

Materials Industry Operating Benchmarks

**Operational and market capitalization data for 256
Materials companies**

Version 2025.1.1

2-Dec-2025



Version

VERSION	DATE	NOTES
2021.1.1	04.01.21	Initial version, dated 04.01.21
2021.2.1	06.25.21	Updated financial and market cap data for 06.25.21. Removed companies that merged or were taken private.
2021.3.1	11.30.21	Updated financial and market cap data for 11.30.21. Removed companies that merged or were taken private.
2022.1.1	01.01.22	Updated financial and market cap data for 01.01.22. Added companies and removed those that merged or were taken private.
2022.2.1	05.16.22	Updated financial and market cap data for 05.16.22. Added companies and removed those that merged or were taken private.
2022.2.2	10.07.22	Updated financial and market cap data for 10.07.22. Added companies and removed those that merged or were taken private.
2023.1.1	12.01.23	Updated financial and market cap data for 12.01.23. Added companies and removed those that merged or were taken private.
2025.1.1	12.02.25	Updated financial and market cap data for 12.02.25. Added companies and removed those that merged or were taken private.

Versioning convention: This document is versioned as follows: **YYYY.N.n**, where **YYYY** is the year, **N** is the major release number, and **n** is the minor release number. A major release includes one or more of the following: the number of companies changes; reports and analyses change; financial and market cap information are updated, and a new date is attached to the report. A minor fixes errors, including data errors, formatting errors, and inconsistencies.

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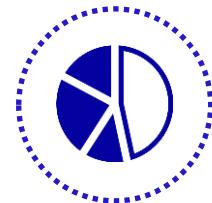
2025 Materials Industry Report: Key Takeaways

- The Materials industry 3-year CAGR is 5.5% (overall dollars growth). The average company 3-year CAGR is 2.0%
- The average Materials company has gross margins of 23.0%, invests 8.4% of revenue in selling, general, and administrative expense, 1.1% in research and development, and generates 13.7% operating margin, 22.5% EBITDA margin, 4.9% free cash flow, and 8.5% return on invested capital.
- The Materials company average inventory turns is 5.1. The median is 4.7. The difference between the average and the median indicates a few outliers raise the average. The median is more in line with the industry operational structure.
- The average Materials company has 100.9% PP&E, and 11.7% in goodwill, and intangibles, all as a percentage of revenue. Goodwill and intangibles are a proxy for mergers and acquisitions; based on this measure, Materials is among the lowest industries in mergers and acquisitions. While many industries exhibit characteristics of the “intangibles economy,” Materials industries would be characterized as asset-intensive based on the level of fixed assets as a percentage of revenue.
- As expected, Materials companies that lead in operating profit, net profit, cash flow, and return on investment (ROA, ROIC, economic profit) are also leaders in market cap multiple.
- Materials companies with higher inventory turns tend to have significantly lower market cap multiples than companies with lower inventory turns. This is an indication that inventory turns is a poor indicator of company market performance. (Note: controlling for gross margin yields the same conclusion).
- Materials companies remain very asset-intensive, with a high percentage of assets relative to revenue, along with significant CAPEX to remain competitive with those assets. That said, materials companies generate significant operating margins and return on investment.
- Historical analysis (using aggregate data and ratios) indicates the operational structure is essentially the same as it was a decade ago. This includes similar gross margins, operating margins, asset intensity, inventory turns, and cash flows. This indicates the industry has a certain physical setpoint and that there are individual winners and losers around that setpoint, but that the overall industry is not operationally performing better than it was a decade ago.
- Individual operational measures are poor statistical predictors of market cap multiple. Quartile analysis was performed to contrast the operational characteristics of market cap multiple leaders with others.
- Market cap multiple leaders have cap multiples that are 2.5X average and 18.3X laggards. Leaders have significantly higher gross margins, invest significantly more in CAPEX, and generate significantly higher operating margins, cash flow, and return on investment (ROA, ROIC, and economic profit).
- From a supply chain management perspective, data in this report supports the thesis that market leaders run their supply chains with more of a profit center mentality than a cost center mentality, which has historically been the case. This further suggests supply chain management has evolved to a sophisticated multivariate decision science, rather than a unidimensional cost management function.

Data Set

Information on the companies and the data set used in the analysis.

Data Set



COMPANIES

The data set includes 256 publicly-traded Materials companies.

256



REVENUE

Aggregate revenue for companies in the data set is \$2.1 trillion for the latest reporting fiscal year as of the date on the cover of this report.

\$2.1T



MARKET CAPITALIZATION

Aggregate market cap for companies in the data set is \$3.1 trillion as of date on the cover of this report.

\$3.1T

Notes:

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2. All market capitalizations are as of the date on the cover of this report.
3. M=million; B=billion; T=trillion.

