Launch of the Supply Chain Index

Which Supply Chain Metrics Matter to Financial Market Valuations?

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Research

This research represents eighteen months of work to understand the relationship between supply chain financial ratios and a company's performance in the financial markets. To complete this research, we constructed a database of specific supply chain financial ratios (from a database of over 50 total financial metrics) and began to run correlations to understand the relationship between financial supply chain ratios and market capitalization for the past seven years. (The market capitalization data and the supply chain financial data used in the analysis was quarterly data from 2006Q1 to 2012Q4.) We use this data to understand which metrics matter to financial markets for twelve Morningstar sectors.

Here we share insights on the Morningstar sectors that make up Consumer and Healthcare Value Networks. In August, we will publish a parallel report that will cover the Automotive, Electronics and Industrial Value Networks. The sectors evaluated in this report include: Apparel Manufacturing, Apparel Stores, Chemical, Drug Manufacturers for Branded and Generic Products, Household and Personal Products (Consumer Packaged Goods), Discount Stores, Medical Care, Medical Devices, Medical Distribution, Medical Instruments & Supplies, and Packaged Food.

Figure 1. Financial Metrics Used in the Correlation to Market Capitalization

Financial Metrics			
Growth	**Profitability**	**Cycle**	**Complexity**
Common Shares	Cash	Cash-to-Cash Cycle	**Altman Z**
Employee Growth	Cash Change in Period	Days of Finished Goods	Capital Turnover
Employees	Cash on Hand	**Days of Inventory**	**Current Ratio**
Market Capitalization	Cash Ratio TTM	**Days of Payables Outstanding**	Quick Ratio
R&D Margin	Cash Ratio Quarter	Days of Raw Materials	**Return on Assets**
R&D Ratio	Cash Ratio Year	**Days of Sales Outstanding**	Return on Equity
R&D to COGS Ratio	Cost of Goods Sold	Days of Work in Progress	**Return on Invested Capital**
Revenue	EBITDA	**DPO/DSO**	**Return on Net Assets**
Revenue Growth	**Free Cash Flow Ratio**	Finished Goods Inventory	Revenue per Employee
Revenue Growth TTM	Gross Margin	Inventory	**Working Capital Ratio**
Revenue TTM	Gross Profit	Inventory Turns	
SG&A Margin	Net Profit Margin	Receivables Turns	
SG&A Ratio	Operating Cash Flow Ratio	Raw Materials Inventory	
SG&A to COGS Ratio	**Operating Margin**	Work in Progress Inventory	
	OPEX Ratio		
	Pretax Margin		

We first started by understanding the patterns within each industry. Over the course of the past year, we have plotted patterns of Fortune 1000 companies' performance progress on growth, profitability, cycle and

complexity measures for the past decade. We publish the results of this analysis in the Supply Chain Metrics That Matter series of reports that are listed in the Appendix.

After understanding the patterns and the progress, or lack of progress, in each industry group, we then started to correlate fourteen financial ratios (listed in figure 1 in red) to financial market performance. The ratios were selected based on the fact that they were ratios and not raw numbers, reliable availability within the database, and relevance to supply chain. Each industry group was studied by Morningstar sector.

The goal of this research is to give the supply chain leader for each industry a clear view of which metrics matter to market capitalization in financial markets.

It is our belief that prior attempts to evaluate supply chain excellence and relative company performance have been too narrowly focused. In the building of this research model, we used the following principles:

- **Each industry is different.** A company's progress needs to be assessed within its individual peer group. Each industry sector has a different potential and a different set of market drivers. We strove to build a methodology that would allow supply chain leaders to understand which metrics matter the most for their specific industry peer group.
- **Differences between value networks.** It was our belief that each industry would have a different set of metrics that mattered and that each value network (or chain of associated supply chains) would also be unique. The research confirmed this hypothesis.
- **A simplistic approach is not sufficient.** Most prior methodologies have had an overdependence on return on assets. Prior evaluations have compared company performance to a combination of growth, return on assets (ROA), and days of inventory (DOI). However, when we tried to correlate this simplistic set of supply chain ratios, we could not find significant correlations to market capitalization performance. For example, in our analysis we find that Return on Assets only correlates to five industries.
- **Supply chain excellence is not a beauty pageant.** This analysis is based solely on financial correlations. While other methodologies have been based on peer input, we find that these types of inputs can become very political. We wanted to sidestep this issue.
- **The methodology should be applicable to all companies.** Supply chain leaders everywhere would like a methodology that is applicable to big companies and little companies and across currencies. Prior methodologies were only applicable to the Fortune 1000 companies. The use of supply chain financial ratios allows the comparison of big companies and small and the translation of performance across currencies.
- **Inventory is only part of the story.** While other methodologies have evaluated inventory performance, we wanted to understand the total impact of cash-to-cash cycles. We found that inventory was only part of the story. In our analysis, we find the correlation of market capitalization to inventory to occur in eleven industry sectors; but, we also find correlations to days of payables in seven out of twelve

Morningstar sectors, and working capital ratio correlations in nine of the twelve Morningstar sectors. *Working capital ratio is (total current assets – total current liabilities)/revenue.*

- **Capital markets reward balance in a portfolio of metrics.** If the goal is improving market capitalization, a simplistic analysis using a few ratios is too limiting. We find that the correlations are often more complex than we expected and market capitalization is usually based upon a portfolio of metrics that are balanced.
- **Industry progress.** We wanted to better understand the performance of industry leaders. In three of the twelve Morningstar sectors profiled in this report, we find clear industry leaders. In the others, we do not. In this analysis , a clear winner has the following characteristics:
    - Year-over-year improvements in growth, profitability, cycle and complexity management
    - Better performance than their peer group
    - Balance of the portfolio of metrics that are rewarded with higher correlations to market capitalization
- **Risk and Altman Z-score.** Different industries carry a different measurement of risk. In our analysis, we find that five of the Morningstar sectors have a correlation to the Altman Z-score factor (major pharmaceutical, medical device, medical instrument & supply, packaged food, and specialty & generic pharmaceutical). The Altman Z-score factor is an output of a credit strength test that gauges a publicly traded small manufacturing company's likelihood of bankruptcy. Since the Altman Z-score is somewhat antiquated, we have deleted the use of it in the findings of this report in favor of more reliable metrics.

Disclosure

As an independent analyst firm, your trust is important to us. In conducting research, we are open and transparent about our financial relationships and our research processes. This research project was solely funded by Supply Chain Insights.

Sharing and Use

Executive Overview

The year 2012 marked the 30th anniversary of supply chain management. We are now in the fourth decade. At the beginning of the last decade, most companies were making progress on the management of growth, profitability, supply chain cycles and complexity. Today, this has changed. Companies find themselves stuck. Growth has slowed. Management of margin is more difficult. Inventory and cash-to-cash cycles have stagnated, or even grown, not diminished.

The answer is not spending more money on Information Technology (IT) infrastructure. Over the last decade, the average company has spent 1.7% of revenue on IT, but to no avail. Spending new money on old processes just gets us the same results. Instead, we require:

- New thinking
- New technologies that offer promise
- Recognition that the missing link in supply chains is talent

In this report, we first examine the progress of industries on driving progress on the Supply Chain Effective Frontier (the management of trade-offs for growth, profitability, supply chain cycles and complexity). Supply chains are complex systems. They are growing more complex. With increased mergers and acquisitions (M&A), growth in product offerings and services, increased market volatility, the tightening of supply, and the building of global supply chains, the management of today's supply chain is far from easy. It is also more critical to a company's success than ever before.

Most companies want to move their supply chains from a focus on cost to one of value. However, to complete this journey, they must answer the question, "What is value?" Leaders are inundated with a myriad of metrics, and there is no roadmap of which metrics matter to improve market capitalization. The goal of this report is to help companies understand the role of supply chain in improving market capitalization and to determine which metrics matter the most in improving value.

