attributes such as a low ratio of price to book value, a low price-earnings ratio, or a high dividend yield. Unfortunately, such characteristics, even if they appear in combination, are far from determinative as to whether an investor is indeed buying something for what it is worth and is therefore truly operating on the principle of obtaining value in his investments. Correspondingly, opposite characteristics - a high ratio of price to book value, a high price-earnings ratio, and a low dividend yield - are in no way inconsistent with a 'value' purchase." (see the positioning of Healthcare and IT sectors in [Figure 52](#) and [Figure 53](#)).

"Growth benefits investors only when the business in point can invest at incremental returns that are enticing - in other words, only when each dollar used to finance the growth creates over a dollar of long-term market value. The more the industry grows, the worse the disaster for owners." (see the Energy section 2.1, where lack of growth is a pre-requisite for generating value for the shareholders).

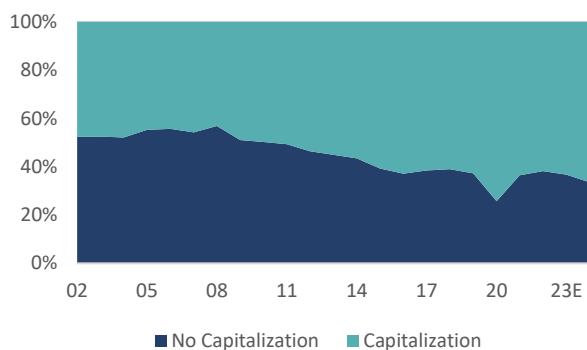
3.2 Intellectual Capital

Intangible assets in the knowledge economy

The CROCI Intellectual Capital (IC) investment strategy was launched in 2019. The idea at the basis is that IC has become the main corporate driver of economic growth in today's world and the strategy seeks to provide exposure to sustainable growth. Such assets are not consistently reported on balance sheets, making it hard for investors to distinguish between companies that have such assets from purely physical asset owning companies.

CROCI systematically capitalises expenditure on the development of such assets and our research suggests that, since 2007, earnings growth has mainly accrued to companies that have such assets while the rest of the market has lagged.

Figure 56: The weight of economic earnings from companies with Intellectual Capital



Source: DWS, CROCI. The chart compares Economic Earnings share of companies with Intellectual Capital with those that don't have such assets. The earnings are adjusted for inflation Data as available on 16 December 2022.

The starting point is to consider all companies with intangible assets, regardless of their sector or region. The second step focuses on excluding companies with poor profitability and high financial leverage. These filters are meant to exclude companies that lack competitive strengths as evidenced by their weak profitability compared to their peers, or where the business is not generating enough cash and thus have too much financial leverage.

The selection process further eliminates companies for which DWS Minimum ESG score is 'ban'²¹. The remaining shares are then weighted on each company's CROCI Equity Earnings and run through a portfolio optimization process so as to select approximately 100 companies and their weights having a risk-return profile that is similar to that of the entire list pre-optimization selections while also limiting other residual ESG risks.

The strategy is implemented in a transparent and systematic manner, avoiding any style drift that can easily arise in ultra-specialised or more discretionary approaches.

²¹ ESG filter in CROCI Intellectual Capital Strategy was applied since 17th Jan 2020

The IC strategy is cheaper than the broader market

The Economic PE for the CROCI IC strategy is trading on a 2023e weighted Economic PE of almost **25x**, a discount to the broader market on a PE of **29x**. Companies in the portfolio are also growing their revenues faster than the broader market, as well as being more profitable and converting more of their sales into free cash flow.

Figure 57: Operational and valuation characteristics

	CROCI Intellectual Capital (IC)	Global coverage (ex Fin.)
Valuation (2023E)		
Accounting PE	20.1x	20.6x
Economic PE	24.6x	29.4x
EV/NCI	5.0x	4.4x
Annualised 10Y Growth		
Sales Growth	7.8%	5.6%
Real Economic Earnings	8.7%	6.8%
Profitability and Leverage (2023E)		
CROCI	20.4%	14.9%
FCF / Sales (Post-Tax)	22.3%	16.1%
Net Fin Liabs / M. Cap	-1.0%	3.3%

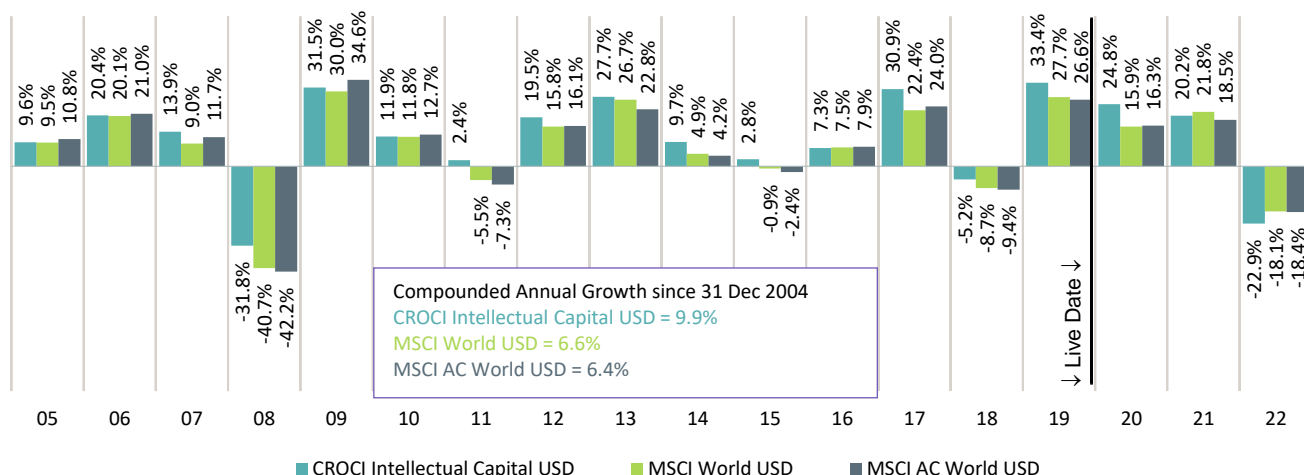
Source: DWS and CROCI. The table compares weighted operational and valuation characteristics of CROCI IC strategy and that of CROCI's coverage globally. CROCI IC characteristics are derived using actual weights of constituent stocks. The global coverage is weighed based on market cap weights of stocks. Data as available on 16 December 2022.

Performance vs benchmark

CROCI IC strategy has generated 8.1% since its launch on 15th April 2019 outperforming the MSCI World and MSCI ACWI indices by 1.2% and 2.2% respectively²². This was significantly lower than at the end of 2021 when the outperformance stood at 4.5% and 5.8% respectively, but in line with the performance over a longer period of this strategy, including back test (Figure 61). The driver has been real earnings growth as demonstrated in Figure 56.

²² All the returns in USD

Figure 58: Annual Returns of CROCI Intellectual Capital Strategy (USD)



Source: DWS and CROCI. The chart shows simulated and live strategy performance between 31 December 2004 and 30 December 2022. The simulated performance is calculated by retroactive application of the strategy model. Past performance is not a reliable indicator of future results. Please refer to additional disclosure on simulated performance on page 2. Data as available on 05 January 2023.

Figure 59: Multi-factor Attribution

	Active return
Country	0.69%
Industry	1.83%
Risk Indices (Style)	-1.18%
Currency	-0.22%
Specific (Stock selection)	-0.03%

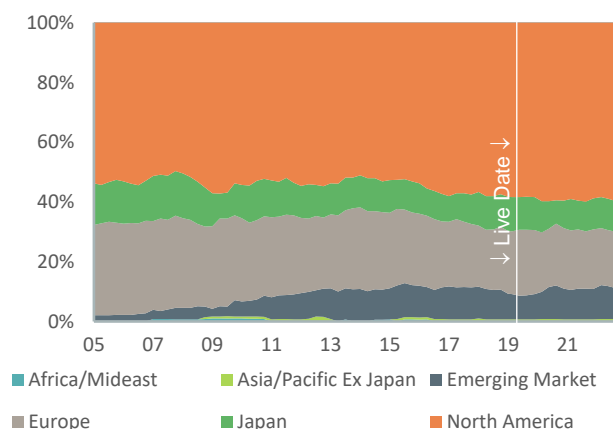
Source: DWS, CROCI, MSCI Barra. The table shows multi-factor attribution of the strategy performance between 31 December 2004 and 30 December 2022. Data as available on 05 January 2023.

Figure 61: Performance analysis (USD)

	31 Dec 2004 – 30 Dec 2022	CROCI IC	MSCI World	MSCI ACWI
Comp. Annual Growth	9.9%	9.9%	6.6%	6.4%
Annualised Monthly Vol	14.1%	14.1%	15.8%	16.0%
Sharpe Ratio (1.33%)	0.61	0.61	0.33	0.32
% of months with gains	64.8%	64.8%	62.5%	61.6%
Tracking Error (Daily)	-	-	4.8%	4.7%
Information Ratio	-	-	0.69	0.75
Worst drawdown	-46.3%	-46.3%	-57.8%	-58.4%
Time to Recov. (month)	23	23	51	51

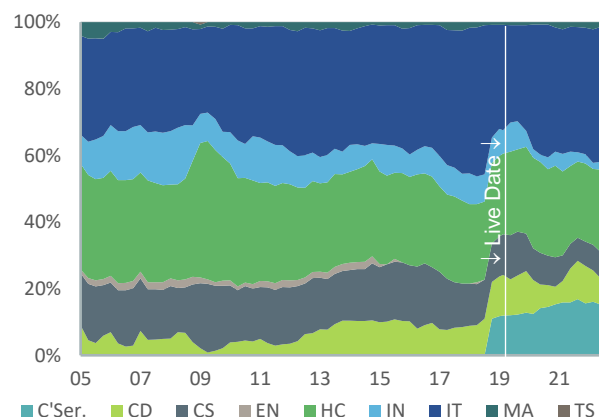
Source: DWS, CROCI. The chart shows simulated Strategy performance between 31 December 2004 and 30 December 2022. The performance is calculated by retroactive application of the strategy model. Past performance is not a reliable indicator of future results. Please refer to page 2 for additional disclosure on simulated data. Data as available on 05 January 2023.

Figure 60: Simulated regional allocations of CROCI Intellectual Capital Strategy



Source: DWS, CROCI. Data between 31 December 2004 and 30 December 2022. Regional allocations are derived by applying the CROCI Intellectual Capital Strategy model retroactively. Past performance is not a reliable indicator of future results. Please refer to page 2 for additional disclosure on simulated data. Data as available on 05 January 2023.

Figure 62: Simulated sector allocations of CROCI Intellectual Capital Strategy



Source: DWS, CROCI. Data between 31 December 2004 and 30 December 2022. Sector allocations are derived by applying the CROCI Intellectual Capital Strategy model retroactively. Past performance is not a reliable indicator of future results. Please refer to page 2 for additional disclosure on simulated data. Data as available on 05 January 2023. C'Ser. - Communication Services; CD - Consumer Discretionary; CS - Consumer Staples; EN - Energy; HC - Healthcare; IN - Industrials; IT - Information Technology; MA - Materials; TS - Telecommunication Services.

3.3 Value through the CROCI prism

We make four important observations in this section connected to the current market environment:

1. CROCI strategies have tended to perform in difficult markets
2. Operational characteristics for CROCI strategies are attractive, and dispersion of value is supportive
3. High inflation has historically been positive for CROCI strategies
4. Performance of low price-to-book has historically been followed by a prolonged performance of quality value, which is when the typical of CROCI strategies as it combined the Economic Price to book with the return on the book (EV/NCI over CROCI)

A. Performance of Value

The 2023 Outlook is cautious at the market level. The obvious question is whether exposure to value can result in positive returns in a falling market.

We tend to be shy of making market forecasts because we are deeply aware of the intrinsic challenge to forecasting changes in the discount factor (i.e. risk appetite) and prefer to focus (i) on highlighting risks and opportunities, (ii) on facts, while remembering that value investors should not fear a crisis in markets.

CROCI had a sterling 2022, but CROCI strategies have in fact managed to deliver strong performance in most market environments.

Figure 63: Annualised returns for selected CROCI strategies over various period

The green areas show annualised outperformance of benchmarks	Pre-Crisis Market	Financial Crisis	Rising Liquidity	Growth/ Momentum	Past year
	2004-2007*	2008-2009	2010-2017	2018-2021	2022
CROCI US Dividends	15.2%	1.0%	16.3%	13.0%	2.8%
S&P 500	8.6%	-11.3%	13.2%	17.0%	-18.5%
Rel. S&P 500	6.7%	12.3%	3.2%	-4.0%	21.3%
CROCI Euro	19.7%	-12.0%	10.4%	6.5%	-12.7%
Euro STOXX 50	12.5%	-20.5%	5.2%	7.7%	-9.5%
Rel. Euro STOXX 50	7.2%	8.5%	5.2%	-1.2%	-3.2%
CROCI Japan	13.3%	-17.9%	12.3%	7.9%	-0.3%
TOPIX 100	9.9%	-21.7%	10.1%	6.5%	-3.2%
Rel. TOPIX 100	3.3%	3.8%	2.2%	1.4%	2.9%
CROCI World	21.6%	-0.8%	10.4%	11.0%	-4.4%
MSCI World	13.2%	-12.1%	9.8%	13.3%	-18.1%
Rel. MSCI World	8.4%	11.4%	0.6%	-2.3%	13.8%
CROCI Global Divs	20.3%	-1.9%	11.2%	4.9%	-1.7%
MSCI World	13.2%	-12.1%	9.8%	13.3%	-18.1%
Rel. MSCI World	7.1%	10.2%	1.3%	-8.4%	16.5%
CROCI Sectors Plus	25.2%	-3.9%	12.5%	13.7%	-0.1%
MSCI World	14.4%	-12.1%	9.8%	13.3%	-18.1%
Rel. MSCI World	10.8%	8.2%	2.7%	0.4%	18.0%

2018-2021 was the only underperforming period: 2018 because of the FAANG trade and 2020 thanks to the COVID pandemic

Source: DWS CROCI, Bloomberg Finance LP; Data as of 6 January 2023.; Global strategy performance in USD terms

*From Mar 2005 for CROCI Sectors Plus; Past performance may not be a reliable indicator of future results. Performance before the live date of strategies is simulated. The Simulations apply an investment strategy retrospectively to data that was in part reconstructed and not necessarily available at the time. As a consequence there may be instances when realised returns would have shown variation from those simulated and the latter may have had the advantage of hindsight. Live date for CROCI World is 29 Nov. 2010, CROCI US Dividends 13 Mar. 2012, CROCI Global Dividends 15th Mar 2012

The first point to make is that beyond the 2018-2021 period (where the market was driven first by growth and momentum and later by an abnormal amount of liquidity during the COVID crisis), **CROCI strategies performed solidly in every other style period.** Even considering the past few years, **CROCI has historically outperformed more often than it has underperformed.** Figure 64 looks at the number of years that CROCI investment strategies have delivered positive and negative returns.

Do not fear a falling market, emotions can be a great detractor to performance

The second important point is behavioural in nature. It is human nature to be affected by emotions and so investors either tend to be cautious during challenging markets or react late. This is a genuine problem as significant outperformance can be achieved in such periods.

Figure 64: CROCI strategy years of outperformance

CROCI Strategy	Benchmark	Outperform Years	Underperform Years
US	S&P 500	12	7
US Dividends	S&P 500	13	6
Euro	Euro STOXX 50	15	4
Japan	TOPIX 100	13	6
World	MSCI World	16	3
Sectors Plus	MSCI World	11	8
Global Dividends	MSCI World	13	4

Source: DWS CROCI; Data as available on 6 January 2023. Period is taken from 2004-2022

Times of crisis have in the past provided great opportunities for investors and it is essential to note that **some of the greatest performances in CROCI investment strategies have been recorded in months which might have suggested just such a cautious approach.**

Figure 65 shows the top ten best months of relative performance for the three strategies where we have longest history (including simulated data back to 1996). The months when the benchmark was in negative territory are highlighted in green.

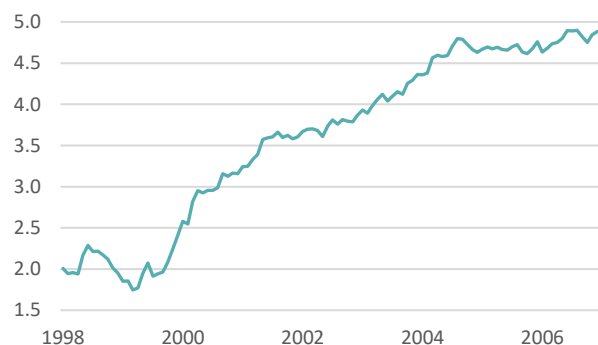
Figure 65: Top 10 monthly relative performances for selected CROCI strategies

CROCI US				CROCI Europe				CROCI Japan				
Month	Strat.	BM	Excess	Month	Strat.	BM	Excess	Month	Strat.	BM	Excess	
1	Apr-99	16.1%	3.8%	12.2%	Feb-01	0.1%	-9.6%	9.7%	May-00	0.7%	-10.3%	11.0%
2	Feb-01	0.5%	-9.2%	9.7%	Sep-98	-4.6%	-10.2%	5.6%	Apr-00	5.0%	-4.0%	9.0%
3	Apr-00	6.6%	-3.0%	9.6%	Jul-00	5.2%	-0.3%	5.5%	Jul-97	9.2%	1.1%	8.2%
4	Oct-00	7.3%	-0.4%	7.8%	Mar-00	6.7%	1.3%	5.3%	Jan-00	4.2%	-2.7%	6.9%
5	Nov-00	-0.9%	-7.9%	7.0%	Oct-00	7.7%	2.9%	4.8%	Jan-97	-0.9%	-7.7%	6.9%
6	Dec-00	7.3%	0.5%	6.8%	Nov-00	-0.7%	-5.4%	4.7%	Dec-96	1.4%	-5.0%	6.3%
7	May-00	4.4%	-2.1%	6.5%	Dec-08	5.3%	0.7%	4.6%	Mar-00	7.1%	1.2%	5.9%
8	Sep-00	0.3%	-5.3%	5.6%	Apr-20	9.8%	5.3%	4.5%	May-99	1.9%	-3.7%	5.7%
9	Aug-01	-0.9%	-6.3%	5.4%	Jun-16	-1.9%	-6.2%	4.3%	Sep-97	6.0%	0.7%	5.3%
10	May-99	2.9%	-2.4%	5.3%	May-03	5.0%	1.0%	4.0%	Mar-11	-3.9%	-9.0%	5.1%

Source: DWS CROCI, Bloomberg Finance LP; Data as of 6 January 2023.; Global strategy performance in USD terms. The three strategies have been live since 2nd February 2004. Any data from before that date is based on simulated data, applying the portfolio construction rules to historical data.

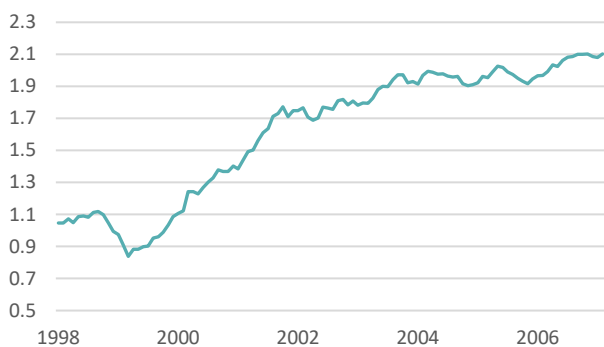
Figure 63 above clearly shows the strong performance of CROCI strategies during the financial crisis period. Over a longer time period, we can turn to those CROCI strategies where simulations back to 1996 exist. After the **TMT bubble**, especially in the US and Europe, there was outperformance of the CROCI strategies versus their benchmarks up until 2006 in the case of CROCI US and right up until just before the financial crisis in the case of CROCI Euro, as shown in the charts below (Figure 66 & Figure 67).