Data Set

Companies included in this report

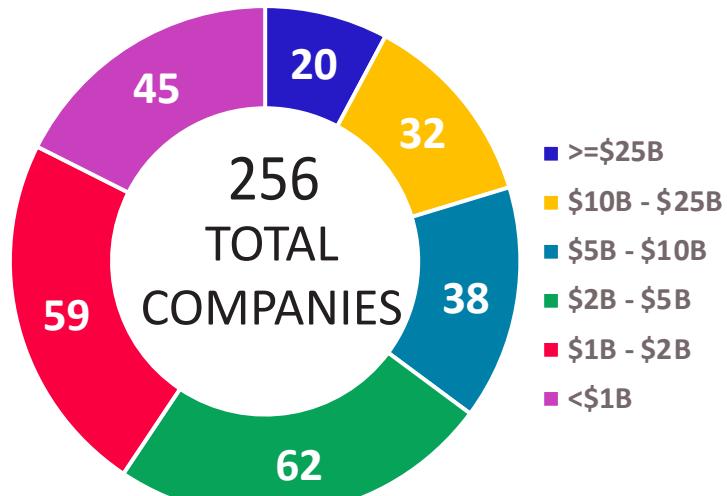


Acerinox SA	Asia Cement (China) Hol	China Oriental Group Co	Eramet SA	Holcim Ltd.	Lundin Gold, Inc.	Nittetsu Mining Co., Lt	PT Semen Indonesia (Per	Stanmore Resources Ltd.	Tokyo Steel Manufacturi	Xinyi Glass Holdings Lt
African Rainbow Mineral	Aura Minerals, Inc.	China Resources Buildin	Eregli Demir ve Çelik F	Holmen AB	Lundin Mining Corp.	Norsk Hydro ASA	PT Timah Tbk	Steel Dynamics, Inc.	Torex Gold Resources, I	Yamato Kogyo Co., Ltd.
Agnico Eagle Mines Ltd.	B2Gold Corp.	China Shanshui Cement G	Evolution Mining Ltd.	Hudbay Minerals, Inc.	Maanshan Iron & Steel C	Northam Platinum Holdin	PT United Tractors Tbk	Stella-Jones, Inc.	Triumph New Energy Co.,	YODOKO Ltd.
Aichi Steel Corp.	Barrick Mining Corp.	China Steel Corp.	Ferrexpo Plc	IAMGOLD Corp.	Macmahon Holdings Ltd.	Northern Star Resources	PT Vale Indonesia Tbk	Stora Enso Oyj	UFP Industries, Inc.	Zhaojin Mining Industry
Alamos Gold, Inc.	BBMG Corp.	CITIC Resources Holding	Ferroglobe PLC	Iluka Resources Ltd.	Magnera Corp.	Nucor Corp.	Ramaco Resources, Inc.	Sumitomo Metal Mining C	UltraTech Cement Ltd.	Zijin Mining Group Co.,
Albany International Co	BHP Group Ltd.	Clearwater Paper Corp.	First Majestic Silver C	Imerys SA	Major Drilling Group In	OceanaGold Corp.	Ramelius Resources Ltd.	Sumitomo Osaka Cement C	Unifi, Inc.	Zimplats Holdings Ltd.
Alcoa Corp.	Billerud AB	Cleveland-Cliffs, Inc.	First Quantum Minerals	Impala Platinum Holding	Martin Marietta Materia	Oji Holdings Corp.	Regis Resources Ltd.	SunCoke Energy, Inc.	UPM-Kymmene Oyj	
Algoma Steel Group, Inc	BlueScope Steel Ltd.	CMOC Group Ltd.	Fletcher Building Ltd.	Industrias CH SA de CV	Maruichi Steel Tube Ltd	Olympic Steel, Inc.	Reliance, Inc.	Suzano SA	Usinas Siderurgicas de	
Alleima AB	Boise Cascade Co.	Coats Group Plc	Fortescue Ltd.	Industrias Peñoles SAB	Materion Corp.	OM Holdings Ltd.	Resolute Mining Ltd.	Svenska Cellulosa AB SC	Vale SA	
Allied Gold Corp. (Cana	Boliden AB	Coeur Mining, Inc.	Fortuna Mining Corp.	Interfor Corp.	Mercer International, I	Origin Enterprises Plc	Rio Tinto Ltd.	Sylvamo Corp.	Vallourec SA	
Alpha Metallurgical Res	Breedon Group Plc	Commercial Metals Co.	Freeport-McMoRan, Inc.	James Hardie Industries	Metallus, Inc.	Outokumpu Oyj	Rio Tinto Plc	Taiheiyo Cement Corp.	Valterra Platinum Ltd.	
Alphamin Resources Corp	Buzzi SpA	Companhia Siderurgica N	Fresnillo Plc	JFE Holdings, Inc.	Minera Frisco SAB de CV	Pacific Textiles Holdin	Royal Gold, Inc.	Tata Steel Ltd.	Vault Minerals Ltd.	
Aluminum Corp. of China	Canfor Corp.	Compañía de Minas Buena	GCC SAB de CV	Jiangxi Copper Co., Ltd	Mineral Resources Ltd.	Pan African Resources P	Salzgitter AG	TCC Group Holdings CO.,	Vesuvius Plc	
AMG Critical Materials	Canfor Pulp Products, I	Compass Minerals Intern	Genesis Minerals Ltd.	Kaiser Aluminum Corp.	Mineros SA	Pan American Silver Cor	Sandfire Resources Ltd.	Teck Resources Limited	Vicat SA	
Amrize Ltd.	Capstone Copper Corp.	Constellium SE	Gerdau SA	KGHM Polska Miedz SA	Mitsubishi Materials Co	Perenti Ltd.	Sappi Ltd.	Tecnoglass, Inc.	voestalpine AG	
Angang Steel Co., Ltd.	Cementir Holding NV	Coronado Global Resourc	Glencore Plc	Kinross Gold Corp.	MMG Ltd.	Perseus Mining Ltd.	Seiren Co., Ltd.	Tekfen Holding AS	Vulcan Materials Co.	
Anglo American Plc	Cementos Argos SA	Corporación Moctezuma S	Gold Fields Ltd.	Klabin SA	Mondi Plc	POSCO Holdings, Inc.	Shenzhou International	Ternium SA	Warrior Met Coal, Inc.	
Anglogold Ashanti Plc	Cementos Pacasmayo SAA	CRH Plc	Grasim Industries Ltd.	Klöckner & Co. SE	Mongolian Mining Corp.	PPC Ltd.	Shougang Fushan Resourc	Texwinca Holdings Ltd.	Webco Industries, Inc.	
Anhui Conch Cement Co.,	CEMEX SAB de CV	Daido Steel Co., Ltd.	Grupo México S.A.B. de	Knife River Corp.	New Gold, Inc.	Press Metal Aluminium H	Sibanye Stillwater Ltd.	Tharisa Plc	West China Cement Ltd.	
Antofagasta Plc	Centerra Gold, Inc.	DOWA HOLDINGS Co., Ltd	Grupo SIMEC SAB de CV	Kobe Steel, Ltd.	Newmont Corp.	PT Aneka Tambang Tbk	Simpson Manufacturing C	The Japan Wool Textile	West Fraser Timber Co.	
Aperam SA	Century Aluminum Co.	DPM Metals, Inc.	Harmony Gold Mining Co.	Kumba Iron Ore Ltd.	Nexa Resources SA	PT Indah Kiat Pulp & Pa	Sims Ltd.	The Navigator Co. SA	Western Forest Products	
Aquaflil SpA	Champion Iron Ltd.	Eagle Materials, Inc.	Hecla Mining Co.	KWS SAAT SE & Co. KGaA	Nickel Industries Ltd.	PT Indocement Tunggal P	South32 Ltd.	Titan America SA	Westgold Resources Ltd.	
ArcelorMittal SA	China Gold Internationa	Eldorado Gold Corp.	Heidelberg Materials AG	Lee & Man Paper Manufac	Nine Dragons Paper Hold	PT Krakatau Steel (Pers	Southern Copper Corp.	Titan SA	Wheaton Precious Metals	
ArcelorMittal South Afr	China Hongqiao Group Lt	Endeavour Mining Plc	Hochschild Mining Plc	Lingbao Gold Group Co.	Nippon Paper Industries	PT Merdeka Copper Gold	SSAB AB	Toho Titanium Co., Ltd.	Wienerberger AG	
Aris Mining Corp.	China National Building	Equinox Gold Corp.	Hokuetu Corp.	Loma Negra Compañía Ind	NIPPON STEEL CORP.	PT Pabrik Kertas Tjiwi	SSR Mining, Inc.	Toho Zinc Co., Ltd.	Worthington Steel, Inc.	