In the process of writing this report, we discovered four key elements that we had not realized before:

- **Industry specific.** The metrics that matter, and correlate to market capitalization, vary by industry. They are very different. The degree of this variation is greater than we thought when we first began this research.
- **Impact of the supply chain varies.** The correlations of distribution-intensive industries have a higher correlation to financial market valuation. In industries with strong product innovation cycles and commodity market risk, the significance of the supply chain impact is lower on market capitalization.
- **Some industries have clear leaders. Some do not.** Some industries like Household & Personal Products have consistent year-over-year leaders. These leading companies have successfully

managed metric trade-offs: delivering a balanced portfolio of metrics while making year-over-year improvements. Other industries like chemical and major drug manufacturers do not have leaders.

- **Supply chain leaders have not held themselves accountable to balance sheet and income statement results.** The data that we present in this report is difficult to obtain. As a result, most supply chain leaders have not been able to monitor and measure these results. In our reviews with supply chain leaders, most are surprised by the findings.

In this report, we start by sharing the trends by industry on the financial ratios and the trade-offs made to balance growth, profitability, supply chain cycles and complexity. We then share insights based on the correlations of supply chain financial ratios to market capitalization. The report ends with a discussion of supply chain leaders and the sharing of specific results by industry peer group.

What is Supply Chain Excellence?

A researcher learns quickly that the analysis of supply chain excellence is not easy. There are many facets. Supply chain experts have opinions; but there is too little real research to have a data-driven discussion. It is our goal to change this. This is the purpose of this report.

We want to help supply chain leaders understand the impact of supply chain performance on market capitalization. We define **Supply Chain Excellence** as: the ability of a company to maximize value through the setting of targets and aligning metrics to drive a value chain strategy.

Supply chains are complex systems composed of complex processes with increasing complexity. Most companies are stalled in improving performance. The reasons are many. Complexity and market volatility are increasing, and supply chain leaders are facing a talent shortage.

To illustrate the point, in the next section, we share the progress on how two very different industries are making trade-offs in managing supply chain financial ratios.

A Closer Look at Apparel

Let's start with industry progress over the last decade for the apparel industry. In the race for lower labor costs, many apparel companies built global supply chains. In the process, this peer group struggled with the design of the global supply chain and the management of inventories. Most of the companies within this peer group have not been able to sustain progress on inventory turns, or drive productivity gains equal to other industries. There is also no clear supply chain winner. No one company stands out as outperforming the others.