Figure 66: CROCI US rel. to S&P 500: 1998-2008



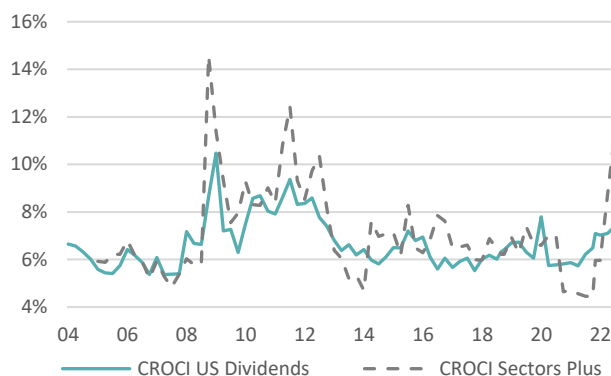
Source: DWS CROCI, Bloomberg. .Simulated data before 2 Feb. 2004. All pro-forma performance data before respective live dates is simulated and was calculated by means of retroactive application of the Strategy models. All returns include reinvested dividends (net of withholding tax). Data as available on 6 January 2023.

Figure 67: CROCI Euro rel. to Euro STOXX50: 1998-2008



Source: DWS CROCI, Bloomberg. Simulated data before 2 Feb. 2004. All pro-forma performance data before respective live dates is simulated and was calculated by means of retroactive application of the Strategy models. All returns include reinvested dividends (net of withholding tax). Data as available on 6 January 2023.

Figure 69: FCF series for CROCI US Dividends and CROCI Sectors Plus since 2004



Source: DWS CROCI, Bloomberg. Data as available on 6 January 2023.

B. Operational characteristics for CROCI strategies are attractive, and dispersion of value is supportive

To assess the intrinsic appeal of quality value, we focus on the current valuation and the free cash flow generation of the concentrated CROCI strategies. The Economic PE for each of the strategies is at least 40% cheaper than the relevant market (and in many cases much cheaper than that). For example, for each of the global strategies, free cash flow yield is over 8.5% with very low associated financial leverage, while global equities have a FCF yield of 4.6%.

Figure 68: CROCI strategy oper. characteristics

2023E	Econ. PE	Discount to market	FCF Yield	Fin. Lev.
US	14.0	-54%	8.3%	12.9%
US Dividends	16.9	-44%	7.9%	16.0%
Euro	14.7	-54%	7.5%	41.6%
Japan	15.4	-42%	4.4%	24.3%
World	14.7	-50%	8.6%	16.0%
Sectors Plus	10.3	-65%	12.6%	18.0%
Global Dividends	13.5	-54%	9.4%	20.8%

Source: DWS CROCI; Data as available on 6 January 2023.

CROCI Sectors Plus has the highest free cash flow yield of all the strategies at the moment, at 12.6%. It first hit double figures in May 2022, and continued rising over the rest of the year. This is particularly high (thanks to the sector composition) compared to previous few years where it ranged between 4.9% and 5.8%

For CROCI US Dividends too the free cash flow yield is more attractive than it has been for several years. It remained below 7% until the start of 2022 and gradually increased over that year to exceed 8% by September 2022.

Attractive dispersion of value

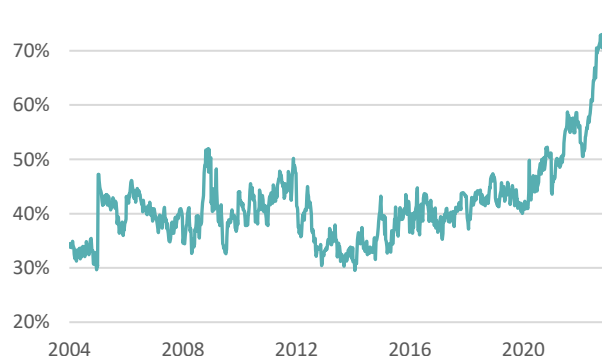
There remains a substantial differential between the valuation of the cheapest companies on economic valuation and the market median. There are substantial areas of value in global and regional equities. The dispersion may have narrowed from the all-time wides that we saw in 2022 as the lowered earnings estimates for 2023 are taken into account, but are still a long way ahead of pre-pandemic highs (Figure 70, Figure 71 & Figure 72).

Figure 70: Dispersion of economic valuation: US



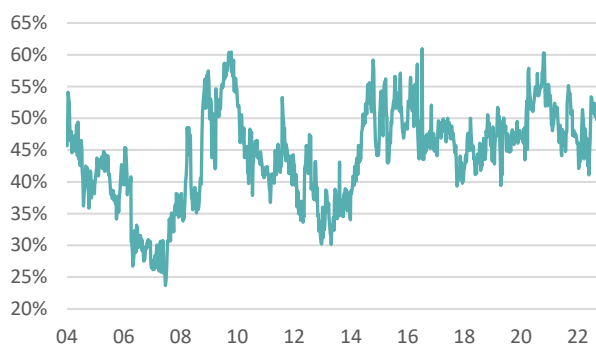
Source: DWS CROCI, Bloomberg. Charts show the percentage difference between the median valuation for the region and cheapest fifth percentile based on CROCI Economic PE, based on CROCI's coverage universe in the region. Data as available on 6 January 2023.

Figure 71: Dispersion of economic valuation: Europe



Source: DWS CROCI, Bloomberg. Charts show the percentage difference between the median valuation for the region and cheapest fifth percentile based on CROCI Economic PE, based on CROCI's coverage universe in the region. Data as available on 6 January 2023.

Figure 72: Dispersion of economic valuation: Japan



Source: DWS CROCI, Bloomberg. Charts show the percentage difference between the median valuation for the region and cheapest fifth percentile based on CROCI Economic PE, based on CROCI's coverage universe in the region. Data as available on 6 January 2023.

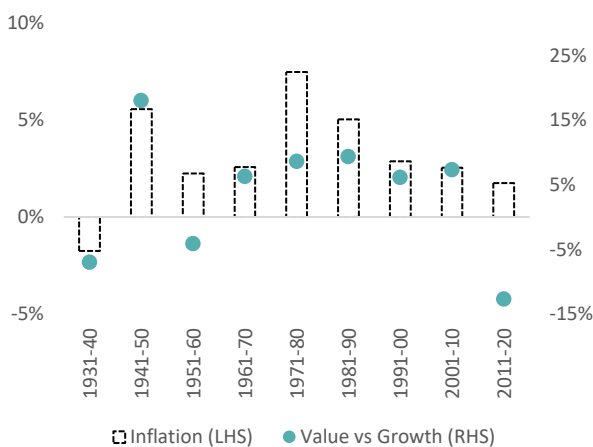
Europe's dispersion is the widest at 57%, only two percentage points below its historical high. The US and Japan are at 50% and 55% respectively. All three regions have long-term average dispersions in the low 40s, so their current levels dispersion remain compelling, given that above average dispersion tends to be a reliable leading indicator for performance of the CROCI strategies.

C. Even inflation that is lower than the current level should be supportive for quality value

The advent of high inflation in 2022 was a strong fillip for the renewed performance of CROCI strategies. The data shows that inflationary environments have always tended to provide support for value.

But inflation anywhere over the 2.5% level has tended to aid the performance of value over the long term, as the chart below indicates. (In order to look as far back as the 1930s, we have to use Fama-French data in the chart below as a proxy for CROCI's value metrics). See Section 3.1 for further commentary on the impact of inflation on quality and value factors.

Figure 73: US CPI overlaid with Value vs Growth factors



Source: DWS, Federal Reserve Economic Data, Fama French Three Factor Asset Pricing Method. Value is the bottom decile and growth is the top decile in price to book ratios, of U.S. stocks. Data as available on 6 January 2023.

Figure 74: Low Price-to-Book vs Quality Value



Source: DWS, CROCI. Low Price-to-Book is made up of the 40 stocks with lowest EV/NCI, whilst Quality Value screens out the worst third of companies by CROCI, Financial Leverage and Price Momentum then selects the cheapest 40 companies by Economic PE. Data as available on 6 January 2023.

D. Low price-to-book has normally heralded strong performance of CROCI strategies

Generally, low price-to-book has tended to perform first when there is a market transition, before quality value takes over. We have seen that the initial low price-to-book outperformance has normally lasted somewhere between 3 months and 18 months, as shown by Figure 74 above.

After the **financial crisis**, for example, where initially low price-to-book outperformed, starting in around April 2007. By summer 2008, quality value had taken over and the rally ran till just before the end of 2014. We can see that a quality value portfolio, as calculated by CROCI, was also able to outperform MSCI World Growth consistently and by a substantial margin over the same time period, as shown in the chart below.

Figure 75: Quality Value rel. to MSCI World Growth



Source: DWS, CROCI. Quality Value screens out the worst third of companies by CROCI, Financial Leverage and Price Momentum then selects the cheapest 40 companies by Economic PE. The performance is compared to MSCI World Growth. Data as available on 6 January 2023.

To take a second example at the time of the TMT bubble, we have already seen (Figure 66 & Figure 67) that quality value in the form of the CROCI strategies started to outperform very soon after the worst phase of market reaction and continued to generate outperformance for multiple years.

The conclusion we draw from this is that in the past a period of low price-to-book performance comes at the time when the market is

still assessing sustainable earnings levels after a shift in market paradigm. Performance of quality value has historically followed once there is more confidence around returns to give confidence to the use of Economic PE.

Appendix: an update on bubbles

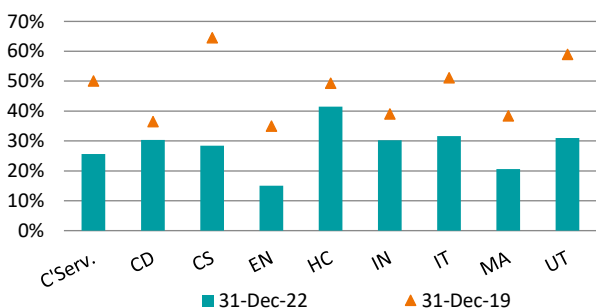
A final comment on our bubble analysis, which we continue to calculate by looking for those stocks priced at over 1.5x their historical return on capital. As of the end of December, there were around 30% of global stocks still in bubble territory, which is not far from the pre-financial crisis level.

Figure 76: Global bubble analysis since 1999 (% in bubbles)



Source: DWS CROCI, Data as of 31 December 2022. Numbers represent the proportion of coverage in bubble territory (determined as EV/NCI of 1.5x 5yr average CROCI). 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.

Figure 77: Global bubble analysis by sectors (% in bubbles)



Source: DWS CROCI, Data as of 31 December 2022. Numbers represent the proportion of coverage in bubble territory (determined as EV/NCI of 1.5x 5yr average CROCI). 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.

Section 4:

Market Valuation

4.1 Regional & Sector Valuations

The Energy sector has moved from the fourth cheapest sector last year²³ to the cheapest sector today. Understandably, buoyant energy prices have enabled the sector to be among the handful of businesses to improve their 2022e CROCI, and the only sector to scale up its 2023e CROCI last year.

We see tell-tale signs of the first full year of the underperformance of the IT sector in a decade (which we covered in section 1.1) in the form of Semiconductors featuring amongst the top five cheapest industry groups. In fact, the most expensive Industry group within the IT Sector - Software & Services, now trade at a 15% premium to global valuation at the median level (2023e); significantly lower than c.40% premium last year.

Figure 78: Global equity valuations by industry group (GICS Level 2)

	Economic PE				CROCI			
	2021	2022E	2023E	2024E	2021	2022E	2023E	2024E
Global Equities	33.6	31.2	30.0	26.7	9.4%	8.8%	8.1%	8.1%
Energy	24.6	13.4	17.9	21.9	3.6%	6.7%	5.7%	4.6%
Pharma Biotech & Life Sci.	24.3	21.4	21.3	19.3	15.3%	15.3%	15.1%	15.5%
Semis & Semi Equipment	23.2	19.3	23.8	21.3	29.3%	26.1%	20.6%	21.6%
Consumer Durables & Apparel	24.6	24.9	25.4	21.0	12.2%	9.6%	8.1%	9.0%
Tech. Hardware & Equipment	27.9	27.0	26.7	21.0	10.3%	8.6%	8.2%	9.8%
Materials	24.0	24.6	27.4	25.6	8.2%	7.1%	5.2%	5.4%
Media & Entertainment	35.8	28.9	27.8	24.5	16.8%	15.3%	15.5%	16.7%
Food Beverage & Tobacco	29.4	28.9	29.0	26.2	13.7%	13.8%	13.6%	14.2%
Capital Goods	33.6	32.0	29.8	27.2	8.1%	8.1%	7.8%	8.1%
Transportation	38.6	31.2	30.2	28.7	4.0%	4.8%	4.7%	4.7%
Retailing	29.2	32.1	30.5	28.6	15.5%	10.3%	9.4%	9.5%
Utilities	33.6	33.2	31.9	33.2	3.3%	3.5%	3.2%	3.0%
Household & Personal Products	37.9	35.8	32.6	29.5	13.3%	12.0%	13.7%	14.1%
Health Care Equip. & Services	38.8	36.0	33.0	27.2	19.6%	17.0%	15.9%	16.4%
Com. & Professional Services	43.3	37.8	33.2	30.2	19.4%	20.2%	19.0%	20.8%
Food & Staples Retailing	32.1	33.1	33.6	32.5	6.7%	6.8%	5.8%	5.2%
Software & Services	44.0	37.9	33.8	31.9	25.5%	29.0%	28.6%	29.1%
Automobiles & Components	43.0	42.1	34.7	27.0	2.2%	2.1%	2.0%	2.6%
Consumer Services	62.9	41.2	35.0	29.6	12.6%	15.1%	13.8%	13.8%
Telecommunication Services	52.6	59.6	67.0	66.2	2.3%	1.8%	1.4%	1.5%

Source: DWS, CROCI. The table shows the median numbers by sector.
Data as available on 18 January 2023. Past performance is not a reliable indicator of future results.

²³ Last year reference in this section is relative to estimates in CROCI 2022 Outlook

On median valuation, Japan continues to remain the cheapest developed market region overall, with U.S. in second place and Europe bringing up the rear.

Amongst the top five cheapest sectors for each region, there are three overlaps between the regions — Pharmaceuticals, Semiconductors and Energy²⁴. On the other end, Telecommunication is the most expensive industry group within U.S. and Europe.

Simply on 2023e CROCI, median return for U.S. company (12.8%) is almost three times to that of a Japanese company (4.4%).

Figure 79: US equity valuations by industry group (GICS Level 2)

	Economic PE				CROCI			
	2021	2022E	2023E	2024E	2021	2022E	2023E	2024E
US Equities	33.6	32.2	30.3	27.4	15.3%	14.3%	12.8%	13.2%
Energy	31.1	16.1	21.2	21.9	3.6%	7.5%	6.4%	6.4%
Pharma., Biotech. & Life Sci.	21.5	22.3	22.9	22.8	23.9%	23.3%	21.1%	20.6%
Consumer Durables & Apparel	23.9	26.9	23.8	20.0	15.0%	10.3%	9.5%	10.2%
Semis & Semi Equipment	25.5	23.2	27.3	24.8	34.1%	29.7%	25.4%	26.3%
Media & Entertainment	31.3	28.9	27.7	24.5	25.4%	15.0%	15.5%	16.7%
Tech. Hardware & Equipment	35.0	31.5	28.4	23.8	13.3%	13.5%	12.1%	13.2%
Food Beverage & Tobacco	29.1	29.7	29.9	28.3	19.5%	17.0%	15.9%	15.4%
Retailing	28.0	32.1	30.0	28.6	16.9%	14.5%	12.2%	12.3%
Transportation	34.1	28.9	30.5	28.6	7.5%	7.7%	7.4%	7.4%
Materials	32.4	28.8	30.9	29.8	11.5%	11.2%	9.3%	8.5%
Capital Goods	35.6	33.1	31.4	27.7	18.3%	17.0%	17.0%	18.3%
Health Care Equip. & Services	35.5	35.5	32.2	26.8	25.3%	21.1%	20.4%	21.0%
Utilities	34.1	33.7	33.1	33.2	3.6%	3.6%	3.3%	3.2%
Food & Staples Retailing	29.6	31.9	33.5	32.2	10.7%	8.8%	8.0%	7.7%
Software & Services	42.5	38.9	34.9	32.4	30.4%	29.9%	28.9%	29.5%
Automobiles & Components	37.0	49.0	35.0	28.0	3.7%	1.9%	2.1%	3.3%
Household & Personal Products	37.2	36.7	35.2	31.7	17.7%	14.4%	15.5%	16.3%
Com. & Professional Services	45.9	39.6	36.3	33.3	22.3%	21.4%	22.8%	24.4%
Consumer Services	54.7	39.7	36.5	25.6	14.4%	14.6%	12.6%	12.4%
Telecommunication Services	35.8	49.0	47.7	47.5	3.3%	2.0%	1.8%	1.8%

Source: DWS, CROCI. The table shows the median numbers by sector.
Data as available on 18 January 2023. Past performance is not a reliable indicator of future results.

²⁴ Only one company covered in Japan within the Energy sector and hence will not appear within the Japan Equity valuation table

Figure 80: European equity valuations by industry group (GICS Level 2)

	Economic PE				CROCI			
	2021	2022E	2023E	2024E	2021	2022E	2023E	2024E
Europe Equities	35.3	31.5	31.7	28.7	8.7%	8.4%	7.2%	7.6%
Tech. Hardware & Equipment	17.6	17.3	13.2	11.4	13.1%	11.7%	11.8%	12.2%
Energy	18.4	7.8	13.3	20.1	3.3%	9.9%	5.1%	2.8%
Semis & Semi Equipment	37.9	19.3	18.8	17.3	13.1%	19.0%	14.3%	13.3%
Transportation	21.2	20.5	20.9	23.5	13.5%	10.7%	8.9%	6.0%
Pharma., Biotech. & Life Sci.	24.7	21.4	21.3	18.2	12.7%	13.3%	13.7%	13.9%
Media & Entertainment	133.9	43.8	28.3	24.8	14.2%	15.3%	12.9%	13.5%
Food Beverage & Tobacco	32.2	29.6	28.3	26.1	13.8%	13.3%	12.5%	12.8%
Utilities	35.4	31.5	31.6	34.9	3.2%	3.5%	3.3%	3.0%
Household & Personal Products	33.9	32.4	31.7	29.4	15.4%	16.2%	15.2%	15.5%
Consumer Durables & Apparel	28.1	24.2	32.0	21.1	12.2%	10.9%	7.2%	8.5%
Capital Goods	34.4	32.2	32.8	28.8	9.9%	8.7%	8.2%	8.0%
Software & Services	50.6	36.7	33.4	31.9	22.8%	27.1%	28.2%	29.1%
Materials	30.6	29.9	33.6	29.5	6.1%	7.2%	5.1%	4.8%
Consumer Services	107.8	39.3	33.7	30.3	8.8%	15.4%	19.6%	18.8%
Com. & Professional Services	45.0	38.0	34.3	31.5	19.4%	19.7%	19.0%	19.2%
Retailing	36.4	46.1	37.8	35.1	8.4%	4.3%	2.9%	3.3%
Health Care Equip. & Services	38.4	37.4	38.1	29.0	11.5%	11.6%	10.4%	11.8%
Automobiles & Components	51.4	53.1	63.6	45.6	1.8%	1.5%	1.2%	1.5%
Food & Staples Retailing	142.7	48.7	72.1	375.3	0.5%	1.7%	0.8%	0.3%
Telecommunication Services	89.9	63.4	74.3	108.2	1.2%	1.6%	1.1%	0.7%

Source: DWS, CROCI. The table shows the median numbers by sector.
Data as available on 18 January 2023. Past performance is not a reliable indicator of future results.