Data Set

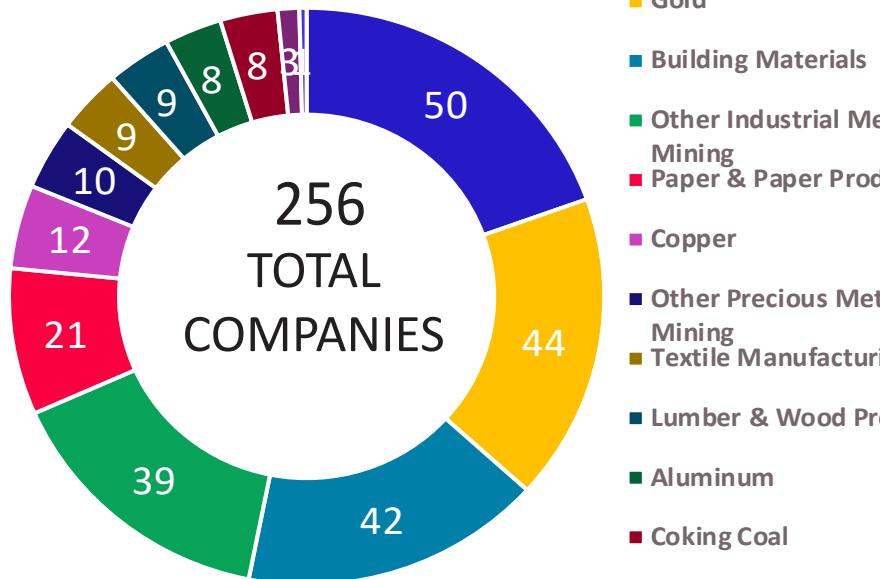
Company distribution

BY ANNUAL REVENUE

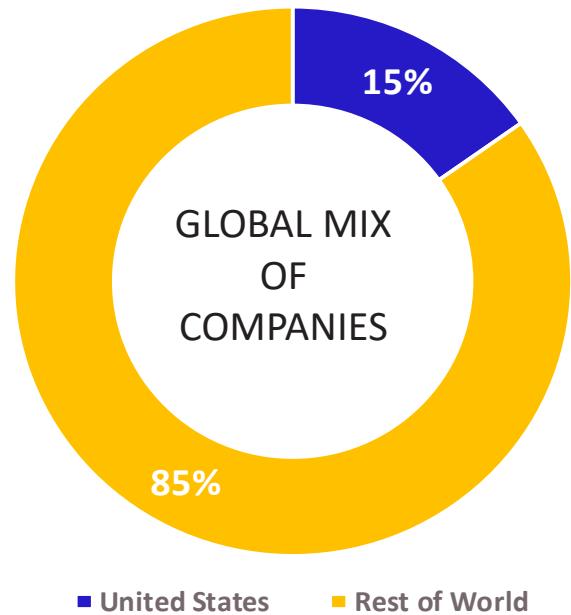


MEDIAN REVENUE = **\$4,490M**

BY SUB-INDUSTRY



GEOGRAPHIC REGION



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Data Set

Index of key metrics included in this report

This report provides analysis of the following variables (and derivatives) for trailing twelve months (TTM) results and for the past ten years.

OPERATIONS	ASSETS	CASH FLOW	ROI	VALUATION
REVENUE	TOTAL ASSETS	OPERATING CASH FLOW	RETURN ON ASSETS (ROA)	MARKET CAPITALIZATION
GROWTH RATE	CASH AND CASH EQUIVALENTS	FREE CASH FLOW	RETURN ON INVESTED CAPITAL (ROIC)	ENTERPRISE VALUE (EV)
GROSS MARGIN	DEBT AND DEBT RATIOS	CAPITAL EXPENDITURES (CAPEX)	RETURN ON CAPITAL EMPLOYED (ROCE)	MARKET CAP / REVENUE
SALES AND MARKETING	EQUITY	DAYS IN RECEIVABLES	ECONOMIC PROFIT (EP)	ENTERPRISE VALUE / REVENUE
GENERAL AND ADMINISTRATIVE	PROPERTY, PLANT, AND EQUIPMENT (PP&E)	DAYS IN PAYABLES	RETURN ON OPERATING ASSETS (ROOA)	MARKET CAP / EBITDA
RESEARCH & DEVELOPMENT	GOODWILL & INTANGIBLES	INVENTORY TURNS	RETURN ON FIXED ASSETS (ROFA)	ENTERPRISE VALUE / EBITDA
REVENUE PER EMPLOYEE	OPERATING ASSETS	CASH CONVERSION CYCLE	RETURN ON PHYSICAL ASSETS (ROPA)	MARKET CAP / NET INCOME
STOCK COMPENSATION	INVESTED CAPITAL			ENTERPRISE VALUE / NET INCOME
GROSS MARGIN ROI	CAPITAL EMPLOYED			
TURN AND EARN	INVENTORY			
	DEFERRED TAX ASSETS			
	RECEIVABLES			
	PAYABLES			
PROFIT				
OPERATING PROFIT				
NET OPERATING PROFIT AFTER TAXES (NOPAT)				
EARNINGS BEFORE INTEREST AND TAXES (EBIT)				
EARNINGS BEFORE INTEREST, TAXES, AND AMORTIZATION (EBITDA)				
ADJUSTED EBITDA				
NET PROFIT				
TAX RATE				

Notes:

1. For definitions and notes on these metrics and their use in this report, refer to the [Appendix](#).

Data Set

Three different analysis approaches in this analysis

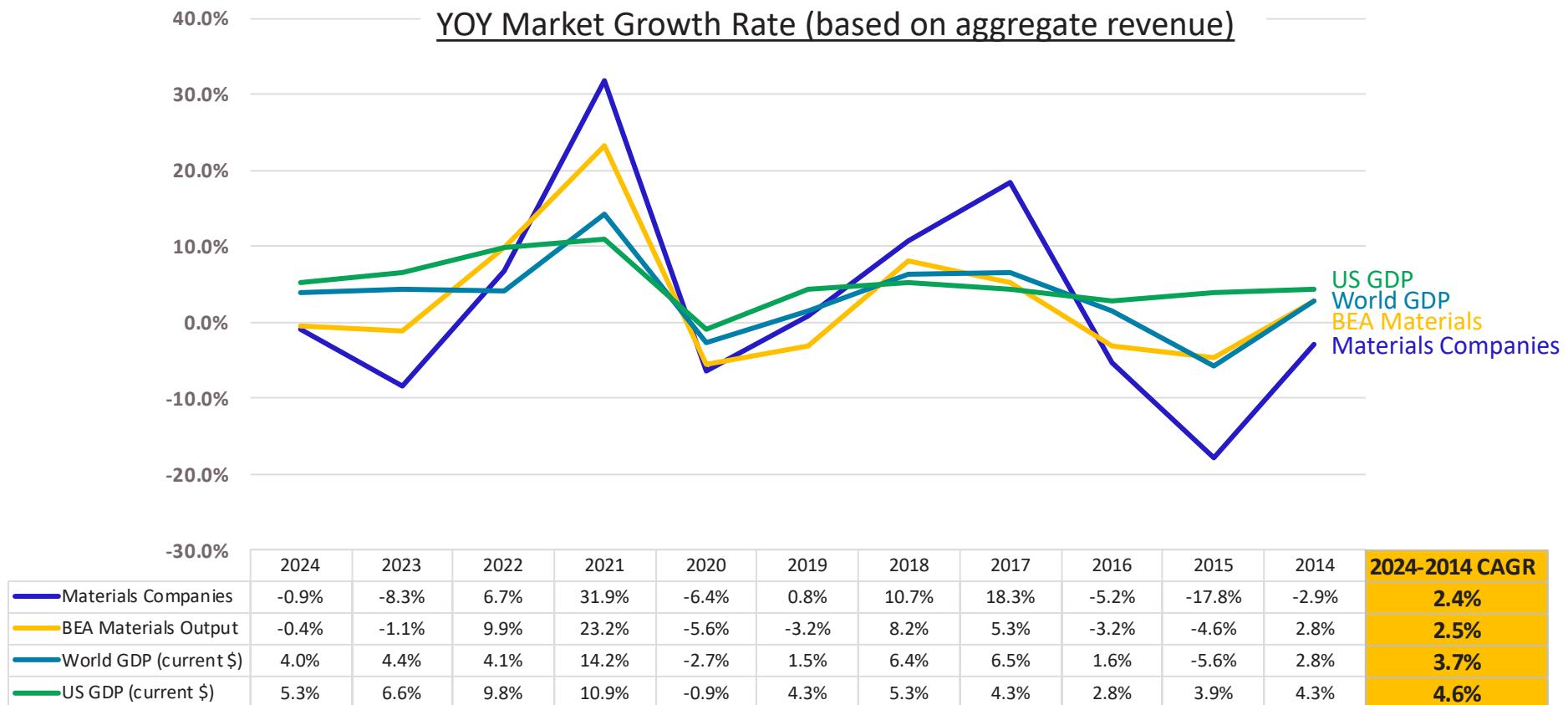


APPROACH	DESCRIPTION	EXAMPLE	GOOD FOR
1. Aggregate averages	Averages are computed by adding up all numbers from all companies. For example, the gross margin for the industry would be the sum of all revenue for all companies minus the sum of all COGS for all companies (divided by the sum of all revenue for all companies).	Average Gross Margin % = (sum of all revenues minus sum of all COGS) / sum of all revenues	Overall industry structure and operations; smooths outliers.
2. Averages of percentages	Averages are computed by taking the averages of all percentages for all the companies. For example, the average gross margin % is the sum of all gross margin %s for all companies divided by the number of companies.	Average Gross Margin % = (sum of all gross margin %s) / (number of companies)	Comparison across companies.
3. Quartile analysis	The market cap multiples of all companies are divided into quartiles. The operating characteristics of the top quartile companies are compared to the others. Likewise, measures for each company are divided into quartiles and the average market cap multiple within each quartile is shown.	<ol style="list-style-type: none">1) Isolate each quartile of market cap multiples; compare gross margin of leaders to others.2) Isolate each quartile of gross margin; display average market cap multiple within each gross margin quartile.	Understanding characteristics of leaders.

Overall Market

Summary of the market using the companies in this report as a proxy for the overall Materials market. Charts in this section use the “aggregate averages” approach.

Overall Market YOY growth rates, past ten years



NOTES & INSIGHTS

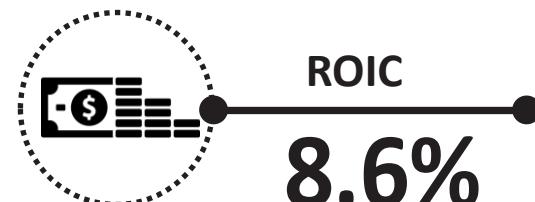
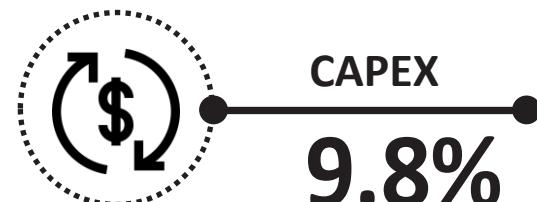
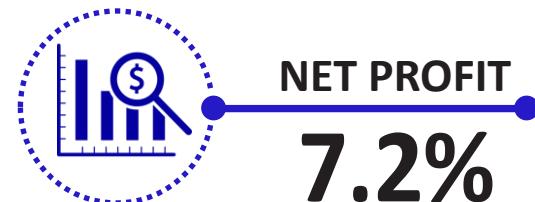
- Materials market CAGR for the past decade was lower than the global current dollar GDP growth rate. Materials YOY growth rates are highly variable, consistent with fluctuations in pricing in commodities markets. CAGR is skewed because of the volatility and dislocation caused by the pandemic.
- BEA numbers are for US domestic manufacturing only. They are shown here for comparison purposes only.

Notes:

- "Materials Companies" represents all companies in the data set for which there are year-over-year revenue numbers. The number of companies varies from year-to-year based on companies going public and some companies merging or being taken private as the decade progresses.
- "BEA Materials Output" growth is calculated from the US Bureau of Economic Analysis (<https://apps.bea.gov/iTable/iTable.cfm?reqid=150&step=2&isuri=1&categories=gdpind>), GDP by Industry. Materials output as defined here is based on output of the following sub-industries: Wood products; Nonmetallic mineral products; Primary metals; Paper products. BEA updates its past numbers periodically, so past reports may not reflect the same past BEA numbers.
- World GDP and US GDP numbers are sourced from The World Bank (data.worldbank.org)
- World GDP and US GDP growth rates are based on *current* dollars. This means they have not been adjusted for inflation. *Current* numbers are used to ensure apples-to-apples comparisons with Materials market growth rates. Note that GDP growth rates are typically reported in constant dollars pegged to a certain year in order to account for the effect of price inflation. Thus, GDP growth rates commonly reported in media are typically lower than those shown here.

Analysis Summary

Operational ratios based on aggregate data, TTM¹



Notes:

1. All revenue and cost numbers are aggregate values for all companies for the trailing twelve months (TTM) as of the date on the cover of this report.

2. Growth rate is based on total dollars growth of the industry over the past four years.

3. Market capitalization ratio is aggregate market capitalization for all companies as of the date on the cover of this report divided by total revenue for all companies on TTM basis.