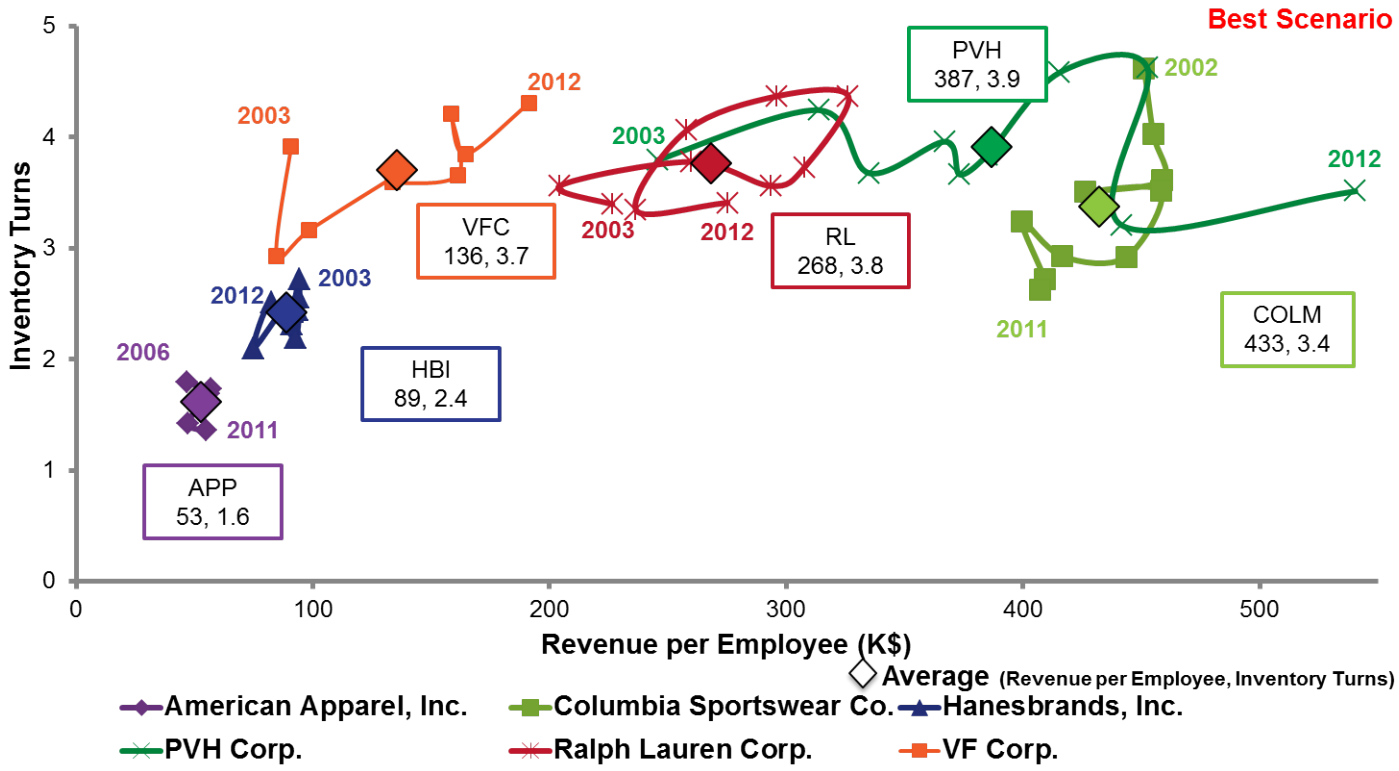
Figure 2a. Apparel Company Comparison

Company	Stock Exchange: Ticker Symbol	2012 Revenue (billions USD)	2012 Global Employees (thousands)	Country Where Based
American Apparel — American Apparel, Inc.*	NYSE AMEX: APP	0.5	10.0	USA (California)
Columbia — Columbia Sportswear Co.	NASAQ: COLM	1.7	4.2	USA (Oregon)
HANESbrandsINC — Hanesbrands, Inc.	NYSE: HBI	4.5	51.5	USA (N. Carolina)
PVH — PVH Corp	NYSE: PVH	5.9	10.9	USA (New York)
Ralph Lauren — Ralph Lauren Corp.	NYSE: RL	6.9	25.0	USA (New York)
vf — VF Corp.	NYSE: VFC	10.9	57.0	USA (N. Carolina)

Source: Supply Chain Insights LLC, Corporate Annual Reports from One Source 2012
*Results for American Apparel, Inc. are from FY 2011

As shown in figure 2b, this is an example of an industry that is “stuck” or stalled in driving year-over-year performance in supply chain excellence. The patterns are circular with most companies moving backwards (away from the upper right corner) over the time period.

Figure 2b. Inventory Turns vs. Revenue per Employee (2002-2012)



Source: Supply Chain Insights LLC, Corporate Annual Reports 2002-2012 from One Source

A Closer Look at Household & Personal Products

Now in contrast, let’s take a closer look at company performance in Household & Personal Products. This is an industry where there is clear progress. When we compare financial ratio patterns in this sector we see sustained progress. Take the example of **Beiersdorf AG, Colgate-Palmolive Company** and **The Procter & Gamble Company.** These are three companies of different sizes attempting to drive supply chain excellence in very different ways. **Beiersdorf**, a small German firm with revenues of $7.8 billion is attempting to reduce cash-to-cash cycles, while **Colgate**, a US-based firm of $17.1 billion, is attempting to drive year-over-year performance in operating margin. **Procter & Gamble,** the largest and the most global player at $83.7 billion, is attempting to drive a balanced portfolio of metrics. Each company, over the course of the last decade, is making year-over-year improvements, but as shown in figures 3a, 3b and 3c, the patterns are very different.