Figure 81: Japanese equity valuations by industry group (GICS Level 2)

	Economic PE				CROCI			
	2021	2022E	2023E	2024E	2021	2022E	2023E	2024E
Japan Equities	30.8	26.3	25.8	22.7	4.2%	4.3%	4.4%	4.8%
Semis & Semi Equipment	29.0	21.4	16.1	23.4	26.7%	25.4%	19.3%	21.6%
Materials	23.6	19.7	17.0	17.7	3.2%	3.2%	2.3%	2.7%
Pharma., Biotech. & Life Sci.	26.2	27.3	17.5	15.4	7.0%	11.0%	11.0%	11.9%
Software & Services	25.6	26.5	18.3	15.6	5.2%	7.0%	7.6%	8.4%
Media & Entertainment	24.2	26.0	21.2	17.9	32.1%	33.5%	37.0%	36.3%
Tech. Hardware & Equipment	53.5	31.0	24.3	23.8	4.3%	4.5%	4.2%	4.1%
Capital Goods	52.3	23.9	24.7	25.3	4.8%	4.7%	4.8%	4.8%
Consumer Durables & Apparel	37.0	35.5	26.7	28.0	2.2%	1.9%	2.2%	2.1%
Automobiles & Components	127.7	50.5	30.2	22.8	1.6%	2.6%	3.1%	2.9%
Transportation	nm	nm	35.5	29.7	-1.4%	2.5%	2.7%	2.8%
Food Beverage & Tobacco	38.3	39.8	40.4	36.2	4.2%	5.1%	5.5%	5.9%
Household & Personal Products	44.1	46.4	43.4	32.6	6.8%	4.4%	6.5%	7.8%
Telecommunication Services	nm	nm	nm	nm	2.2%	2.0%	2.0%	2.1%
Utilities	77.3	nm	nm	46.2	0.3%	-1.5%	1.5%	1.4%

Source: DWS, CROCI. The table shows the median numbers by sector.
Data as available on 18 January 2023. Past performance is not a reliable indicator of future results.

Section 5:

Markets and Sectors

Figure 82: Global Sector Valuation 2023E

		EV/NCI	CROCI	Ec PE
Communication Services (6.4% weight in MSCI World)	Current	1.48x	4.7%	31.4x
	5Y	1.94x	5.8%	25.5x
	10Y	1.84x	5.5%	27.1x
	20Y	1.66x	6.0%	24.8x
Consumer Discretionary (10.0%)	Current	1.71x	4.4%	38.7x
	5Y	1.89x	4.4%	38.6x
	10Y	1.71x	5.0%	34.2x
	20Y	1.46x	4.9%	35.2x
Consumer Staples (7.9%)	Current	3.53x	11.8%	29.7x
	5Y	3.86x	12.5%	28.2x
	10Y	3.61x	11.9%	29.6x
	20Y	3.07x	11.7%	30.2x
Energy (5.7%)	Current	0.90x	5.1%	17.6x
	5Y	0.88x	3.1%	28.6x
	10Y	0.92x	2.9%	31.3x
	19Y	1.14x	5.4%	16.6x
Financials* (14.3%)	Current	1.23x	9.7%	12.7x (21.2x)
	5Y	1.32x	9.6%	12.7x (19.6x)
	10Y	1.36x	9.5%	12.9x (18.9x)
	20Y	1.68x	11.1%	11.1x (15.5x)
Health Care (14.6%)	Current	3.81x	16.5%	23.1x
	5Y	3.90x	15.8%	24.1x
	10Y	3.57x	15.0%	25.4x
	20Y	2.99x	14.8%	25.7x
Industrials (10.7%)	Current	1.98x	6.6%	30.1x
	5Y	2.07x	6.0%	33.3x
	10Y	1.95x	6.4%	31.1x
	20Y	1.78x	6.7%	29.5x
Information Technology (20.2%)	Current	4.82x	14.9%	32.3x
	5Y	5.32x	17.1%	28.2x
	10Y	4.31x	16.3%	29.5x
	20Y	3.55x	14.8%	32.5x
Materials (4.5%)	Current	1.40x	5.3%	26.4x
	5Y	1.46x	6.2%	22.7x
	10Y	1.36x	5.3%	26.3x
	20Y	1.33x	5.9%	23.7x
Utilities (3.2%)	Current	0.99x	2.5%	39.0x
	5Y	1.02x	2.7%	36.3x
	10Y	0.98x	3.1%	32.0x
	20Y	0.93x	3.5%	28.5x
COC	4.65%		Banks COE	7.75%

Glossary:

EV/NCI: An economically adjusted measure of the price-to-book. Similar to Tobin's Q, this is a ratio of market value of assets to replacement value of assets. An EV/NCI greater than 1 implies that the market expects value creation (in equilibrium, EV/NCI = CROCI/COC).

*Financials: The Financial sector excludes Insurance but includes Banks and Diversified Financials. Note that the PE of Financials is not comparable to Industrials as we estimate that they have a different Cost of Equity due to the higher leverage.

Numbers in brackets are risk adjusted Economic PE.

Source: DWS CROCI, MSCI. Data as on 18 January 2023. MSCI index weights do not add upto to 100% because 1) rounding-off and 2) Real Estate is not covered.

Figure 83: Regional Sector Valuation 2023E

		US	Europe	Japan	A-Pac	GEMs	Value
Communication Services	EV/NCI	1.87	1.03	1.01	1.21	1.19	US
	CROCI	7.3%	1.6%	1.8%	3.0%	3.2%	
	Ec PE	25.8	62.4	54.8	41.0	37.3	
Consumer Discretionary	EV/NCI	2.85	1.34	0.76	1.16	0.99	Japan
	CROCI	7.4%	2.8%	2.8%	3.4%	3.0%	
	Ec PE	38.6	47.3	27.4	33.7	33.0	
Consumer Staples	EV/NCI	4.01	3.47	1.79	2.98	3.38	Europe
	CROCI	12.9%	12.4%	6.2%	8.8%	11.6%	
	Ec PE	31.1	27.9	28.7	33.7	29.2	
Energy‡	EV/NCI	1.35	0.65	0.51	0.56	0.53	Europe
	CROCI	6.5%	5.3%	0.7%	3.2%	3.1%	
	Ec PE	20.7	12.2	71.4	17.5	17.5	
Financials*	P/B	1.49	0.82	0.71	1.69	NA	Japan
	Inf. Adj. ROC	12.3%	6.8%	6.0%	11.9%	NA	
	PE	12.9	12.3	11.8	14.4	NA	
	PE (risk adj)†	21.5	20.5	19.6	23.9	NA	
Health Care	EV/NCI	4.67	3.00	2.14	4.60	1.56	Japan
	CROCI	19.9%	13.3%	11.0%	13.2%	7.6%	
	Ec PE	23.5	22.5	19.5	34.9	20.6	
Industrials	EV/NCI	2.92	2.45	1.03	0.87	0.79	GEMs
	CROCI	8.7%	8.0%	4.2%	4.0%	4.0%	
	Ec PE	33.5	30.4	24.4	22.0	19.7	
Information Technology	EV/NCI	7.52	4.90	1.24	1.44	1.43	Japan
	CROCI	22.8%	17.6%	6.2%	4.3%	4.2%	
	Ec PE	33.0	27.9	20.0	33.8	33.8	
Materials	EV/NCI	2.36	1.20	0.59	1.36	1.10	A-Pac
	CROCI	7.7%	4.4%	2.6%	6.3%	4.9%	
	Ec PE	30.8	27.3	22.5	21.5	22.4	
Utilities	EV/NCI	1.12	1.01	0.61	0.71	0.64	Europe
	CROCI	3.3%	3.2%	0.5%	-1.3%	-1.6%	
	Ec PE	33.7	31.8	nm	nm	nm	

Source: DWS CROCI. Data as on 18 January 2023.

* Financials: Asia Pacific Financials represents Australian Banks.

† Reflects accounting PE adjusted for relative differential in cost of capital.

‡ Japan Energy Sector consists of one company

Figure 84: Regional Valuations

		2022E	2023E	2024E
USA	Sales Growth	11.0%	0.2%	4.2%
	CROCI	11.1%	10.0%	10.1%
	EV/FCF	26.9	22.7	20.1
	Economic PE	31.4	29.8	27.2
	Accounting PE	20.2	19.3	17.9
Europe	Sales Growth	22.6%	-2.4%	1.0%
	CROCI	7.1%	5.7%	5.5%
	EV/FCF	19.4	19.2	18.4
	Economic PE	23.9	28.5	27.4
	Accounting PE	12.5	14.6	14.3
Japan	Sales Growth	14.3%	0.5%	1.6%
	CROCI	3.2%	3.5%	3.7%
	EV/FCF	51.2	20.3	18.6
	Economic PE	30.6	27.1	24.2
	Accounting PE	12.6	12.1	11.4
Emerging Markets	Sales Growth	4.9%	1.7%	4.1%
	CROCI	4.2%	3.5%	4.1%
	EV/FCF	24.0	19.6	15.6
	Economic PE	26.4	29.5	23.5
	Accounting PE	13.2	14.4	12.3

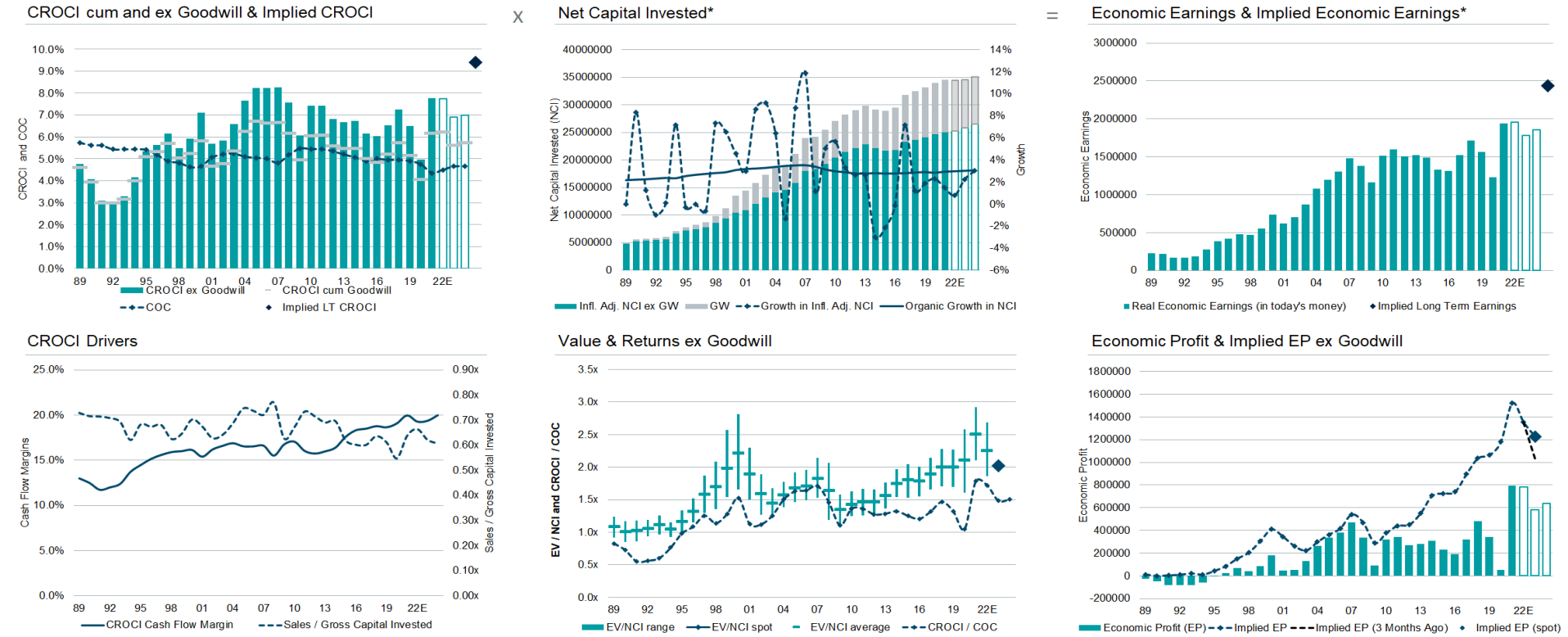
Source: DWS CROCI. Data as on 18 January 2023. Regional Aggregates excluding Financial Companies

Figure 85: Benchmark Indices Valuation

	Acct. PE	Ec. PE	Div. Yield	FCF Yield	EV/NCI	CROCI	CROCI	CROCI	NCI Growth	Earnings Growth	Market Cap/EV
	2023E	2023E	2023E	2023E	2023E	2023E	5YA	Implied	2012-2022E		2023E
Benchmarks											
DJ Global Titans	20.2	28.6	1.6%	4.6%	3.7	12.9%	13.9%	17.1%	50.6%	48.1%	97.1%
S&P 500	19.4	29.7	1.7%	4.4%	3.1	10.3%	10.5%	14.3%	40.3%	44.9%	87.2%
NASDAQ-100 Index	23.0	30.8	1.0%	4.2%	4.5	14.7%	18.1%	21.0%	176.7%	129.2%	95.3%
DJ Industrial Average	20.3	31.8	1.8%	4.7%	4.1	12.9%	13.4%	19.1%	23.6%	14.2%	93.5%
TOPIX 100	12.4	25.9	2.5%	5.1%	1.0	3.9%	3.4%	4.7%	58.0%	82.1%	85.0%
STOXX 600	15.1	28.9	2.9%	5.0%	1.7	5.8%	5.7%	7.8%	20.3%	5.3%	76.9%
Euro STOXX 600	14.7	32.1	2.7%	4.7%	1.5	4.6%	4.5%	6.9%	27.3%	4.3%	71.5%
Germany DAX	13.1	37.9	2.9%	4.5%	1.2	3.2%	3.7%	5.6%	46.4%	-21.6%	59.1%
France CAC 40	16.9	28.5	2.3%	5.0%	2.1	7.6%	6.4%	10.0%	17.4%	40.3%	84.9%
FTSE 100	12.1	23.2	3.6%	6.4%	1.6	6.8%	6.4%	7.3%	5.4%	-2.3%	78.7%
Switzerland SMI	19.4	24.4	2.7%	4.9%	3.1	12.8%	12.4%	14.5%	10.3%	14.0%	94.3%
China & Hong Kong	12.0	21.9	4.1%	6.5%	0.9	4.0%	3.8%	4.1%	27.6%	7.5%	87.1%
CROCI Global	17.1	29.3	2.2%	4.7%	2.0	6.9%	6.8%	9.4%	16.6%	17.9%	84.3%
CROCI Emerging Markets	14.4	29.5	3.6%	5.1%	1.0	3.5%	4.1%	4.8%	17.4%	-22.8%	87.5%

Source: DWS CROCI: represents a bottom-up aggregation of the CROCI coverage of the stated benchmark. Data as on 18 January 2023.

Figure 86: Global Equities CROCI

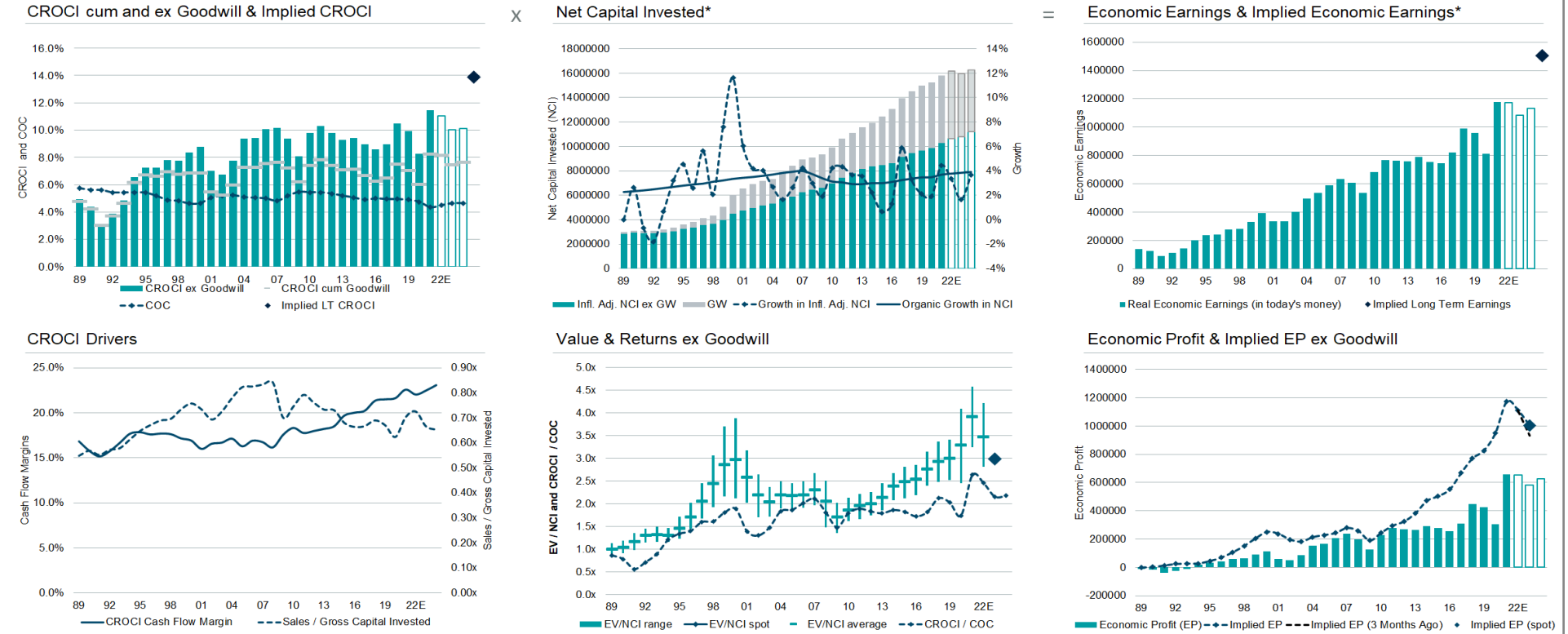


	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022E	2023E	2024E
Enterprise Value (USD bn)	16188	17896	20234	24957	23276	20547	23302	25483	26591	29549	32518	33379	33645	38521	41927	43486	47484	58286	54176	52332	51033
Market Cap (USD bn)	12726	14498	16672	20763	17842	15075	17920	19605	20321	23378	26141	26724	26532	30654	33419	34439	38187	49087	45043	44096	44099
EV/NCI Ex. GW	1.57x	1.67x	1.71x	1.82x	1.63x	1.35x	1.42x	1.47x	1.46x	1.56x	1.75x	1.80x	1.79x	1.89x	2.00x	2.00x	2.10x	2.51x	2.25x	2.02x	1.87x
Economic PE	20.5x	20.4x	20.8x	22.1x	21.6x	22.2x	19.2x	19.7x	21.4x	23.3x	26.0x	29.3x	29.6x	28.9x	27.5x	30.8x	42.2x	32.3x	29.0x	29.3x	26.8x
Accounting PE	15.1x	15.1x	15.4x	16.5x	15.7x	15.7x	13.2x	13.1x	13.8x	15.7x	17.2x	19.3x	18.8x	18.4x	17.5x	19.2x	24.6x	20.0x	17.0x	17.1x	15.9x
Cost of Capital	5.10%	5.05%	5.00%	4.82%	5.18%	5.48%	5.45%	5.45%	5.35%	5.20%	5.07%	4.90%	5.00%	4.95%	4.95%	4.90%	4.75%	4.35%	4.50%	4.65%	4.65%
CROCI Ex. GW	7.7%	8.2%	8.2%	8.2%	7.6%	6.1%	7.4%	7.4%	6.8%	6.7%	6.7%	6.1%	6.0%	6.5%	7.3%	6.5%	5.0%	7.8%	7.7%	6.9%	7.0%
Implied CROCI	8.0%	8.5%	8.5%	8.8%	8.5%	7.4%	7.7%	8.0%	7.8%	8.1%	8.9%	8.8%	8.9%	9.3%	9.9%	9.8%	10.0%	10.9%	10.1%	9.4%	8.7%
Implied Economic Earnings/ Economic Earnings	104%	103%	104%	106%	112%	122%	105%	108%	115%	121%	132%	144%	148%	143%	136%	151%	200%	140%	131%	136%	124%

Source: Company reports, Bloomberg Finance L.P., DWS and CROCI. The table shows aggregate data of companies in CROCI's global coverage. Data in USD as on 18 January 2023. * Displayed in today's money