Overall Market

Historical key metrics based on aggregate data, past ten years



	METRIC	TTM	2024	2023	2022	2021	2020	2019	2018	2017	2016	2015	2014	AVG14-24	HISTORY	2013	2000
		2024	2023	2022	2021	2020	2019	2018	2017	2016	2015	2014	AVG14-24	2013	2000		
OPERATIONS	Growth Rate (3YRCAGR)	5.0%	5.5%	4.6%	7.8%	8.9%	4.9%	5.8%	0.6%	-2.9%	-5.2%	-17.8%	-2.9%	0.9%			
	Gross Margin	20.3%	19.1%	19.1%	22.7%	26.7%	21.2%	18.6%	20.1%	19.4%	17.2%	15.0%	17.5%	19.7%	17.5%	21.9%	
	SG&A % of Revenue	7.6%	6.9%	6.7%	6.3%	6.2%	7.6%	7.3%	7.5%	7.9%	8.3%	8.3%	7.4%	7.3%	7.2%	8.1%	
	R&D % of Revenue	0.8%	0.8%	0.7%	0.6%	0.6%	0.7%	0.6%	0.6%	0.6%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	
	Inventory Turns (COGS/Inv)	4.5	4.7	4.5	4.6	4.5	4.5	5.0	4.8	4.7	4.7	5.2	5.2	4.8	5.3	5.1	
	Days in Inventory	80.4	77.2	80.4	78.8	80.4	81.8	73.4	76.2	77.1	77.7	70.1	70.7	76.7	69.4	71.0	
	Revenue / Employee (\$K)	\$499	\$497	\$515	\$570	\$539	\$411	\$442	\$436	\$416	\$350	\$356	\$437	\$452	\$438	\$208	
PROFIT & CASH FLOW	Operating Income	12.5%	12.0%	12.0%	16.2%	20.2%	13.2%	10.8%	12.6%	11.9%	8.7%	6.4%	9.8%	12.2%	10.1%	11.3%	
	Net Profit	7.2%	6.6%	7.0%	11.8%	14.2%	6.0%	5.6%	8.3%	7.3%	3.3%	-3.9%	3.3%	6.3%	1.0%	7.1%	
	EBITDA	19.1%	19.3%	18.3%	22.0%	26.0%	20.6%	17.5%	18.9%	19.1%	16.8%	14.3%	16.5%	19.0%	16.2%	19.3%	
	Operating Cash Flow	15.6%	15.1%	14.7%	15.2%	19.1%	16.7%	14.5%	13.4%	14.1%	13.1%	13.2%	12.6%	14.7%	12.3%	15.4%	
	FCF % of Revenue	5.8%	5.3%	5.5%	7.3%	11.8%	8.5%	6.8%	6.3%	7.3%	5.1%	3.4%	2.8%	6.4%	0.1%	6.9%	
	CAPEX % of Revenue	9.8%	9.8%	9.2%	7.9%	7.3%	8.2%	7.7%	7.1%	6.8%	8.0%	9.8%	9.8%	8.3%	12.2%	8.5%	
	Stock Compensation	0.5%	0.4%	0.4%	0.3%	0.4%	0.4%	1.3%	0.4%	0.4%	0.4%	0.4%	0.4%	0.5%	0.4%		
	Days in Receivables	33.3	30.1	31.1	30.1	32.2	36.9	34.2	36.1	39.1	40.6	36.4	36.1	34.8	38.0	59.1	
	Days in Payables	47.1	41.6	42.6	42.4	45.4	47.0	42.7	44.9	46.8	51.5	45.2	43.6	44.9	43.9	49.2	
	Cash-to-Cash Cycle (Days)	66.6	65.6	68.9	66.5	67.2	71.7	64.9	67.4	69.4	66.8	61.3	63.2	66.6	63.5	80.8	
ASSETS	Property, Plant, Equipment %	77.4%	73.9%	71.1%	61.9%	65.2%	83.1%	75.5%	71.5%	80.4%	90.8%	87.5%	80.7%	76.5%	80.1%	84.2%	
	Cash % of Revenue	15.5%	14.4%	14.8%	14.2%	16.6%	19.2%	13.9%	13.6%	14.7%	14.6%	12.8%	11.7%	14.6%	11.3%	10.6%	
	Debt % of Revenue	39.3%	36.5%	35.7%	30.6%	33.7%	46.4%	41.0%	39.4%	44.4%	53.3%	52.9%	46.9%	41.9%	46.8%	58.0%	
	Goodwill and Intangibles % of	13.2%	11.7%	11.7%	9.9%	10.3%	13.0%	11.1%	11.4%	12.7%	14.8%	13.5%	11.8%	12.0%	11.7%	10.3%	
ROI	ROIC	8.6%	8.9%	9.2%	14.0%	16.5%	8.7%	6.3%	8.6%	7.7%	4.7%	3.7%	6.9%	8.7%	7.2%	11.0%	
	ROCE	10.3%	9.9%	10.1%	15.5%	18.4%	9.7%	9.0%	10.8%	9.4%	6.2%	4.8%	8.0%	10.2%	8.2%	10.1%	
	ROA	4.6%	4.4%	4.7%	9.0%	10.2%	3.6%	3.7%	5.6%	4.6%	1.9%	-2.3%	2.2%	4.3%	0.6%	4.5%	
	ROOA	7.9%	8.1%	8.3%	12.5%	14.5%	7.7%	5.6%	7.8%	6.7%	4.2%	3.4%	6.1%	57.6%	6.3%	6.8%	
	EP	-0.2%	0.8%	-1.0%	7.2%	10.5%	1.5%	-3.4%	-0.2%	-0.6%	-5.1%	-5.8%	-2.3%	0.1%	-2.1%	1.4%	

NOTES & INSIGHTS

- This chart shows the operational structure of the industry today and for the past decade.
- These data indicate that the operational structure of the industry has remained relatively constant for the past decade.
- This indicates that industry operates around a certain "setpoint" driven by physics and physical characteristics.
- That said, individual companies deviate significantly from the overall structural setpoint, resulting in significantly different company-level operational results (next section).
- The final three years of CAGR are one-year growth rates (due to lack of data).
- Historical numbers beyond ten years have fewer companies and need further analysis for apples-to-apples comparisons.

Analysis Summary

Charts that summarize key variables in the report.

Charts in this section use the “averages of percentages” approach. In other words, it shows the averages of all percentages for all companies. (These numbers will differ from industry structural numbers in the previous section)

Analysis Summary

Average and median for different variables, TTM



The table below contains the average and median values for the 256 companies investigated. This shows that the average Materials company operates with a gross margin of **23.0%**, spends **8.4%** of revenue on SG&A, **1.1%** on R&D, and has inventory turns of **5.1**, operating income of **13.7%**, net income of **8.1%**, free cash flow of **4.9%**, and return on invested capital of **8.5%**.

	REVENUE (TTM)		OPERATIONS			PROFIT AND CASH				ROIC
	Annual Revenue (\$M)	3-Year CAGR	Gross Margin	SG&A	R&D	Inventory Turns	Operating Income	Net Income	Free Cash Flow	
Average	\$8,038	2.0%	23.0%	8.4%	1.1%	5.1	13.7%	8.1%	4.9%	8.5%
Median	\$2,516	0.3%	20.1%	6.4%	0.6%	4.7	9.4%	5.9%	4.2%	7.0%

Notes:

1. TTM = trailing twelve months. All revenue and cost numbers are based on trailing twelve months results as of the date on the cover of this report. This report provides the averages of the percentages of all companies, including outliers.
2. Growth rate is based on the past four years of financial results
3. All percentage numbers are a percentage of revenue. Average is the average of all the percentages for each of the companies.