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Figure 87: US Equities CROCI

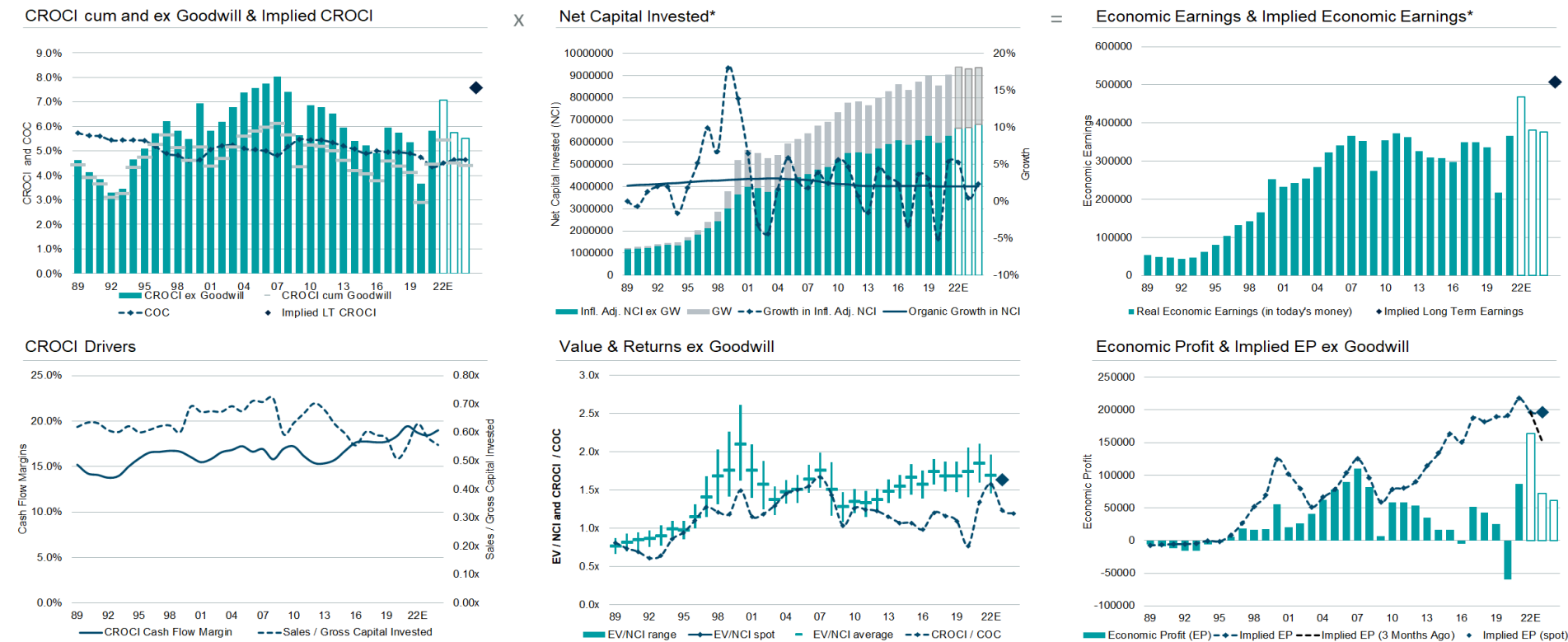


	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022E	2023E	2024E
Enterprise Value (USD bn)	7736	8414	8961	10221	9707	8407	9760	11105	12162	13861	16026	17212	18169	21149	23639	25316	28736	36211	34639	32404	31521
Market Cap (USD bn)	6541	7152	7769	8946	7949	6663	8082	9123	10051	11773	13691	14515	15018	17376	19410	20767	23997	31478	29773	28112	28115
EV/NCI Ex. GW	2.18x	2.17x	2.19x	2.30x	2.05x	1.71x	1.86x	1.95x	1.99x	2.13x	2.37x	2.48x	2.54x	2.76x	2.93x	3.00x	3.28x	3.91x	3.47x	2.99x	2.75x
Economic PE	23.3x	23.1x	21.7x	22.7x	21.9x	21.1x	19.0x	18.9x	20.4x	22.9x	25.2x	27.8x	29.5x	30.7x	27.9x	30.2x	39.8x	34.2x	31.4x	29.8x	27.2x
Accounting PE	17.8x	17.7x	16.7x	17.2x	15.7x	16.2x	13.9x	13.3x	14.3x	16.5x	18.0x	19.6x	20.2x	20.7x	19.2x	20.7x	26.5x	23.7x	20.2x	19.3x	17.9x
Cost of Capital	5.10%	5.05%	5.00%	4.82%	5.18%	5.48%	5.45%	5.45%	5.35%	5.20%	5.07%	4.90%	5.00%	4.95%	4.95%	4.90%	4.75%	4.35%	4.50%	4.65%	4.65%
CROCI Ex. GW	9.4%	9.4%	10.1%	10.2%	9.4%	8.1%	9.8%	10.3%	9.8%	9.3%	9.4%	8.9%	8.6%	9.0%	10.5%	9.9%	8.2%	11.4%	11.1%	10.0%	10.1%
Implied CROCI	11.1%	11.0%	10.9%	11.1%	10.6%	9.3%	10.1%	10.6%	10.7%	11.1%	12.0%	12.2%	12.7%	13.6%	14.5%	14.7%	15.6%	17.0%	15.6%	13.9%	12.8%
Implied Economic Earnings/ Economic Earnings	119%	117%	109%	109%	113%	115%	103%	103%	109%	119%	128%	136%	148%	152%	138%	148%	189%	149%	141%	139%	126%

Source: Company reports, Bloomberg Finance L.P., DWS and CROCI. The table shows aggregate data of companies in CROCI's global coverage. Data in USD as on 18 January 2023. * Displayed in today's money

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Figure 88: Europe Equities CROCI

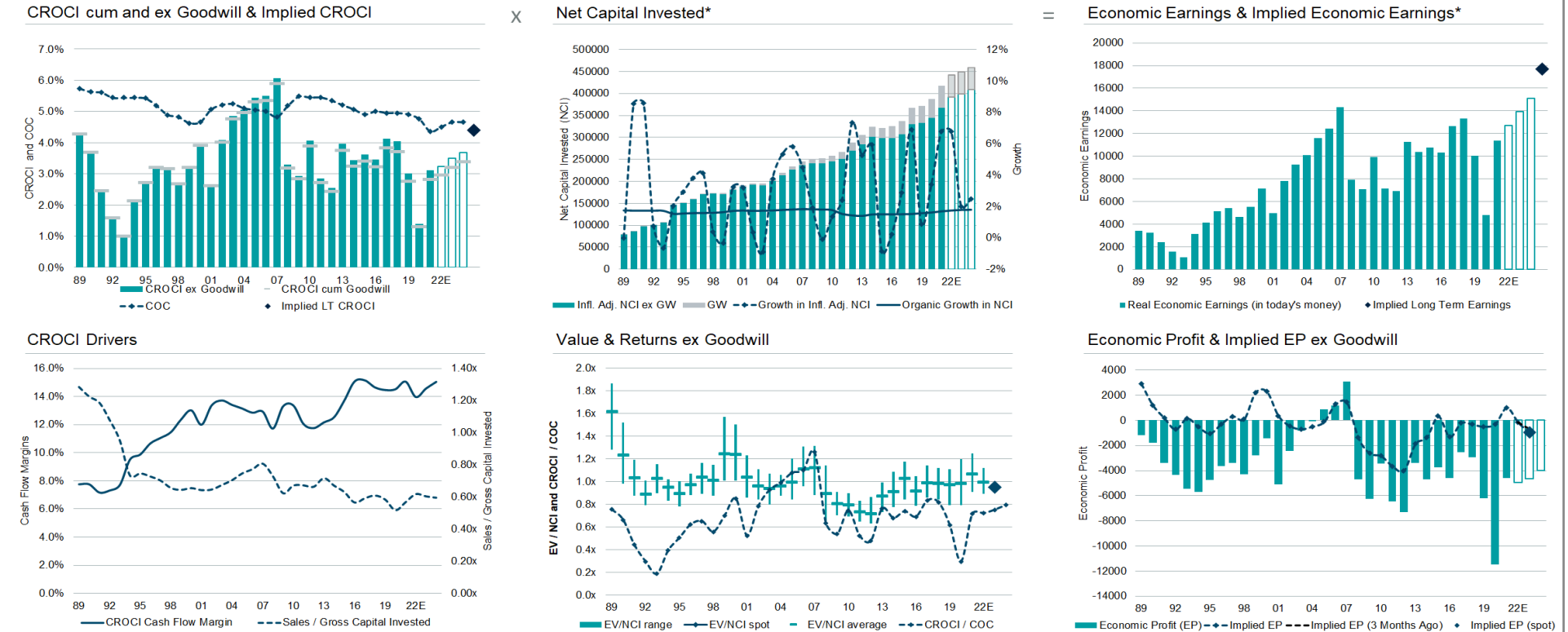


	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022E	2023E	2024E
Enterprise Value (EUR bn)	4043	4654	5334	6021	5513	4910	5571	5919	6244	6752	7468	8395	8267	8929	9089	9537	9520	10888	10721	10916	10665
Market Cap (EUR bn)	2995	3520	4066	4669	3788	3156	3823	4052	4281	4875	5451	6196	5882	6512	6591	6816	6718	8156	8001	8395	8395
EV/NCI Ex. GW	1.47x	1.50x	1.63x	1.75x	1.51x	1.28x	1.35x	1.33x	1.37x	1.48x	1.55x	1.66x	1.57x	1.74x	1.68x	1.68x	1.74x	1.85x	1.69x	1.63x	1.51x
Economic PE	20.0x	19.9x	21.1x	21.8x	20.3x	22.6x	19.6x	19.6x	21.0x	24.8x	28.6x	31.7x	32.1x	29.2x	29.3x	31.4x	47.6x	31.8x	23.9x	28.5x	27.4x
Accounting PE	13.5x	13.4x	14.4x	14.8x	13.1x	14.0x	12.3x	11.7x	12.7x	15.9x	18.1x	20.2x	18.9x	17.4x	17.0x	17.9x	26.0x	17.0x	12.5x	14.6x	14.3x
Cost of Capital	5.10%	5.05%	5.00%	4.82%	5.18%	5.48%	5.45%	5.45%	5.35%	5.20%	5.07%	4.90%	5.00%	4.95%	4.95%	4.90%	4.75%	4.35%	4.50%	4.65%	4.65%
CROCI Ex. GW	7.4%	7.6%	7.7%	8.0%	7.4%	5.6%	6.9%	6.8%	6.5%	6.0%	5.4%	5.2%	4.9%	5.9%	5.7%	5.3%	3.7%	5.8%	7.1%	5.7%	5.5%
Implied CROCI	7.5%	7.6%	8.2%	8.5%	7.8%	7.0%	7.3%	7.2%	7.3%	7.7%	7.8%	8.1%	7.9%	8.6%	8.3%	8.2%	8.3%	8.0%	7.6%	7.6%	7.0%
Implied Economic Earnings/ Economic Earnings	102%	100%	106%	105%	105%	124%	107%	107%	112%	129%	145%	156%	160%	145%	145%	154%	226%	138%	107%	132%	127%

Source: Company reports, Bloomberg Finance L.P., DWS and CROCI. The table shows aggregate data of companies in CROCI's global coverage. Data in EUR as on 18 January 2023. * Displayed in today's money

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Figure 89: Japan Equities CROCI



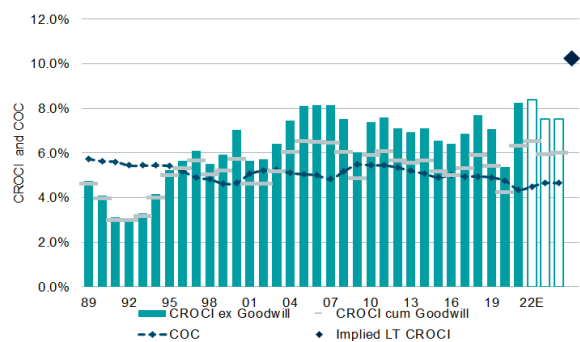
	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022E	2023E	2024E
Enterprise Value (JPY tn)	206	222	261	275	221	197	195	181	187	237	261	297	270	302	320	319	337	393	388	381	369
Market Cap (JPY tn)	141	169	211	219	151	129	133	118	118	172	196	227	206	244	255	248	266	322	313	311	311
EV/NCI Ex. GW	0.96x	0.99x	1.11x	1.12x	0.89x	0.80x	0.79x	0.73x	0.71x	0.87x	0.91x	1.02x	0.91x	0.99x	0.98x	0.97x	0.98x	1.06x	0.99x	0.95x	0.89x
Economic PE	18.9x	18.2x	20.2x	18.5x	27.1x	27.4x	19.5x	25.7x	27.9x	21.9x	26.3x	28.3x	26.4x	24.0x	24.2x	32.1x	70.1x	34.2x	30.6x	27.1x	24.2x
Accounting PE	15.5x	15.5x	17.1x	16.5x	31.1x	21.9x	13.4x	16.2x	14.2x	13.6x	13.8x	15.8x	13.5x	13.2x	13.3x	15.2x	18.6x	13.7x	12.6x	12.1x	11.4x
Cost of Capital	5.10%	5.05%	5.00%	4.82%	5.18%	5.48%	5.45%	5.45%	5.35%	5.20%	5.07%	4.90%	5.00%	4.95%	4.95%	4.90%	4.75%	4.35%	4.50%	4.65%	4.65%
CROCI Ex. GW	5.1%	5.4%	5.5%	6.1%	3.3%	2.9%	4.1%	2.8%	2.6%	4.0%	3.4%	3.6%	3.4%	4.1%	4.0%	3.0%	1.4%	3.1%	3.2%	3.5%	3.7%
Implied CROCI	4.9%	5.0%	5.5%	5.4%	4.6%	4.4%	4.3%	4.0%	3.8%	4.5%	4.6%	5.0%	4.6%	4.9%	4.9%	4.7%	4.7%	4.6%	4.5%	4.4%	4.1%
Implied Economic Earnings/ Economic Earnings	96%	92%	101%	89%	141%	150%	106%	140%	149%	114%	133%	139%	132%	119%	120%	157%	333%	149%	138%	126%	112%

Source: Company reports, Bloomberg Finance L.P., DWS and CROCI. The table shows aggregate data of companies in CROCI's global coverage. Data in JPY as on 18 January 2023. * Displayed in today's money

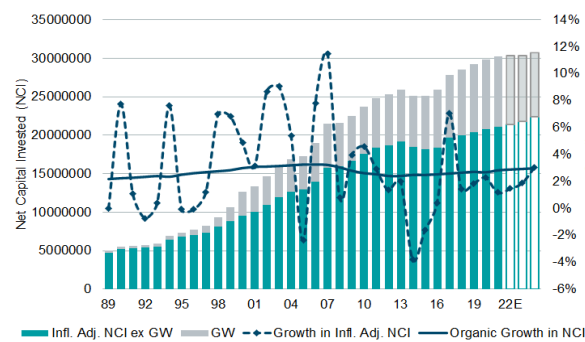
Past performance may not be a reliable indicator of future results. Market and index performance data is sourced from Bloomberg Finance L.P. Company data is from the CROCI database. Forecasts are based on assumptions, estimates, views and/or analyses, which might prove inaccurate or incorrect. Unless stated this data is as of December 2022.

Figure 90: Developed Markets Equities CROCI

CROCI cum and ex Goodwill & Implied CROCI



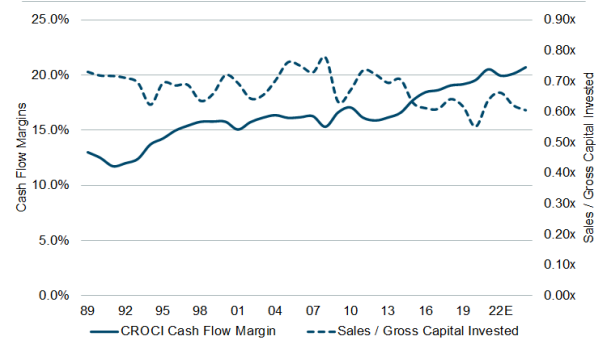
Net Capital Invested*



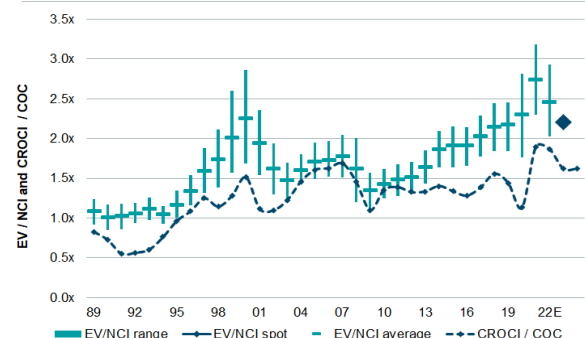
Economic Earnings & Implied Economic Earnings*



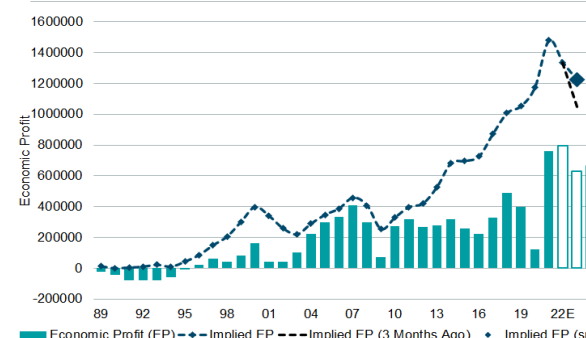
CROCI Drivers



Value & Returns ex Goodwill



Economic Profit & Implied EP ex Goodwill

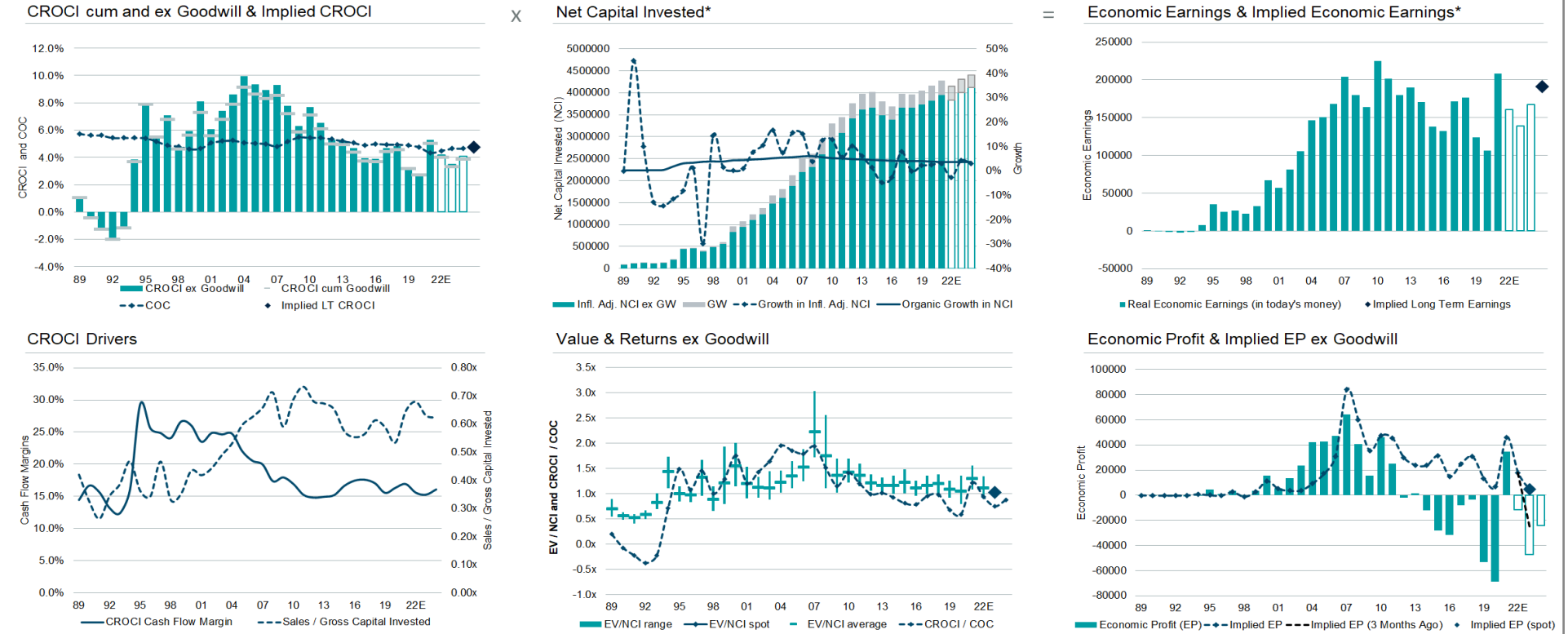


	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022E	2023E	2024E
Enterprise Value (USD bn)	15134	16559	18423	21788	20570	18074	20361	22346	23342	26162	29007	29788	30442	34842	38055	39835	43835	53560	50116	48226	46990
Market Cap (USD bn)	11886	13399	15148	17929	15533	13018	15448	16977	17707	20694	23357	23831	23977	27587	30166	31398	34972	44844	41503	40504	40507
EV/NCI Ex. GW	1.60x	1.71x	1.73x	1.77x	1.62x	1.35x	1.42x	1.48x	1.51x	1.63x	1.86x	1.91x	1.91x	2.02x	2.15x	2.17x	2.29x	2.73x	2.45x	2.20x	2.04x
Economic PE	21.5x	21.1x	21.2x	21.8x	21.5x	22.3x	19.3x	19.6x	21.2x	23.5x	26.2x	29.2x	29.8x	29.5x	27.9x	30.7x	42.7x	33.2x	29.2x	29.3x	27.1x
Accounting PE	15.8x	15.6x	15.8x	16.1x	15.3x	15.8x	13.2x	12.9x	13.8x	16.0x	17.6x	19.5x	19.1x	18.8x	17.9x	19.4x	25.4x	20.7x	17.4x	17.4x	16.4x
Cost of Capital	5.10%	5.05%	5.00%	4.82%	5.18%	5.48%	5.45%	5.45%	5.35%	5.20%	5.07%	4.90%	5.00%	4.95%	4.95%	4.90%	4.75%	4.35%	4.50%	4.65%	4.65%
CROCI Ex. GW	7.5%	8.1%	8.1%	8.1%	7.5%	6.0%	7.4%	7.6%	7.1%	6.9%	7.1%	6.6%	6.4%	6.9%	7.7%	7.1%	5.4%	8.2%	8.4%	7.5%	7.5%
Implied CROCI	8.2%	8.6%	8.6%	8.5%	8.4%	7.4%	7.7%	8.1%	8.1%	8.5%	9.5%	9.4%	9.6%	10.0%	10.6%	10.6%	10.9%	11.9%	11.0%	10.2%	9.5%
Implied Economic Earnings/ Economic Earnings	110%	107%	106%	105%	112%	122%	105%	107%	114%	122%	133%	143%	149%	146%	138%	150%	203%	145%	132%	136%	126%

Source: Company reports, Bloomberg Finance L.P., DWS and CROCI. The table shows aggregate data of companies in CROCI's global coverage. Data in USD as on 18 January 2023. * Displayed in today's money

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Figure 91: Emerging Markets Equities CROCI

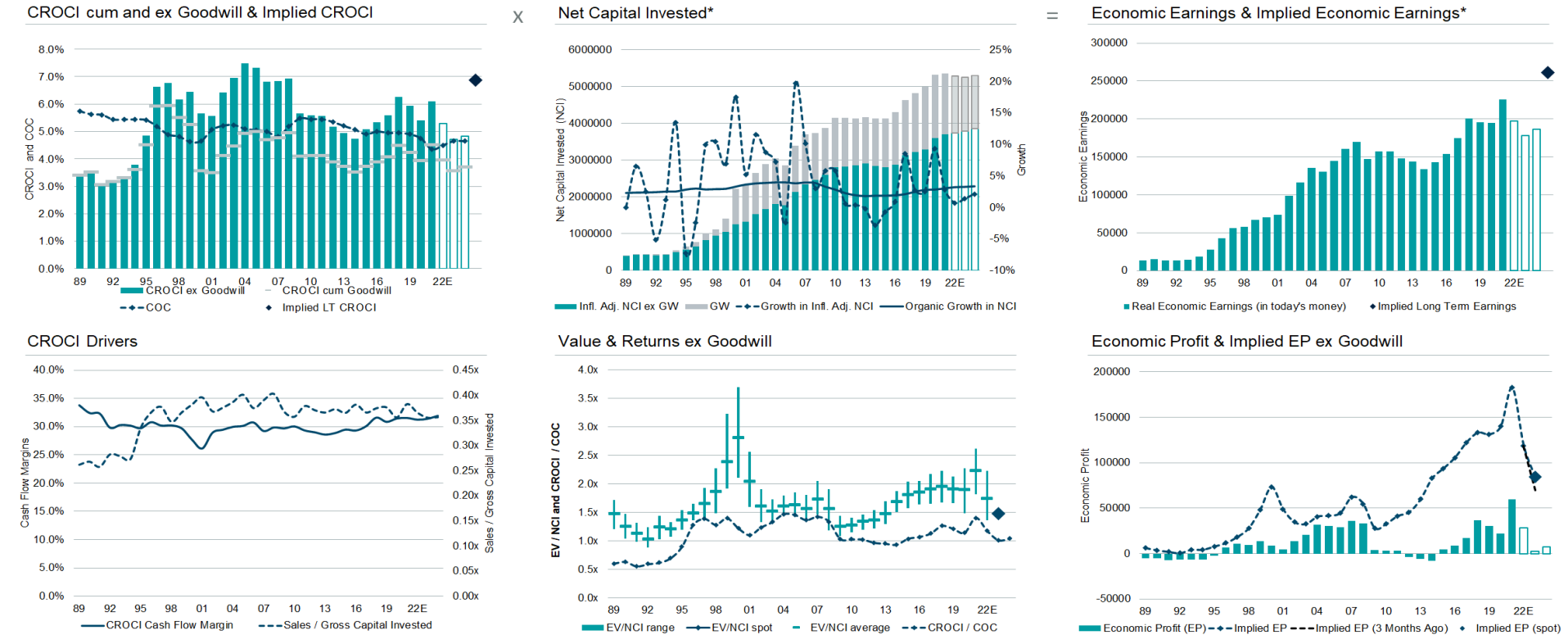


	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022E	2023E	2024E
Enterprise Value (USD bn)	1054	1336	1811	3169	2706	2473	2941	3136	3249	3388	3511	3591	3203	3679	3872	3651	3649	4726	4060	4107	4042
Market Cap (USD bn)	841	1099	1524	2833	2309	2057	2473	2628	2614	2685	2784	2894	2554	3066	3254	3041	3215	4243	3540	3592	3592
EV/NCI Ex. GW	1.21x	1.34x	1.52x	2.22x	1.75x	1.35x	1.42x	1.36x	1.21x	1.16x	1.15x	1.21x	1.10x	1.16x	1.19x	1.08x	1.04x	1.29x	1.11x	1.02x	0.96x
Economic PE	12.2x	14.3x	17.0x	23.9x	22.4x	21.4x	18.5x	20.8x	22.9x	22.0x	24.7x	30.7x	28.3x	24.7x	24.6x	32.6x	37.3x	24.4x	26.4x	29.5x	23.5x
Accounting PE	9.3x	10.7x	12.7x	19.5x	18.6x	15.5x	13.4x	14.2x	14.1x	13.7x	14.9x	18.3x	16.8x	15.6x	14.6x	17.5x	18.5x	14.7x	13.2x	14.4x	12.3x
Cost of Capital	5.10%	5.05%	5.00%	4.82%	5.18%	5.48%	5.45%	5.45%	5.35%	5.20%	5.07%	4.90%	5.00%	4.95%	4.95%	4.90%	4.75%	4.35%	4.50%	4.65%	4.65%
CROCI Ex. GW	9.9%	9.3%	8.9%	9.3%	7.8%	6.3%	7.7%	6.5%	5.3%	5.3%	4.7%	4.0%	3.9%	4.7%	4.8%	3.3%	2.8%	5.3%	4.2%	3.5%	4.1%
Implied CROCI	6.2%	6.8%	7.6%	10.7%	9.0%	7.4%	7.7%	7.4%	6.5%	6.0%	5.8%	6.0%	5.5%	5.7%	5.9%	5.3%	4.9%	5.6%	5.0%	4.8%	4.5%
Implied Economic Earnings/ Economic Earnings	62%	72%	85%	115%	116%	117%	101%	113%	122%	115%	125%	151%	141%	122%	122%	160%	177%	106%	119%	137%	109%

Source: Company reports, Bloomberg Finance L.P., DWS and CROCI. The table shows aggregate data of companies in CROCI's global coverage. Data in USD as on 18 January 2023. * Displayed in today's money

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Figure 92: Communication Services CROCI

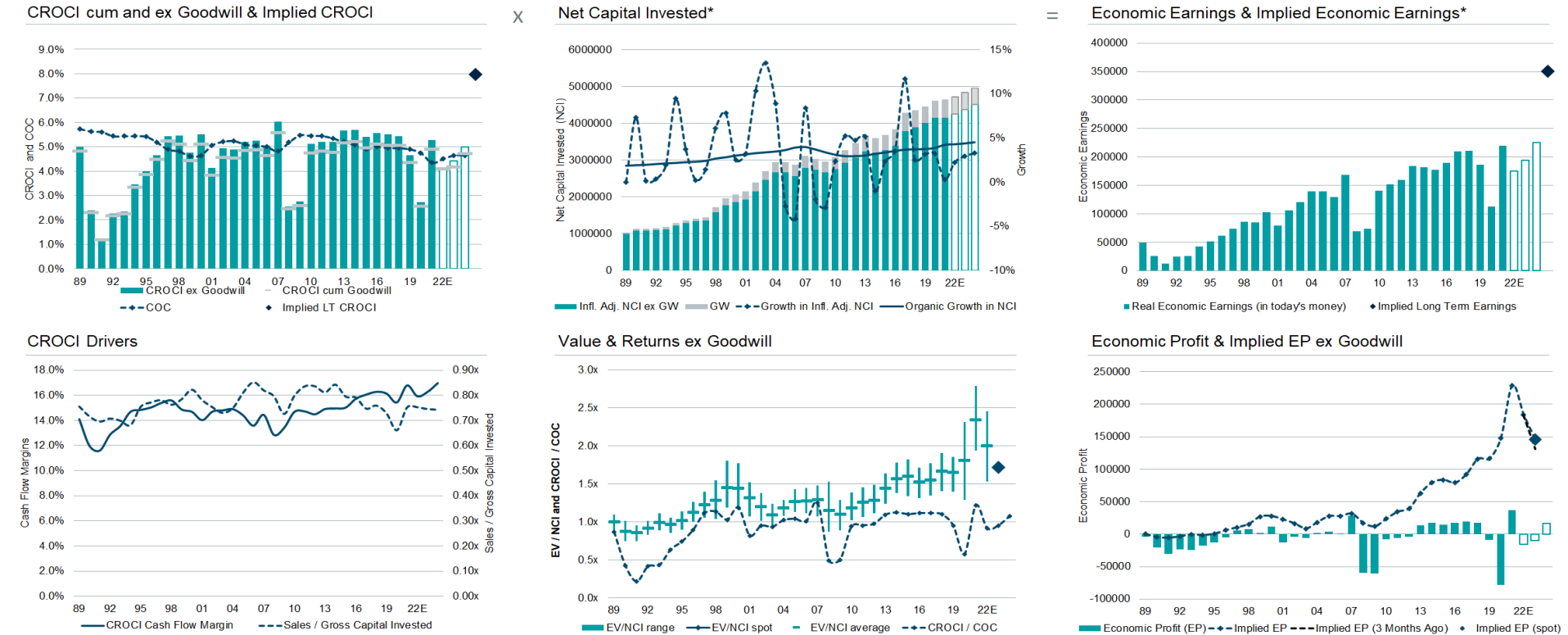


	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022E	2023E	2024E
Enterprise Value (USD bn)	2128	2143	2483	3075	2954	2573	2832	3034	3193	3569	4004	4308	4587	5183	5520	5632	6230	7617	6181	5616	5425
Market Cap (USD bn)	1510	1576	1748	2356	2064	1706	1958	2119	2242	2563	3049	3304	3485	4015	4218	4347	4918	6294	4855	4372	4372
EV/NCI Ex. GW	1.60x	1.63x	1.56x	1.72x	1.56x	1.25x	1.27x	1.33x	1.36x	1.48x	1.69x	1.80x	1.85x	1.91x	1.95x	1.91x	1.90x	2.23x	1.74x	1.48x	1.37x
Economic PE	21.4x	22.2x	23.0x	25.2x	22.5x	22.0x	22.7x	23.9x	26.3x	29.9x	35.6x	35.4x	34.7x	34.2x	31.2x	32.1x	35.0x	36.5x	32.9x	31.4x	28.3x
Accounting PE	15.5x	15.6x	15.9x	17.8x	14.6x	12.1x	13.0x	13.3x	13.7x	16.3x	19.5x	20.7x	19.4x	20.1x	18.8x	19.1x	20.2x	21.0x	18.4x	15.6x	14.1x
Cost of Capital	5.10%	5.05%	5.00%	4.82%	5.18%	5.48%	5.45%	5.45%	5.35%	5.20%	5.07%	4.90%	5.00%	4.95%	4.95%	4.90%	4.75%	4.35%	4.50%	4.65%	4.65%
CROCI Ex. GW	7.5%	7.3%	6.8%	6.8%	6.9%	5.7%	5.6%	5.6%	5.2%	4.9%	4.7%	5.1%	5.3%	5.6%	6.2%	5.9%	5.4%	6.1%	5.3%	4.7%	4.8%
Implied CROCI	8.2%	8.2%	7.8%	8.3%	8.1%	6.8%	6.9%	7.3%	7.3%	7.7%	8.6%	8.8%	9.3%	9.5%	9.6%	9.3%	9.0%	9.7%	7.8%	6.9%	6.4%
Implied Economic Earnings/ Economic Earnings	109%	112%	115%	121%	116%	121%	124%	130%	141%	155%	181%	174%	174%	169%	154%	157%	166%	159%	148%	146%	132%

Source: Company reports, Bloomberg Finance L.P., DWS and CROCI. The table shows aggregate data of companies in CROCI's global coverage. Data in USD as on 18 January 2023. * Displayed in today's money

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Figure 93: Consumer Discretionary CROCI

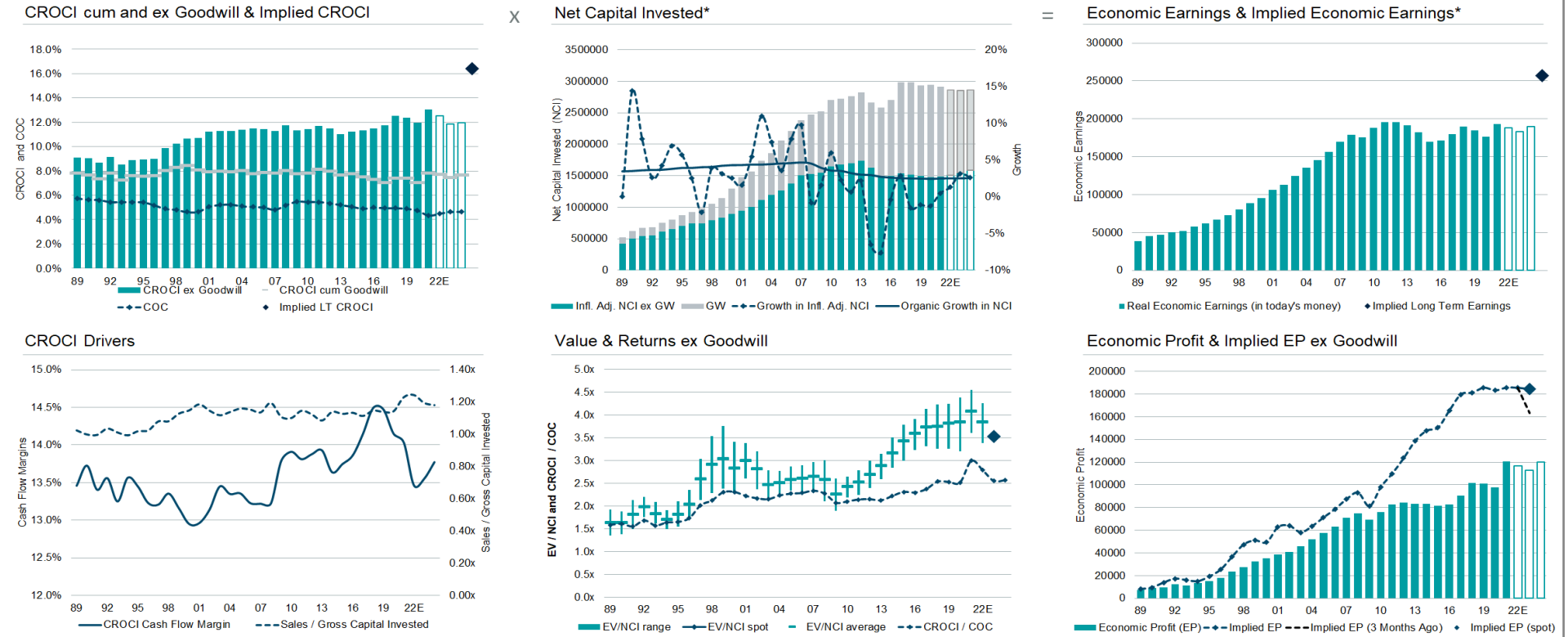


	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022E	2023E	2024E
Enterprise Value (USD bn)	2392	2600	2595	2915	2593	2451	2777	3117	3347	3987	4329	4582	4607	5272	5877	6071	6976	9199	8185	7537	7377
Market Cap (USD bn)	1389	1581	1794	2033	1531	1440	1901	2196	2371	2995	3285	3459	3390	3899	4401	4465	5338	7660	6570	5977	5977
EV/NCI Ex. GW	1.18x	1.26x	1.27x	1.29x	1.15x	1.10x	1.18x	1.25x	1.28x	1.44x	1.56x	1.59x	1.52x	1.54x	1.66x	1.64x	1.80x	2.34x	1.99x	1.71x	1.59x
Economic PE	22.6x	24.1x	25.2x	21.3x	45.0x	39.8x	23.1x	24.1x	24.6x	25.3x	27.5x	29.5x	27.3x	28.0x	30.6x	35.3x	65.9x	44.2x	48.4x	38.7x	31.8x
Accounting PE	14.3x	16.0x	18.6x	16.3x	40.8x	38.2x	13.8x	14.2x	14.2x	15.7x	16.4x	17.1x	15.8x	16.5x	18.2x	20.5x	35.1x	25.3x	22.2x	18.3x	16.1x
Cost of Capital	5.10%	5.05%	5.00%	4.82%	5.18%	5.48%	5.45%	5.45%	5.35%	5.20%	5.07%	4.90%	5.00%	4.95%	4.95%	4.90%	4.75%	4.35%	4.50%	4.65%	4.65%
CROCI Ex. GW	5.2%	5.2%	5.0%	6.0%	2.6%	2.8%	5.1%	5.2%	5.2%	5.7%	5.7%	5.4%	5.6%	5.5%	5.4%	4.7%	2.7%	5.3%	4.1%	4.4%	5.0%
Implied CROCI	6.0%	6.4%	6.4%	6.2%	5.9%	6.0%	6.4%	6.8%	6.9%	7.5%	7.9%	7.8%	7.6%	7.6%	8.2%	8.0%	8.6%	10.2%	9.0%	8.0%	7.4%
Implied Economic Earnings/ Economic Earnings	115%	122%	126%	103%	233%	218%	126%	131%	132%	132%	139%	145%	137%	139%	151%	173%	313%	192%	218%	180%	148%