Analysis Summary

Average values by revenue quartile, TTM¹



Performance across the revenue quartiles is remarkably consistent. Gross margin, inventory turns, operating income and return on invested capital are similar across the revenue bands.

All numbers are averages within each quartile

#	REVENUE (TTM)		MKT CAP	OPERATIONS				PROFIT AND CASH				ROIC
	Revenue(\$M)	3-Year CAGR	Mkt Cap/Revenue	Gross Margin	SG&A	R&D	Inventory Turns	Operating Income	Net Income	Free Cash Flow		
Quartile 4	64	\$24,808	-1.5%	1.5	22.0%	8.3%	0.7%	4.9	13.1%	8.0%	5.8%	8.3%
Quartile 3	64	\$4,687	-0.8%	1.8	20.7%	7.7%	0.6%	5.0	12.4%	5.8%	4.6%	8.0%
Quartile 2	64	\$1,844	6.4%	2.6	24.8%	9.4%	1.7%	5.1	13.9%	8.6%	5.1%	7.5%
Quartile 1	64	\$813	3.9%	2.7	24.5%	8.3%	1.8%	5.6	15.3%	9.8%	4.3%	10.2%

REVENUE QUARTILES (\$M)

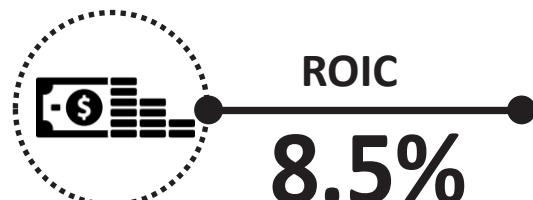
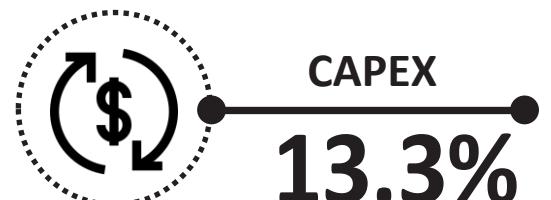
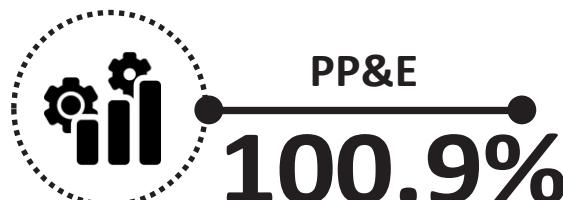
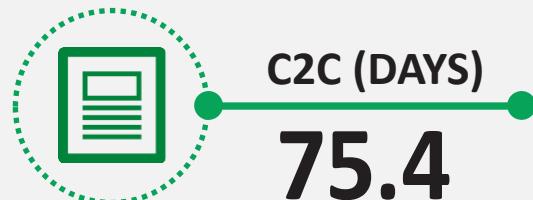
Quartile 4 >= \$7,819
 Quartile 3 >= \$2,516, < \$7,819
 Quartile 2 >= \$1,232, < \$2,516
 Quartile 1 < \$1,232

Notes:

1. TTM = trailing twelve months. All revenue and cost numbers are based on trailing twelve months results as of the date on the cover of this report. This report provides the averages of the percentages of all companies, including outliers.
2. Growth rate is based on the past four years of financial results
3. All percentage numbers are a percentage of revenue. Average is the average of all the percentages for each of the companies.

Analysis Summary

Average numbers for the entire data set, TTM¹

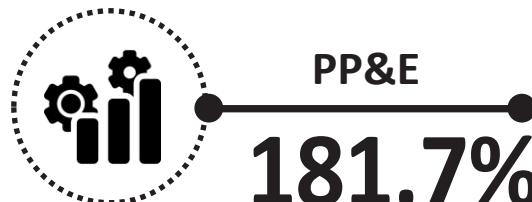
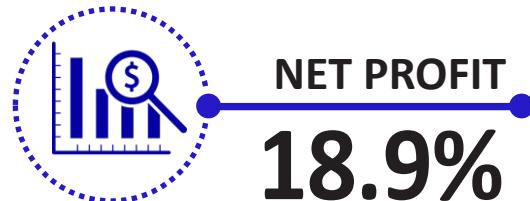


Notes:

1. All revenue and cost numbers are based on trailing twelve months (TTM) results as of the date on the cover of this report for all companies in the data set.
2. All ratios shown here are averages of the ratios of each company.

Analysis Summary

Average numbers for the top-quartile market cap¹ multiple leaders



Notes:

1. All revenue and cost numbers are based on trailing twelve months (TTM) results as of the date on the cover of this report for all companies in the top quartile of market cap multiple performance.
2. All ratios shown here are averages of the ratios of each company.

Analysis Summary

Key metric benchmarks and relationship to market cap multiple



Average metric value within the quartile and corresponding average market cap within the quartile

		INDUSTRY BENCHMARKS			MARKET CAP MULTIPLE	
		Q4 AVG	MEDIAN	Q1 AVG	Q4 AVG	Q1 AVG
OPERATIONS	3-Year CAGR	20.5%	0.3%	-12.8%	3.4	1.3
	Gross Margin	44.4%	20.1%	5.0%	4.1	0.8
	SG&A	18.9%	6.4%	1.9%	1.3	3.3
	R&D	2.9%	9.4%	0.1%	1.5	1.3
	Operating Margin	34.5%	9.4%	-1.3%	4.7	0.7
	EBITDA Margin	48.5%	17.8%	4.6%	4.5	0.6
	Net Profit Margin	24.6%	5.9%	-5.2%	4.7	1.1
	Free Cash Flow	20.6%	4.2%	-9.9%	4.3	1.5
	CAPEX % of Revenue	30.2%	9.3%	3.6%	4.3	0.9
	PP&E (net) % of Revenue	215.3%	73.2%	32.5%	4.2	0.8
ROI	ROIC % of Revenue	21.9%	7.0%	-1.6%	3.9	1.1
	ROCE % of Revenue	23.2%	8.2%	-1.8%	3.9	1.1
	ROA % of Revenue	12.3%	3.6%	-4.0%	3.9	1.1
	EP % of Revenue	12.6%	-1.8%	-14.2%	4.2	1.8
	ROOA % of Revenue	26.3%	8.0%	-1.3%	3.6	0.8
	ROPA % of Revenue	31.9%	11.0%	-1.6%	3.1	1.1
C2C	Inventory Turns	8.7	4.7	2.5	2.2	1.8
	Payables (days)	159.4	78.4	45.3	1.8	2.2
	Receivables (days)	104.6	37.6	9.9	1.6	3.4
	Cash-to-Cash (days)	76.4	68.3	10.3	1.7	2.4

Notes:

1. All metric numbers are based on trailing twelve months (TTM) results as of the date on the cover of this report. Market capitalization numbers are as of the date on the cover of this report.
2. This chart uses the averages and medians of the percentages of each company within a quartile and across the entire data set. Q4=top quartile; Q1=bottom quartile.
3. Source of all data is Calcbench and YCharts and Worldlocity analysis.