Source: Company reports, Bloomberg Finance L.P., DWS and CROCI. The table shows aggregate data of companies in CROCI's global coverage. Data in USD as on 18 January 2023. * Displayed in today's money

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Figure 94: Consumer Staples CROCI



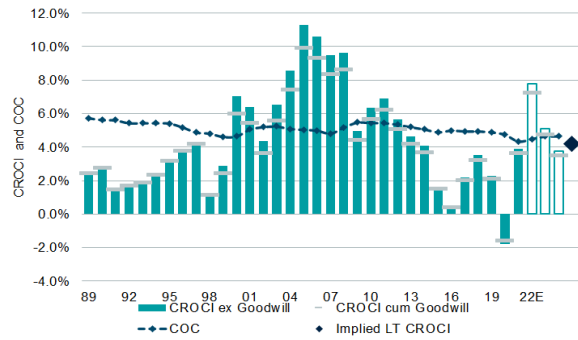
	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022E	2023E	2024E
Enterprise Value (USD bn)	2072	2307	2558	2918	2933	2662	3072	3343	3680	4088	4262	4341	4590	4962	4996	5134	5211	5655	5569	5532	5440
Market Cap (USD bn)	1710	1892	2144	2463	2290	2087	2486	2696	3010	3412	3567	3676	3864	4110	4076	4237	4341	4804	4700	4718	4722
EV/NCI Ex. GW	2.51x	2.58x	2.60x	2.64x	2.58x	2.25x	2.42x	2.52x	2.69x	2.88x	3.16x	3.42x	3.59x	3.73x	3.74x	3.81x	3.84x	4.08x	3.84x	3.53x	3.30x
Economic PE	22.1x	22.5x	22.7x	23.4x	21.9x	19.8x	21.1x	21.6x	23.4x	26.0x	28.1x	30.2x	31.3x	31.7x	29.8x	30.7x	32.2x	31.3x	30.6x	29.7x	27.6x
Accounting PE	17.5x	17.8x	18.3x	18.8x	17.1x	14.7x	15.7x	15.6x	17.0x	19.1x	20.8x	22.2x	22.5x	22.5x	20.6x	21.4x	22.2x	21.7x	21.3x	20.0x	18.4x
Cost of Capital	5.10%	5.05%	5.00%	4.82%	5.18%	5.48%	5.45%	5.45%	5.35%	5.20%	5.07%	4.90%	5.00%	4.95%	4.95%	4.90%	4.75%	4.35%	4.50%	4.65%	4.65%
CROCI Ex. GW	11.4%	11.5%	11.4%	11.3%	11.8%	11.4%	11.4%	11.7%	11.5%	11.0%	11.3%	11.3%	11.5%	11.7%	12.6%	12.4%	11.9%	13.0%	12.5%	11.8%	11.9%
Implied CROCI	12.8%	13.0%	13.0%	12.7%	13.4%	12.3%	13.2%	13.8%	14.4%	15.0%	16.0%	16.7%	18.0%	18.4%	18.5%	18.7%	18.3%	17.7%	17.3%	16.4%	15.3%
Implied Economic Earnings/ Economic Earnings	113%	114%	114%	113%	114%	109%	115%	118%	125%	135%	142%	148%	157%	157%	148%	151%	153%	136%	138%	138%	128%

Source: Company reports, Bloomberg Finance L.P., DWS and CROCI. The table shows aggregate data of companies in CROCI's global coverage. Data in USD as on 18 January 2023. * Displayed in today's money

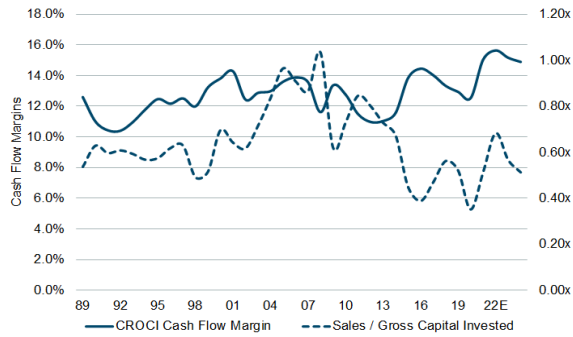
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Figure 95: Energy CROCI

CROCI cum and ex Goodwill & Implied CROCI

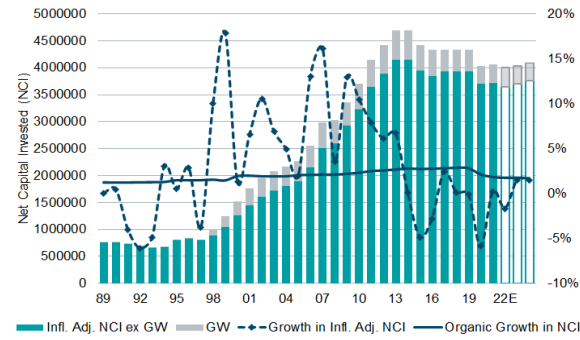


CROCI Drivers

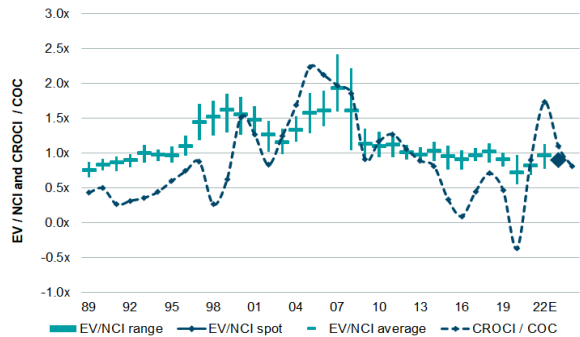


X

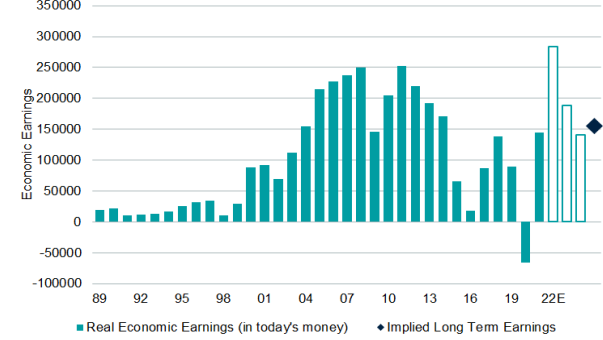
Net Capital Invested*



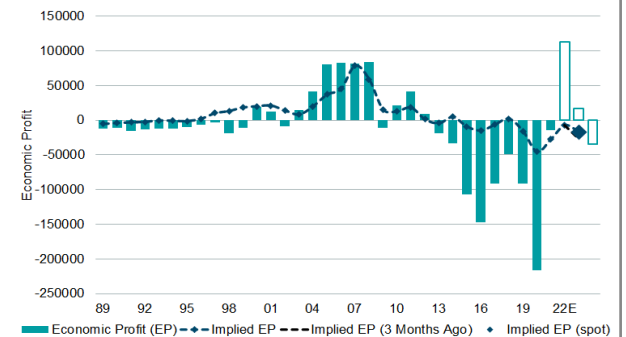
Value & Returns ex Goodwill



= Economic Earnings & Implied Economic Earnings*



Economic Profit & Implied EP ex Goodwill



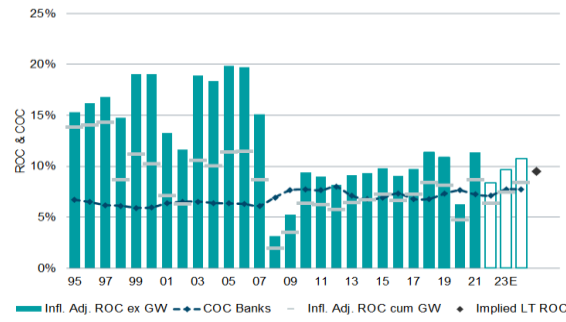
	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022E	2023E	2024E
Enterprise Value (USD bn)	1584	2018	2382	3382	3014	2476	2671	3133	3110	3272	3510	3110	2934	3207	3440	3154	2374	2750	3286	3339	3161
Market Cap (USD bn)	1475	1938	2274	3278	2799	2185	2333	2693	2603	2728	2911	2496	2283	2552	2809	2465	1657	2083	2745	3037	3037
EV/NCI Ex. GW	1.33x	1.57x	1.61x	1.93x	1.61x	1.13x	1.10x	1.12x	1.01x	0.98x	1.03x	0.94x	0.91x	0.96x	1.01x	0.91x	0.71x	0.82x	0.96x	0.90x	0.82x
Economic PE	15.5x	13.9x	15.2x	20.3x	16.7x	22.7x	17.3x	16.2x	17.8x	21.1x	25.0x	57.0x	nm	43.6x	28.8x	39.9x	nm	20.9x	12.3x	17.6x	22.0x
Accounting PE	9.7x	9.4x	9.9x	13.1x	11.0x	14.5x	11.3x	9.7x	10.5x	12.5x	14.8x	29.7x	51.4x	20.9x	14.7x	16.7x	nm	9.3x	6.2x	8.9x	10.6x
Cost of Capital	5.10%	5.05%	5.00%	4.82%	5.18%	5.48%	5.45%	5.45%	5.35%	5.20%	5.07%	4.90%	5.00%	4.95%	4.95%	4.90%	4.75%	4.35%	4.50%	4.65%	4.65%
CROCI Ex. GW	8.6%	11.3%	10.6%	9.5%	9.6%	5.0%	6.3%	6.9%	5.7%	4.6%	4.1%	1.7%	0.5%	2.2%	3.5%	2.3%	-1.8%	3.9%	7.8%	5.1%	3.7%
Implied CROCI	6.8%	7.9%	8.0%	9.3%	8.3%	6.2%	6.0%	6.1%	5.4%	5.1%	5.2%	4.6%	4.5%	4.8%	5.0%	4.5%	3.4%	3.6%	4.3%	4.2%	3.8%
Implied Economic Earnings/ Economic Earnings	79%	70%	76%	98%	87%	124%	94%	88%	95%	110%	127%	280%	nm	216%	142%	195%	nm	91%	55%	82%	102%

Source: Company reports, Bloomberg Finance L.P., DWS and CROCI. The table shows aggregate data of companies in CROCI's global coverage. Data in USD as on 18 January 2023. * Displayed in today's money

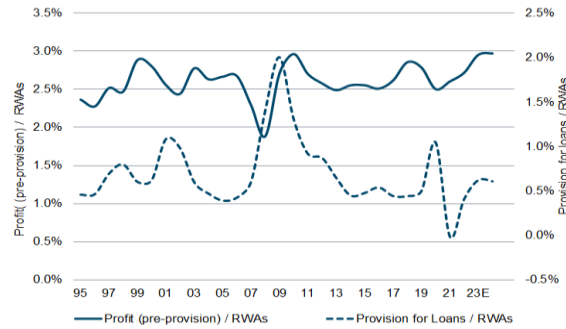
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Figure 96: Financials CROCI

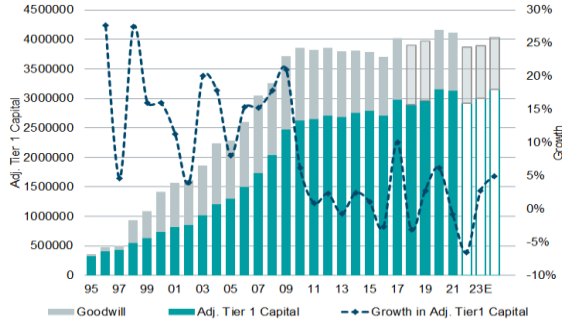
Inflation Adjusted ROC cum and ex Goodwill & Implied ROC



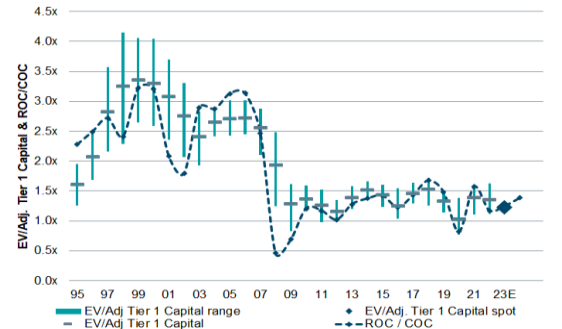
Return Drivers



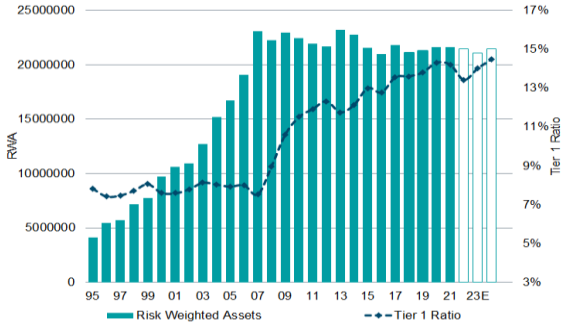
Adjusted Tier 1 Capital *



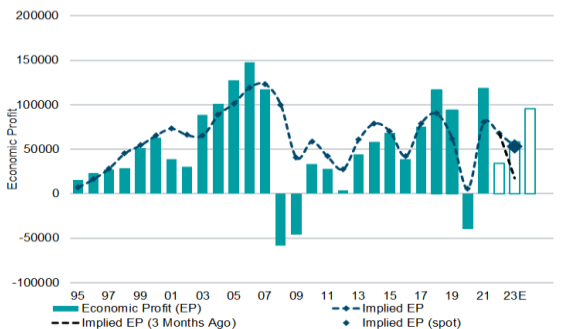
Value & Returns ex Goodwill



RWA * & Tier 1 Ratio



Economic Profit & Implied EP ex Goodwill

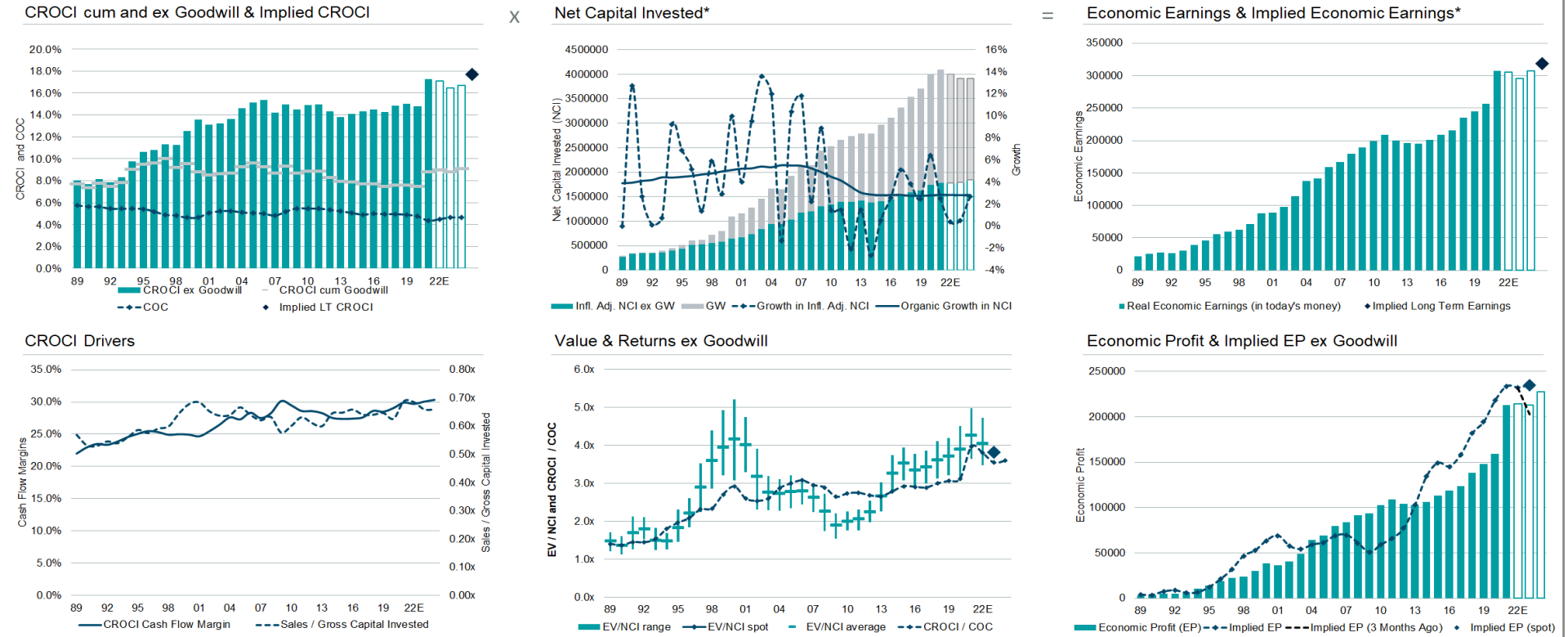


	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022E	2023E	2024E
Enterprise Value (USD bn)	2236	2543	2998	3318	3000	2462	2831	2671	2551	3074	3461	3368	2878	3737	3860	3498	2936	3983	3719	3696	3682
Market Cap (USD bn)	1937	2214	2683	2923	2244	1720	2322	2195	2135	2755	3118	2995	2585	3393	3505	3115	2537	3587	3340	3314	3301
EV/Adjusted Tier 1 Capital	2.64x	2.70x	2.72x	2.55x	1.93x	1.27x	1.36x	1.26x	1.16x	1.38x	1.51x	1.43x	1.25x	1.45x	1.52x	1.32x	1.03x	1.38x	1.34x	1.23x	1.14x
Adjusted PE	14.4x	13.6x	13.8x	16.9x	60.8x	24.1x	14.6x	14.0x	14.1x	15.2x	16.2x	14.6x	13.8x	14.9x	13.4x	12.2x	16.4x	12.2x	16.0x	12.7x	10.6x
COC Adjusted PE	18.0x	17.1x	17.4x	21.4x	81.4x	33.7x	20.7x	19.7x	21.2x	20.8x	21.7x	20.5x	20.3x	20.5x	18.4x	18.2x	26.5x	20.3x	25.4x	21.2x	17.7x
Accounting PE	12.7x	12.4x	13.0x	15.0x	44.3x	26.8x	12.2x	10.7x	11.1x	12.5x	12.1x	12.2x	11.6x	12.5x	11.2x	10.1x	12.8x	9.7x	10.1x	9.5x	8.9x
Cost of Capital (COC) - Financials	6.40%	6.35%	6.30%	6.12%	6.94%	7.66%	7.76%	7.66%	8.01%	7.12%	6.78%	6.90%	7.35%	6.80%	6.80%	7.30%	7.65%	7.25%	7.15%	7.75%	7.75%
Inflation Adjusted ROC ex Goodwill	18.4%	19.9%	19.7%	15.1%	3.2%	5.3%	9.4%	9.0%	8.2%	9.1%	9.3%	9.8%	9.0%	9.7%	11.4%	10.8%	6.2%	11.4%	8.4%	9.7%	10.7%
Implied ROC	16.9%	17.1%	17.1%	15.6%	13.4%	9.8%	10.6%	9.6%	9.3%	9.9%	10.2%	9.9%	9.2%	9.9%	10.4%	9.6%	7.9%	10.0%	9.6%	9.5%	8.9%
Implied Economic Earnings/ Economic Earnings	95%	86%	87%	103%	422%	185%	113%	107%	113%	108%	110%	101%	102%	101%	91%	89%	126%	88%	114%	98%	83%
Adjusted Tier 1 Capital Ex. GW (USD bn)	847	942	1103	1302	1557	1933	2075	2124	2207	2220	2294	2352	2305	2577	2535	2651	2860	2877	2771	3007	3225
Adjusted Tier 1 Capital Cum. GW (USD bn)	1545	1636	1892	2270	2485	2905	3041	3060	3132	3122	3161	3193	3141	3465	3417	3538	3770	3779	3660	3900	4118
Inflation Adjusted Earnings (USD bn)	156	187	217	197	49	102	194	191	181	202	213	231	208	251	289	287	179	327	232	291	346

Source: Company reports, Bloomberg Finance L.P., DWS and CROCI. The table shows aggregate data of companies in CROCI's global coverage. Data in USD as on 18 January 2023. * Displayed in today's money

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Figure 97: Healthcare CROCI

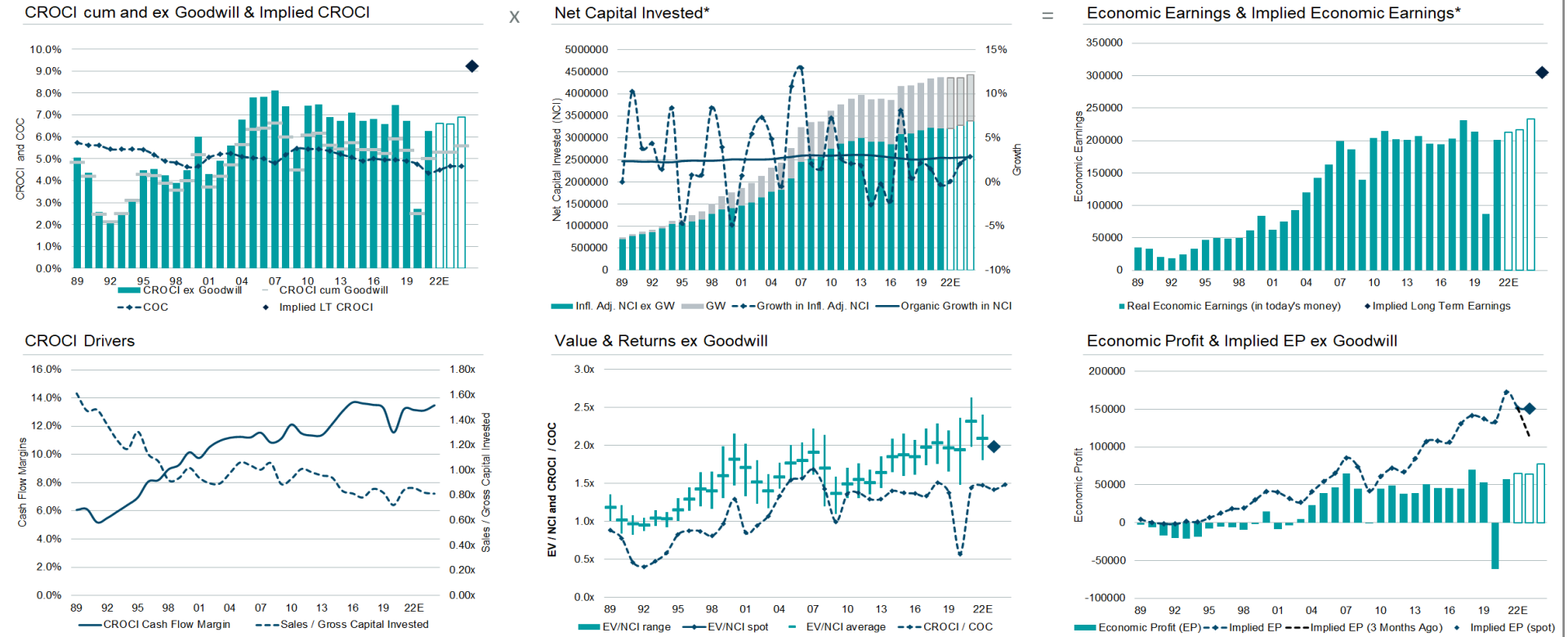


	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022E	2023E	2024E
Enterprise Value (USD bn)	1831	1902	2147	2341	2112	1961	2165	2354	2597	3173	3825	4245	4145	4518	5072	5433	6175	7015	6857	6849	6615
Market Cap (USD bn)	1787	1872	2048	2228	1947	1745	1931	2065	2278	2881	3452	3775	3578	3852	4268	4549	5195	6009	5944	6153	6153
EV/NCI Ex. GW	2.72x	2.77x	2.78x	2.62x	2.25x	1.89x	2.00x	2.06x	2.24x	2.66x	3.26x	3.53x	3.33x	3.42x	3.61x	3.70x	3.89x	4.26x	4.03x	3.81x	3.50x
Economic PE	18.6x	18.3x	18.1x	18.4x	15.0x	13.0x	13.4x	13.8x	15.6x	19.3x	23.1x	24.6x	23.0x	23.9x	24.4x	24.7x	26.3x	24.7x	23.6x	23.1x	21.0x
Accounting PE	18.6x	18.5x	17.8x	17.7x	14.2x	12.7x	12.3x	12.3x	13.7x	16.9x	19.3x	20.3x	18.0x	18.4x	18.5x	18.5x	19.9x	18.3x	17.5x	17.6x	16.3x
Cost of Capital	5.10%	5.05%	5.00%	4.82%	5.18%	5.48%	5.45%	5.45%	5.35%	5.20%	5.07%	4.90%	5.00%	4.95%	4.95%	4.90%	4.75%	4.35%	4.50%	4.65%	4.65%
CROCI Ex. GW	14.6%	15.1%	15.4%	14.2%	15.0%	14.5%	14.9%	15.0%	14.3%	13.8%	14.1%	14.3%	14.5%	14.3%	14.8%	15.0%	14.8%	17.3%	17.1%	16.5%	16.7%
Implied CROCI	13.9%	14.0%	13.9%	12.6%	11.7%	10.3%	10.9%	11.2%	12.0%	13.8%	16.5%	17.3%	16.7%	16.9%	17.9%	18.1%	18.5%	18.5%	18.1%	17.7%	16.3%
Implied Economic Earnings/ Economic Earnings	95%	92%	91%	89%	78%	71%	73%	75%	84%	100%	117%	121%	115%	119%	121%	121%	125%	107%	106%	107%	98%

Source: Company reports, Bloomberg Finance L.P., DWS and CROCI. The table shows aggregate data of companies in CROCI's global coverage. Data in USD as on 18 January 2023. * Displayed in today's money

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Figure 98: Industrials CROCI

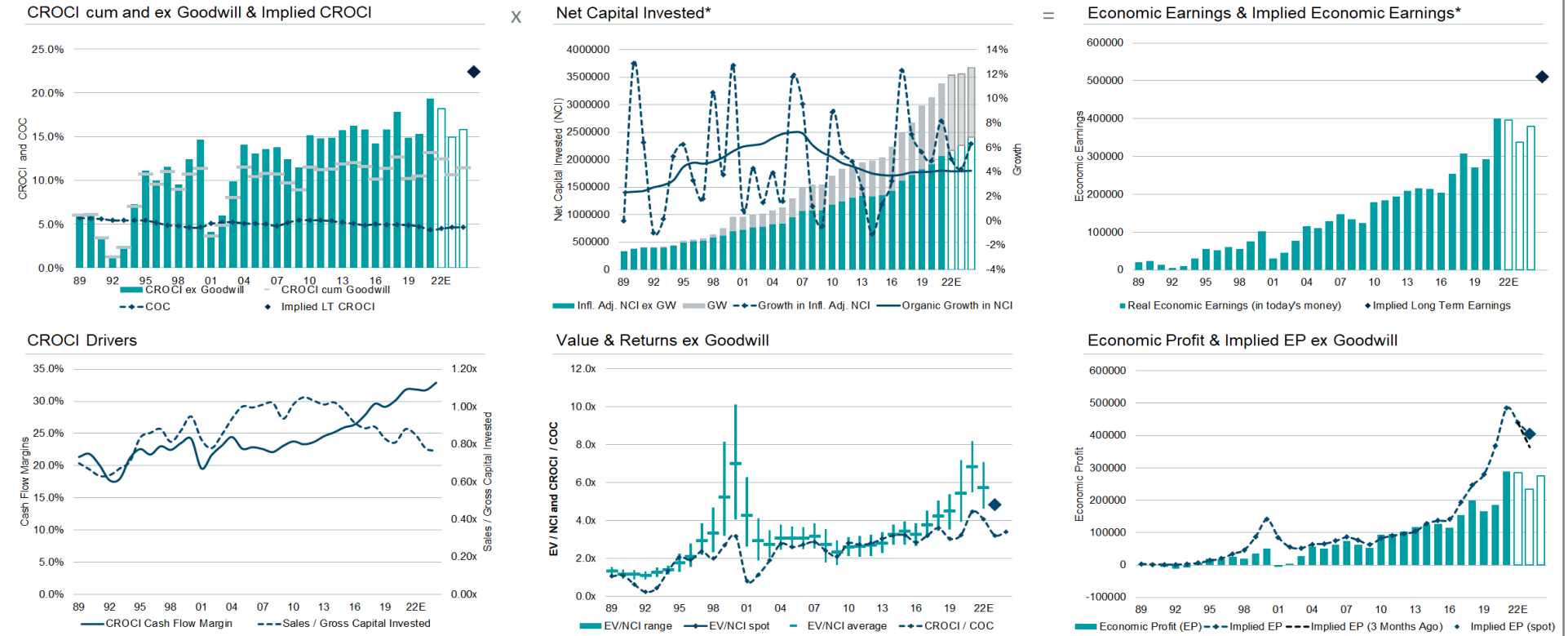


	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022E	2023E	2024E
Enterprise Value (USD bn)	2197	2506	2945	3743	3473	2895	3413	3729	3731	4182	4621	4737	4639	5379	5651	5701	5806	6991	6462	6547	6434
Market Cap (USD bn)	1640	1943	2298	2929	2396	1831	2346	2596	2530	3052	3461	3510	3372	3990	4168	4170	4215	5447	4912	5094	5094
EV/NCI Ex. GW	1.58x	1.76x	1.80x	1.91x	1.69x	1.36x	1.49x	1.55x	1.51x	1.64x	1.85x	1.87x	1.85x	1.97x	2.02x	1.97x	1.94x	2.31x	2.09x	1.98x	1.86x
Economic PE	23.2x	22.6x	23.0x	23.5x	22.9x	25.1x	20.1x	20.7x	21.8x	24.4x	26.0x	27.8x	27.1x	29.8x	27.2x	29.2x	71.6x	36.9x	31.6x	30.1x	26.9x
Accounting PE	16.5x	16.6x	16.5x	17.3x	16.3x	18.7x	13.8x	13.4x	13.3x	15.8x	16.5x	17.7x	16.6x	18.3x	16.7x	17.3x	31.9x	19.2x	15.5x	16.6x	15.3x
Cost of Capital	5.10%	5.05%	5.00%	4.82%	5.18%	5.48%	5.45%	5.45%	5.35%	5.20%	5.07%	4.90%	5.00%	4.95%	4.95%	4.90%	4.75%	4.35%	4.50%	4.65%	4.65%
CROCI Ex. GW	6.8%	7.8%	7.8%	8.1%	7.4%	5.4%	7.4%	7.5%	6.9%	6.7%	7.1%	6.7%	6.8%	6.6%	7.5%	6.7%	2.7%	6.3%	6.6%	6.6%	6.9%
Implied CROCI	8.1%	8.9%	9.0%	9.2%	8.8%	7.5%	8.1%	8.4%	8.1%	8.5%	9.4%	9.2%	9.2%	9.7%	10.0%	9.6%	9.2%	10.0%	9.4%	9.2%	8.6%
Implied Economic Earnings/ Economic Earnings	119%	114%	115%	113%	119%	137%	109%	113%	117%	127%	132%	136%	135%	148%	134%	143%	340%	161%	142%	140%	125%

Source: Company reports, Bloomberg Finance L.P., DWS and CROCI. The table shows aggregate data of companies in CROCI's global coverage. Data in USD as on 18 January 2023. * Displayed in today's money

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Figure 99: Information Technology CROCI

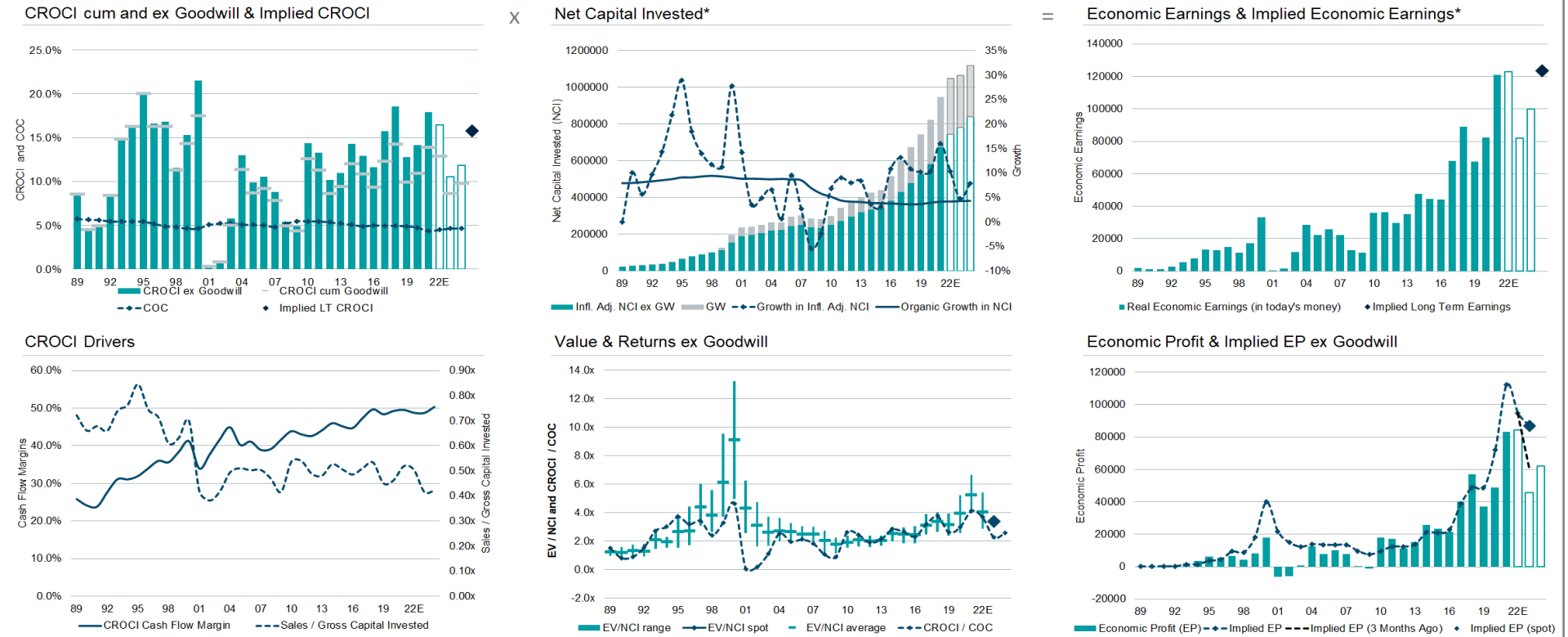


	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022E	2023E	2024E
Enterprise Value (USD bn)	1879	1937	2214	2621	2338	2030	2472	2680	2894	3118	3657	3962	4075	5343	6523	7379	9503	13075	11864	10996	10641
Market Cap (USD bn)	1951	2023	2269	2632	2275	2025	2515	2699	2926	3232	3746	4033	4091	5276	6334	7056	9179	12697	11483	10809	10809
EV/NCI Ex. GW	3.04x	3.05x	3.04x	3.15x	2.72x	2.33x	2.58x	2.62x	2.68x	2.78x	3.25x	3.40x	3.26x	3.76x	4.23x	4.46x	5.42x	6.81x	5.70x	4.82x	4.30x
Economic PE	21.5x	23.3x	22.4x	22.8x	21.8x	20.2x	17.0x	17.7x	18.0x	17.7x	20.0x	21.5x	23.0x	23.8x	23.7x	30.0x	35.4x	35.2x	31.3x	32.3x	27.3x
Accounting PE	20.1x	21.5x	19.9x	19.5x	19.5x	16.7x	13.7x	14.0x	14.1x	14.4x	15.7x	16.3x	16.8x	17.3x	17.3x	21.0x	24.7x	25.4x	22.4x	22.0x	19.1x
Cost of Capital	5.10%	5.05%	5.00%	4.82%	5.18%	5.48%	5.45%	5.45%	5.35%	5.20%	5.07%	4.90%	5.00%	4.95%	4.95%	4.90%	4.75%	4.35%	4.50%	4.65%	4.65%
CROCI Ex. GW	14.1%	13.1%	13.6%	13.8%	12.4%	11.5%	15.2%	14.8%	14.9%	15.7%	16.2%	15.8%	14.2%	15.8%	17.8%	14.9%	15.3%	19.4%	18.2%	14.9%	15.8%
Implied CROCI	15.5%	15.4%	15.2%	15.2%	14.1%	12.8%	14.0%	14.3%	14.3%	14.5%	16.5%	16.7%	16.3%	18.6%	20.9%	21.9%	25.8%	29.6%	25.6%	22.4%	20.0%
Implied Economic Earnings/ Economic Earnings	110%	118%	112%	110%	113%	111%	93%	96%	96%	92%	101%	105%	115%	118%	117%	147%	168%	153%	141%	150%	127%

Source: Company reports, Bloomberg Finance L.P., DWS and CROCI. The table shows aggregate data of companies in CROCI's global coverage. Data in USD as on 18 January 2023. * Displayed in today's money

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Figure 100: Semiconductors & Semiconductor Equipment CROCI

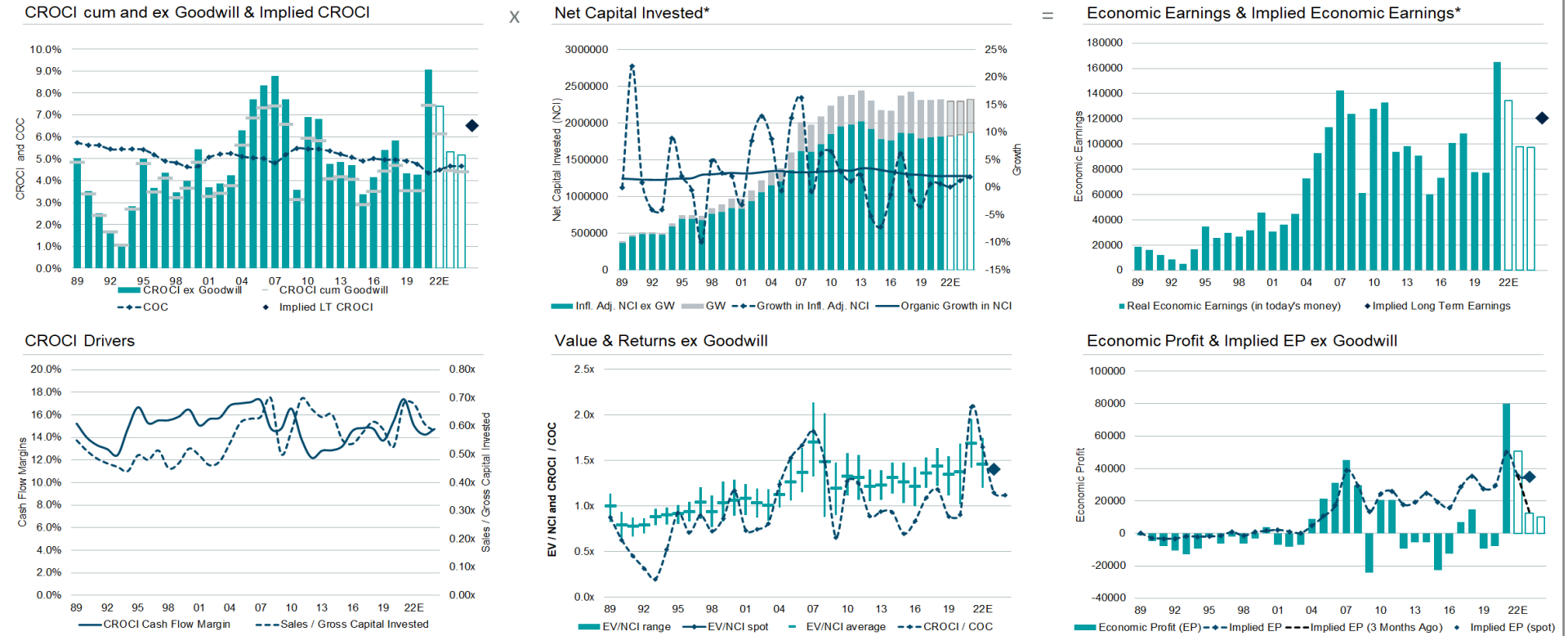


	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022E	2023E	2024E
Enterprise Value (USD bn)	433	433	451	472	373	322	379	448	470	526	694	714	784	1158	1408	1461	2043	3198	2808	2654	2593
Market Cap (USD bn)	477	487	499	520	408	358	434	491	511	576	738	758	806	1158	1370	1396	1972	3133	2750	2632	2632
EV/NCI Ex. GW	2.70x	2.63x	2.45x	2.45x	2.01x	1.74x	1.89x	2.04x	1.97x	2.01x	2.50x	2.46x	2.40x	3.10x	3.36x	3.12x	3.91x	5.21x	4.00x	3.39x	3.02x
Economic PE	20.8x	26.6x	23.3x	27.8x	37.2x	35.7x	13.2x	15.3x	19.4x	18.2x	17.5x	19.0x	20.7x	19.7x	18.1x	24.4x	27.7x	29.1x	24.2x	32.3x	25.4x
Accounting PE	21.2x	24.0x	20.7x	22.7x	32.7x	30.8x	11.8x	13.7x	17.2x	16.0x	14.8x	15.7x	15.8x	15.1x	13.4x	17.5x	20.5x	22.2x	18.5x	22.6x	18.4x
Cost of Capital	5.10%	5.05%	5.00%	4.82%	5.18%	5.48%	5.45%	5.45%	5.35%	5.20%	5.07%	4.90%	5.00%	4.95%	4.95%	4.90%	4.75%	4.35%	4.50%	4.65%	4.65%
CROCI Ex. GW	13.0%	9.9%	10.5%	8.8%	5.4%	4.9%	14.4%	13.3%	10.1%	11.0%	14.3%	12.9%	11.6%	15.7%	18.6%	12.8%	14.1%	17.9%	16.5%	10.5%	11.9%
Implied CROCI	13.8%	13.3%	12.3%	11.8%	10.4%	9.5%	10.3%	11.1%	10.5%	10.4%	12.7%	12.1%	12.0%	15.4%	16.6%	15.3%	18.6%	22.7%	18.0%	15.8%	14.0%
Implied Economic Earnings/ Economic Earnings	106%	134%	116%	134%	193%	195%	72%	84%	104%	95%	89%	93%	103%	98%	90%	120%	131%	127%	109%	150%	118%