Gross margin is important to market performance, indicating product superiority and pricing power are paramount.

All forms of profitability have a strong correlation with market performance.

All forms of ROI have a strong correlation with market performance.

Inventory turns and cash-to-cash (days) correlate little or negatively with market performance

Analysis Summary

Market cap multiple quartile comparison

This chart compares the operating characteristics of each market cap multiple quartile in order to glean insights into what cap leaders do differently. It summarizes the difference between the top and bottom quartiles in order to draw contrasts.

n=256 METRIC		DATA SET AVG	QUARTILE (AVGS WITHIN EACH MKT CAP QUARTILE)				DIFFERENCE TOP-BOTTOM
			TOP (Q4)	Q3	Q2	BOTTOM (Q1)	
	Market Cap Multiple	2.2	5.5	2.0	0.8	0.3	18.3X
OPERATIONS	1-Year Growth	2.0%	8.1%	1.0%	3.1%	-4.2%	12.3 pps
	Gross Margin	23.0%	34.4%	27.0%	19.6%	11.1%	23.3 pps
	SG&A	8.4%	5.0%	8.1%	12.0%	8.5%	-3.5 pps
	R&D	1.1%	1.0%	1.9%	0.8%	0.6%	0.4 pps
PROFIT	Operating Profit	13.7%	28.5%	16.9%	7.4%	1.9%	26.6 pps
	Net Profit	8.1%	18.9%	10.1%	4.3%	-1.0%	19.9 pps
	EBITDA	22.5%	41.1%	26.2%	15.5%	7.2%	33.9 pps
CASH	Inventory Turns	5.1	5.5	4.7	4.9	5.4	0.1 Turns
	C2C Cycle (days)	75.4	60.1	79.2	83.5	79.2	-19.0 Days
	Net Cash	-18.1%	-8.0%	-8.0%	-26.8%	-29.6%	21.6 pps
ROI	CAPEX	13.3%	22.9%	15.4%	8.9%	6.0%	16.9 pps
	Free Cash Flow	4.9%	13.0%	4.7%	1.8%	0.3%	12.7 pps
	ROA	4.0%	7.6%	6.2%	3.2%	-1.1%	8.6 pps
	ROIC	8.5%	14.5%	11.9%	6.3%	1.3%	13.2 pps
	EP	-1.4%	3.6%	1.5%	-4.6%	-6.3%	9.9 pps
	ROOA	10.4%	17.4%	14.3%	8.0%	2.0%	15.4 pps
	ROPA	12.9%	20.1%	17.8%	10.8%	3.0%	17.1 pps

NOTES & INSIGHTS

- Leaders have market cap multiples that are 2.5X average, and 18.3X laggards.
- Leaders have significantly higher gross margins, asset bases, and capital expenditures.
- Leaders excel in all forms of profitability, cash flow, and return on investment.
- Paradoxically, cap leaders do not lead in inventory turns. Cap laggards are more likely to lead in inventory turns than cap leaders. This is likely because cap leaders are managing their supply chains as profit centers and cap laggards are solely focused on cost.
- All financial numbers are for the trailing twelve months as of the date on the cover of this report. All market cap numbers are as of the date on the cover of this report.

Appendix

Additional supporting material and notes.

Notes and Definitions (1 of 4)

1	Primary data sources for the analysis are YCharts and Worldlocity research using data publicly available through the Internet.
2	Company data filtering - Companies included in this analysis are filtered based on available financial, operational, and market cap data. Generally, companies must have revenue, COGS, and market cap data to be included in the analysis.
3	Industry classification - companies are classified to industries using 1) Morningstar industry classifications; 2) Global Industry Classification System (GICS); and 3) Manual adjustments in those cases where either Morningstar is incorrect, GICS is incorrect, or both are incorrect. Both Morningstar and GICS are incorrect in a small percentage of cases. An attempt has been made to correct all of these, but there are probably still a small number of companies that may misclassified.
4	TTM = trailing twelve months = last four fiscal quarters.
5	Weighted Average Cost of Capital (WACC) = represents a company's average cost of raising funds from both debt and equity, weighted by their portion of the firm's capital structure. It's essentially the company's hurdle rate for new investments. WACC for each industry and each year is as reported by Aswath Damodaran, NYU Stern Business School. This is reported annually in January using data from the previous year. For a given year, this analysis uses the values reported in January for that year and uses the data set for US companies, only. Global WACC numbers for each industry will be slightly higher.
6	Tax Rates used in any financial calculations (for example NOPAT) are global industry averages for the money-making companies in each industry, as reported each year by Aswath Damodaran, NYU Stern Business School. This is reported annually in January using data from the previous year. For a given year, this analysis uses the values reported in January for that year.
7	Gross Profit = Revenue minus Cost of Goods Sold (COGS)
8	Gross Margin = Gross profit divided by Revenue
9	Operating Income = Gross profit minus operating costs, which typically include sales and marketing, general and administrative, and research and development costs.
10	EBIT = earnings before interest and taxes
11	EBITDA = earnings before interest, taxes, and amortization. EBITDA is calculated as operating income plus depreciation and amortization.
12	Adjusted EBITDA = EBITDA plus stock compensation.
13	Net Operating Profit After Taxes (NOPAT) = Operating Income times (1 minus Tax Rate). NOPAT is used in some ROI equations to focus on the operating aspects of a company, while also recognizing the reality of taxes.
14	Free Cash Flow = operating cash flow minus CAPEX.
15	Cash = cash, cash equivalents, and marketable securities.
16	Non-Operating Cash and Cash Equivalents is calculated as Cash and Cash Equivalents minus 3.5% times Revenue. The assumption here is that 3.5% of revenue is the amount of cash needed to fund operations. The amount of operating cash for each company and industry may be different, but this rule of thumb is used for scalability across a large number of companies. In those cases where the Non-Operating Cash and Cash Equivalents results in a negative number, it is set to zero.

Notes and Definitions (2 of 4)

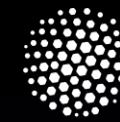
17	Total Debt = short-term debt, the current portion of long-term debt, long-term debt, borrowings under credit facility, capital lease obligations, convertible notes, and deferred rent.
18	Operating Assets = total receivables + inventories + deferred tax assets + Net PP&E + goodwill and intangibles. Operating assets are the assets needed to drive operations in a manufacturing, distribution, retail, transportation or other company engaged in supply chains. Deferred Tax Assets are considered part of operating assets since they were created by operating activities and represent a future tax savings. Receivables are included because they are a direct result of operations. Goodwill and Intangibles are included because they are presumably used in the producing, selling, and distributing goods and services.
19	Capital Employed = Total Assets minus Current Liabilities, or alternatively, Shareholders Equity plus Non-Current Liabilities. This is intended to capture all the long-term capital invested in the business.
20	Invested Capital = Total Debt + Total Equity minus Non-Operating Cash and Cash Equivalents. In those cases where equity is negative, equity is set to zero. Invested capital is intended to represent the amount of capital invested in a business by shareholders and debtholders. Non-operating cash is subtracted in order to arrive at the net debt invested in the business.
21	Return on Assets (ROA) = Net Income divided by Total Assets.
22	Return on Invested Capital (ROIC) = NOPAT (defined above) divided by Invested Capital (defined above). If a company's Invested Capital is negative, ROIC is meaningless and not calculated for that company.
23	Return on Capital Employed (ROCE) = EBIT (defined above) divided by capital employed (defined above). If a company's Capital Employed is negative, ROCE is meaningless and not calculated for that company.
24	Economic Profit (EP) = Net Operating Profit after Taxes (NOPAT) minus Weighted Average Cost of Capital (WACC) times Invested Capital. WAAC, NOPAT, and invested Capital are defined above. EP is also known as Economic Value Added (EVA). EVA is a trademark of Stern Value Management. A company is deemed to be creating value if its EP is greater than zero. The idea is that the cost of capital represents a hurdle rate for investors and debtholders and must be exceeded by NOPAT in order for value to be created.
25	Return on Operating Assets (ROOA) = NOPAT / Operating Assets. ROOA is a measure of operational efficiency and can be used to compare the supply chain operational efficiency of different companies.
26	Return on Fixed Assets (ROFA) = Operating Profit divided by Property, Plant, and Equipment (PP&E, net of depreciation). ROFA is sometimes used as supply chain metric to show how much operating profit is being generated by a company's fixed assets.
27	Return on Physical Assets (ROPA) = Operating Profit divided by (PP&E (net) plus Inventory). ROPA is sometimes used as a supply chain metric to show how much operating profit is being generated by a company's physical assets.
28	Inventory Turns = COGS (end of period) divided by Inventory (end of period). A more precise definition is the average COGS over a period divided by average Inventory over that period. In this analysis, the end of period (typically the end of the most recent fiscal year, or trailing twelve months (TTM)) is used for ease of calculation and scalability.

Notes and Definitions (3 of 4)

29	Gross Margin ROI = GMROI = Gross Profit divided by Inventory. GMROI is typically used in the retail industry to understand how much gross profit is generated by a certain amount of inventory. Different product lines and products will have different GMROI values. In this analysis we use Gross Profit and Inventory at the end of a reporting period. A more precise calculation would use the average inventory over the reporting period.
30	Turn and Earn = Inventory Turnover times Gross Margin %. Turn and Earn is a metric that shows the tradeoff between inventory turns and gross margin. High gross margin targets with low inventory turns can result in the same results as low gross margin targets with high inventory turns. In the automotive retail business, "Earn" has a double meaning - it also means that the faster you turn inventory, the more product allocation you will "earn" from the manufacturer.
31	Cash-to-Cash (C2C) = Days in Receivables plus Days in Inventory minus Days in Payables. This is also called the Cash Conversion Cycle (CCC).
32	Capital Expenditures (CAPEX) = gross CAPEX, in other words it does not net out the sale of assets.
33	Enterprise Value (EV) = Market Capitalization plus Total Debt minus Cash.
34	Mergers and Acquisitions - In the case of companies formed from mergers, the oldest company is used to designate the resultant company founding year.
35	Depreciation is the systematic allocation of a fixed asset over its useful lifetime. The useful life of production and other machinery for accounting purposes is typically somewhere between 7 and 20 years. Enterprise software, can be a significant part of the fixed asset base of companies, typically has a useful life for depreciation purposes of 3-10 years. This does not apply to Software as a Service (SaaS) or subscription software, which are treated as an expense, not an asset that has to be depreciated.
36	Amortization is the expensing of the cost of an intangible asset over time. Intangible assets include goodwill, intellectual property, patents, and software. Amortization is a non-cash charge that shows up in various elements of a company's income statement. The costs of obtaining a contract - typically sales commissions - are also amortized under accounting standards ASC 606 and IFRS 15.
37	Allocation of Depreciation and Amortization - Most companies allocate depreciation and amortization costs to individual cost buckets, including COGS, SG&A, and R&D. This is done based on where the depreciated or amortized asset is used. For example, depreciation of manufacturing equipment, which is used in production, would be allocated to COGS, while the amortization of intellectual property used in sales and marketing would be allocated to that cost bucket. Some subset of companies explicitly show depreciation and amortization costs on the income statement after the other cost buckets. No attempt was made to reallocate these costs for this subset of companies. This has the effect of understating COGS, SG&A, and R&D for those companies.
38	3-Year Compound Annual Growth Rate (CAGR) is based on the past four years of annual financial data.
39	Market Capitalization is based on the stock prices as of the date on the cover of this report for each company. Market Cap to Revenue Ratios or Enterprise Value to Revenue ratios are market capitalization divided by trailing twelve months (TTM) revenue through the most recently reported fiscal quarter as of the date on the cover of this report.

Notes and Definitions (4 of 4)

40	Mergers and Acquisitions - Individual company YOY numbers may be distorted due to mergers and acquisitions. No attempt has been made to normalize for mergers, acquisitions, and divestitures.
41	All Financial Data is based on what has been reported as of the date on the cover of this report. Data is captured for Trailing Twelve Months (last four quarters) and for the last fiscal year that occurred on or before the calendar year end (12/31) for each year.
42	Historical data is the past eleven fiscal years for all companies. The number of companies grows for each year in the historical analysis, as more companies became public across the decade.
43	Aggregate Inventory Turns is calculated as follows: sum of all COGS for all companies in an industry divided by sum of all inventories for all companies in an industry at the end of the calendar year or for the most recent trailing twelve months (TTM). The aggregate COGS number that is used for aggregate inventory calculations is the sum of COGS for those companies that have non-zero inventory. This has been found to be more accurate due to missing inventory data for certain companies in out years (several years beyond the present).
44	Research and Development - A good percentage of companies in various industries do not report research and development separately on their income statements. In these companies, R&D is included in COGS. This has the effect of overstating COGS for those companies, which by extension understates their gross margins and overstates their inventory turns. Aerospace & Defense, Automotive, Industrials, and Hitech Electronics are the industries in which a significant number of companies do not report R&D separately, and in which R&D represents a significant percentage of revenue. R&D as a percentage of revenue in these industries can average 4%-8% of revenue. This can result in understating aggregate and average gross margins for an industry and overstating aggregate and average inventory turns. No attempt has been made to normalize for this effect (it will be studied in later reports). Other industries that have significant R&D such as Hitech Semiconductors, Pharmaceuticals, and Medical Equipment have this problem, but only for a small percentage of companies that do not report R&D.



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