Source: Company reports, Bloomberg Finance L.P., DWS and CROCI. The table shows aggregate data of companies in CROCI's global coverage. Data in USD as on 18 January 2023. * Displayed in today's money

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Figure 101: Materials CROCI

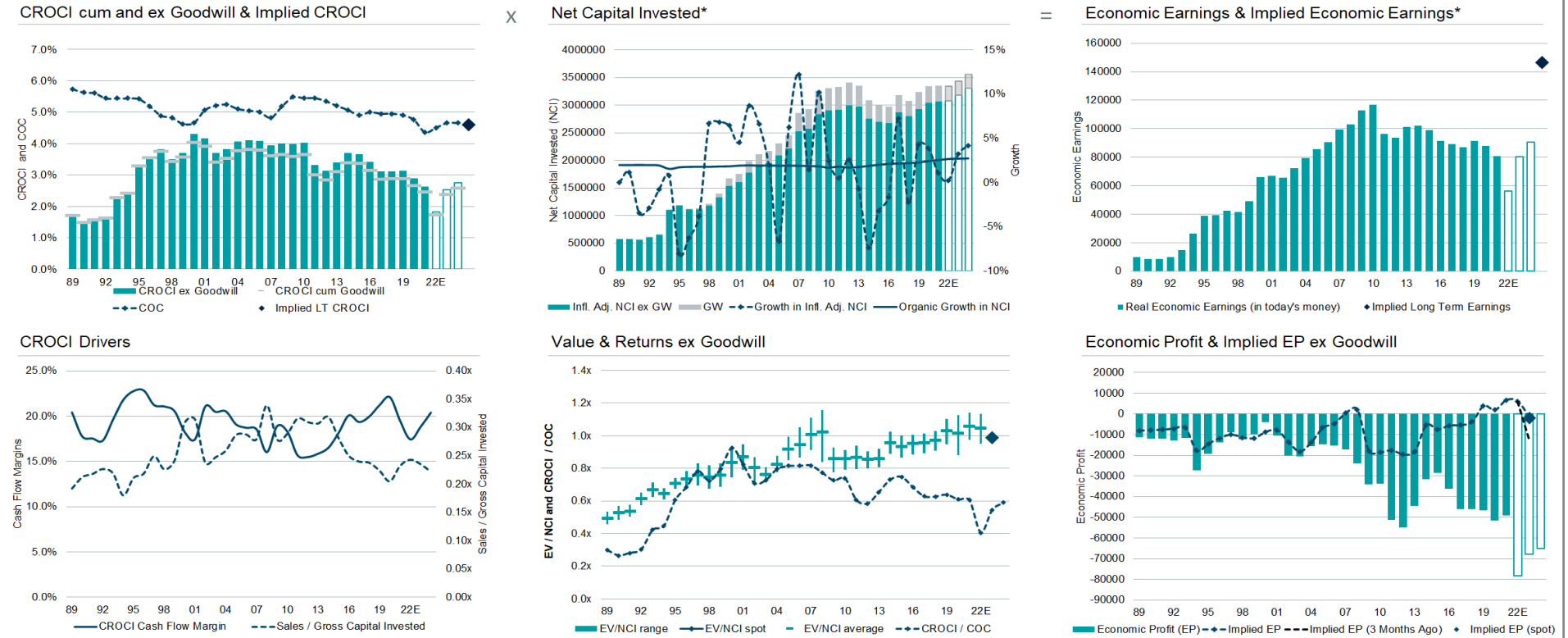


	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022E	2023E	2024E
Enterprise Value (USD bn)	854	1014	1282	1948	1744	1523	1847	1990	1902	2003	2065	1893	1821	2198	2355	2179	2276	2845	2535	2597	2534
Market Cap (USD bn)	658	842	1087	1586	1338	1109	1459	1552	1399	1481	1524	1354	1319	1721	1844	1652	1766	2342	2091	2203	2203
EV/NCI Ex. GW	1.12x	1.26x	1.37x	1.70x	1.48x	1.19x	1.32x	1.31x	1.21x	1.22x	1.31x	1.26x	1.21x	1.35x	1.43x	1.35x	1.37x	1.68x	1.45x	1.40x	1.31x
Economic PE	17.8x	16.3x	16.4x	19.4x	19.2x	33.3x	19.1x	19.3x	25.4x	25.2x	27.7x	37.3x	29.1x	25.1x	24.5x	31.1x	32.1x	18.5x	19.6x	26.4x	25.4x
Accounting PE	11.6x	10.9x	11.1x	13.3x	13.6x	19.2x	13.0x	12.6x	15.7x	16.2x	16.8x	21.2x	16.4x	14.9x	14.2x	16.8x	17.1x	10.8x	11.0x	14.4x	14.1x
Cost of Capital	5.10%	5.05%	5.00%	4.82%	5.18%	5.48%	5.45%	5.45%	5.35%	5.20%	5.07%	4.90%	5.00%	4.95%	4.95%	4.90%	4.75%	4.35%	4.50%	4.65%	4.65%
CROCI Ex. GW	6.3%	7.7%	8.3%	8.8%	7.7%	3.6%	6.9%	6.8%	4.8%	4.9%	4.7%	3.4%	4.2%	5.4%	5.8%	4.3%	4.3%	9.1%	7.4%	5.3%	5.2%
Implied CROCI	5.7%	6.3%	6.8%	8.2%	7.7%	6.5%	7.2%	7.1%	6.5%	6.4%	6.6%	6.2%	6.1%	6.7%	7.1%	6.6%	6.5%	7.3%	6.5%	6.5%	6.1%
Implied Economic Earnings/ Economic Earnings	91%	82%	82%	93%	100%	182%	104%	105%	136%	131%	140%	183%	146%	124%	121%	153%	152%	81%	88%	123%	118%

Source: Company reports, Bloomberg Finance L.P., DWS and CROCI. The table shows aggregate data of companies in CROCI's global coverage. Data in USD as on 18 January 2023. * Displayed in today's money

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Figure 102: Utilities CROCI



	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022E	2023E	2024E
Enterprise Value (USD bn)	1229	1440	1592	1965	2075	1949	2024	2073	2107	2125	2202	2148	2194	2396	2411	2711	2815	3001	3064	3149	3241
Market Cap (USD bn)	586	803	976	1213	1169	923	970	964	936	1006	1110	1074	1105	1182	1228	1416	1468	1624	1588	1576	1576
EV/NCI Ex. GW	0.82x	0.91x	0.94x	1.00x	1.02x	0.86x	0.86x	0.87x	0.85x	0.86x	0.95x	0.93x	0.95x	0.96x	0.97x	1.03x	1.01x	1.05x	1.05x	0.99x	0.95x
Economic PE	20.2x	22.2x	23.1x	25.5x	25.5x	21.5x	21.3x	26.2x	27.2x	25.2x	25.7x	25.5x	27.8x	30.7x	31.2x	32.9x	35.1x	40.1x	57.3x	39.0x	34.8x
Accounting PE	12.8x	14.7x	16.1x	17.4x	16.8x	12.6x	12.8x	17.3x	16.0x	15.5x	15.9x	14.8x	15.5x	16.5x	17.4x	18.6x	19.4x	21.8x	23.2x	18.1x	15.6x
Cost of Capital	5.10%	5.05%	5.00%	4.82%	5.18%	5.48%	5.45%	5.45%	5.35%	5.20%	5.07%	4.90%	5.00%	4.95%	4.95%	4.90%	4.75%	4.35%	4.50%	4.65%	4.65%
CROCI Ex. GW	4.1%	4.1%	4.1%	3.9%	4.0%	4.0%	4.0%	3.3%	3.1%	3.4%	3.7%	3.7%	3.4%	3.1%	3.1%	3.1%	2.9%	2.6%	1.8%	2.5%	2.7%
Implied CROCI	4.2%	4.6%	4.7%	4.8%	5.3%	4.7%	4.7%	4.7%	4.6%	4.5%	4.8%	4.6%	4.8%	4.7%	4.8%	5.0%	4.8%	4.6%	4.7%	4.6%	4.4%
Implied Economic Earnings/ Economic Earnings	103%	112%	116%	123%	132%	118%	116%	143%	146%	131%	130%	125%	139%	152%	154%	161%	167%	174%	258%	182%	162%

Source: Company reports, Bloomberg Finance L.P., DWS and CROCI. The table shows aggregate data of companies in CROCI's global coverage. Data in USD as on 18 January 2023. * Displayed in today's money

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Glossary A: Introduction to CROCI

Cash Return on Capital Invested (CROCI) is a cash-flow-based analysis which, by making a series of economic adjustments to traditional accounting data, aims to make non-financial companies comparable - regardless of industry or domicile. The main areas where the “economic data” differ from accounting data are as follows:

- Accounting for “hidden” liabilities – CROCI Enterprise Value (EV) includes not only financial liabilities (such as debt) but also operational liabilities (such as operating lease commitments, warranties, pension funding, specific provisions etc).
- Depreciating similar assets in a similar manner - Adjusting depreciation to reflect “economic depreciation” and effective useful economic life.
- Replacement value of assets – Inflating the value of net assets using the relevant inflator (based on the real age of assets).
- Unreported assets – Systematically capitalizing real cash-generative assets that are left off the balance sheet. Research and development costs and advertising are examples of such assets. In the data and charts presented throughout this document, “E” refers to financial years that are not yet reported. Data for these years are calculated by applying the CROCI model to market’s consensus estimates of accounting data. The CROCI Group does not make any forecasts or projections of accounting data.

CROCI Disclaimer

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Risk Considerations

The CROCI Model: The analysis above has been built on the CROCI premise that stocks with lower CROCI Economic P/E ratios may outperform stocks with higher CROCI Economic P/E ratios over time. This premise may not be correct and prospective investors should evaluate this assumption prior to investing based on CROCI analysis. CROCI represents one of many possible ways to analyze and value stocks. Potential investors must form their own view of the CROCI methodology and evaluate whether CROCI and investment associated with CROCI are appropriate for them. The CROCI Group does not provide investment advice.

CROCI analysis: The discussion above is based on analysis of agglomerations of the companies in the CROCI universe, which consists of over 850 companies globally. These agglomerations of companies may not be representative of the countries, regions, and sectors which they are intended to reflect.

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PAST PERFORMANCE DOES NOT PREDICT FUTURE RETURNS.

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Glossary B: CROCI & Real Value

Real Investor:

Definition: An investor whose investments are driven principally by the careful analysis of company fundamentals, including their economic cash returns and their economic valuation. Specifically, a Real Investor has two characteristics:

- 1. Fundamental:** any investment is informed or driven by the interplay between the cash flow generation, the capital intensity and the valuation of that company;
- 2. Skeptical of reported financial statements as a guide to investing:** Real Investors believe that the income statement and balance sheet in a company's accounts are not necessarily designed to be helpful to equity investors, and that a synthesis of all the notes to the accounts and diligent restatement of the accounts must happen in order to render valuations comparable and meaningful; and

Real Investors look to economic value to inform investment, and believe that the reported financial statement data may not be representative of the economic reality of a company.

Since CROCI makes adjustments to financial statements in order to include all relevant information in the notes to the accounts, and to restate the accounts in order to render economic valuations, which are meaningful and comparable, CROCI may be one valuable approach for the Real Investor.

Real Value:

Definition: Economic value as calculated by the CROCI process via the adjustments to and normalisations of reported financial statements, conducted by CROCI's team of company analysts.

Notes: The CROCI process seeks to make company financial data more consistent, comparable and economically meaningful through a series of reviews and adjustments. This contrasts with more conventional definitions of "Value" that tend to be based on accounting measures such as equity or profits.

The principal indicator of Real Value is CROCI's Economic P/E. An attractive Economic P/E ratio suggests that the market is undervaluing the cash flow being produced by the operating assets, all other things being equal. The term Real Value can therefore be used attributively to refer to companies with the lowest CROCI Economic P/E.

Rolling 12 months performance as of 30 December 2022

Name	Currency	Live Date	12/21 - 12/22	12/20 - 12/21	12/19 - 12/20	12/18 - 12/19	12/17 - 12/18	12/16 - 12/17	12/15 - 12/16	12/14 - 12/15	12/13 - 12/14	12/12 - 12/13
CROCI US Strategy	USD	2 Feb. 2004	-4.6%	29.2%	0.7%	32.6%	-10.0%	27.8%	13.5%	-7.4%	11.9%	36.6%
CROCI US Dividends Strategy	USD	13 Mar. 2012	2.8%	22.5%	5.7%	29.0%	-2.3%	20.8%	20.2%	-2.3%	9.7%	35.9%
CROCI Euro Strategy	EUR	2 Feb. 2004	-12.7%	19.7%	-0.4%	26.5%	-14.8%	19.3%	11.3%	12.1%	9.6%	22.9%
CROCI Japan Strategy	JPY	2 Feb. 2004	-0.3%	15.8%	10.4%	24.5%	-14.7%	23.2%	7.6%	5.9%	12.8%	44.1%
CROCI World EUR Strategy	EUR	29 Nov. 2010	1.9%	31.3%	0.1%	32.4%	-8.0%	10.3%	12.4%	2.1%	22.7%	23.6%
CROCI World USD Strategy	USD	29 Nov. 2010	-4.4%	22.0%	9.2%	30.0%	-12.4%	25.6%	9.1%	-8.3%	7.7%	29.2%
CROCI Sectors Plus EUR Strategy	EUR	18 Nov. 2015	6.4%	37.7%	18.6%	23.9%	-12.8%	11.9%	24.0%	-2.5%	22.7%	25.1%
CROCI Sectors Plus USD Strategy	USD	18 Nov. 2015	-0.1%	28.0%	29.3%	21.7%	-17.0%	27.4%	20.4%	-12.5%	7.7%	30.8%
CROCI Global Dividends EUR Strategy	EUR	15 Mar. 2012	4.8%	21.3%	-14.1%	28.7%	-4.8%	7.0%	17.6%	5.4%	16.9%	19.8%
CROCI Global Dividends USD Strategy	USD	15 Mar. 2012	-1.7%	12.8%	-6.4%	26.3%	-9.3%	21.9%	14.2%	-5.4%	1.3%	26.9%
CROCI Intellectual Capital EUR Strategy	EUR	15 Apr. 2019	-17.8%	29.4%	14.5%	35.9%	-0.4%	14.9%	10.6%	14.5%	25.0%	22.2%
CROCI Intellectual Capital USD Strategy	USD	15 Apr. 2019	-22.9%	20.2%	24.8%	33.4%	-5.2%	30.9%	7.3%	2.8%	9.7%	27.7%
ESTOXX 50	EUR	-	-9.5%	23.3%	-3.2%	28.2%	-12.0%	9.2%	3.7%	6.4%	4.0%	21.5%
MSCI AC World (EUR)	EUR	-	-13.0%	27.5%	6.7%	28.9%	-4.8%	8.9%	11.1%	8.8%	18.6%	17.5%
MSCI AC World (USD)	USD	-	-18.4%	18.5%	16.3%	26.6%	-9.4%	24.0%	7.9%	-2.4%	4.2%	22.8%
MSCI Japan Value	JPY	-	8.6%	18.1%	-4.3%	14.3%	-14.9%	14.5%	1.2%	11.4%	7.5%	47.7%
MSCI World (EUR)	EUR	-	-12.8%	31.1%	6.3%	30.0%	-4.1%	7.5%	10.7%	10.4%	19.5%	21.2%
MSCI World (USD)	USD	-	-18.1%	21.8%	15.9%	27.7%	-8.7%	22.4%	7.5%	-0.9%	4.9%	26.7%
MSCI World High Dividend Yield (EUR)	EUR	-	1.3%	24.4%	-8.2%	25.6%	-3.0%	3.6%	12.6%	7.8%	16.8%	16.7%
MSCI World High Dividend Yield (USD)	USD	-	-4.7%	15.8%	0.0%	23.2%	-7.6%	18.1%	9.3%	-3.2%	2.5%	21.9%
MSCI World Value (EUR)	EUR	-	-0.6%	30.9%	-9.2%	24.2%	-6.3%	2.7%	15.7%	6.0%	18.2%	21.2%
MSCI World Value (USD)	USD	-	-6.5%	21.9%	-1.2%	21.7%	-10.8%	17.1%	12.3%	-4.8%	3.7%	26.6%
S&P 500	USD	-	-18.5%	28.2%	17.8%	30.7%	-4.9%	21.1%	11.2%	0.7%	13.0%	31.5%
S&P 500 Value	USD	-	-5.9%	24.1%	0.5%	30.9%	-9.7%	14.5%	16.5%	-3.9%	11.5%	31.0%
S&P High Yield Dividend Aristocrats	USD	-	-1.1%	24.7%	1.0%	22.8%	-3.2%	15.4%	19.6%	-1.2%	13.3%	29.5%
TOPIX 100	JPY	-	-3.2%	15.6%	8.9%	19.5%	-14.3%	19.5%	0.1%	10.0%	8.5%	54.9%

Source: DWS, Bloomberg, Factset, Performance data before live date is simulated and was calculated by means of retroactive application of the Strategy/Index model. All returns in respective currency, include reinvested dividends (net of withholding tax) but do not include fees that might be charged on an investment product. It is not possible to invest directly in a strategy. The performance shown here is for model portfolios. The performance of any actual investment products may differ significantly. The CROCI team does not provide investment advice, stock recommendations or act in any other fiduciary capacity. This information is intended for informational purposes only and does not constitute investment advice, a recommendation, an offer or solicitation. No distribution is allowed into the USA.

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Further Information:

CROCI Team

crocivaluations@dws.com