From the charts, it is unclear which company is making the most progress. It is also unclear which company’s supply chain performance is having the greatest impact on improving market capitalization. Each company is executing a different supply chain strategy.

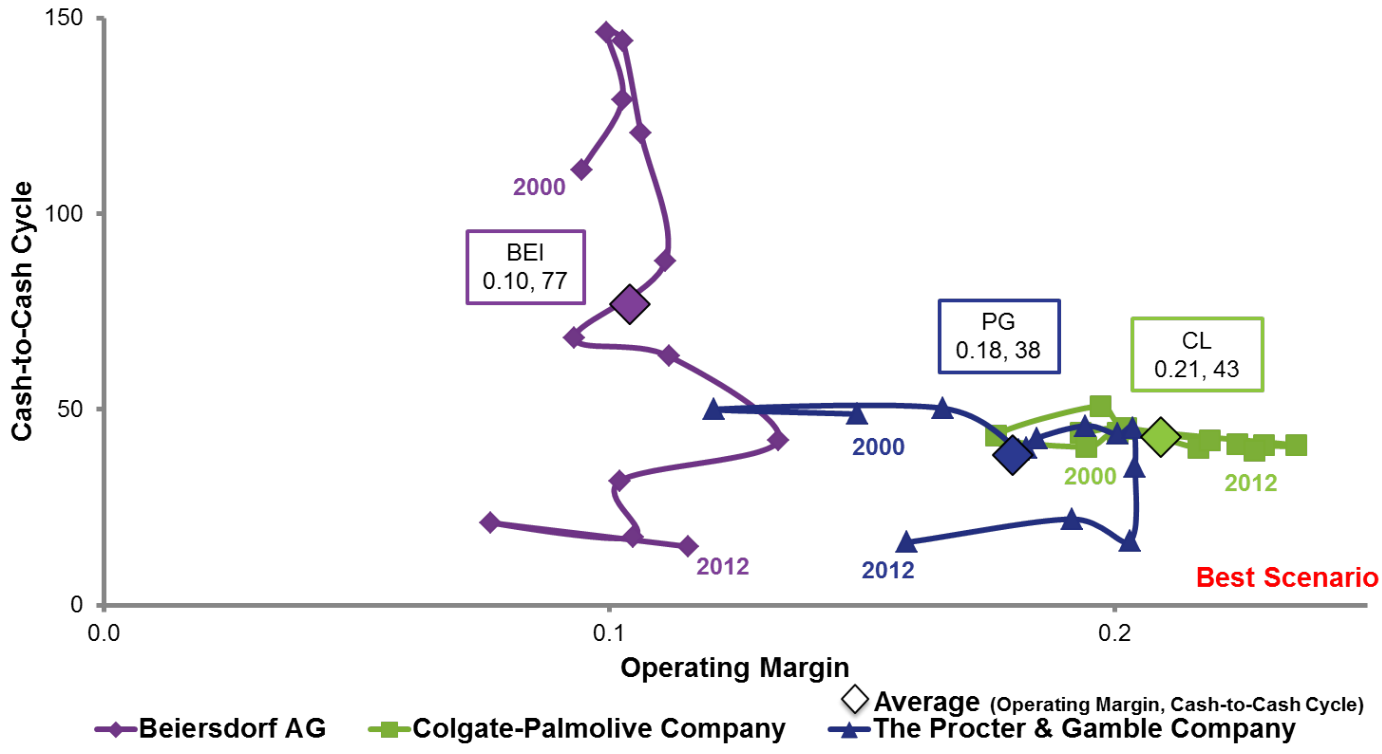
Figure 3a. Household & Personal Products Comparison

Company	Stock Exchange: Ticker Symbol	2012 Revenue (billions USD)	2012 Global Employees (thousands)	Country Where Based
Beiersdorf AG	FWB: BEI	7.8	16.6	Germany
Colgate-Palmolive Company	NYSE: CL	17.1	37.7	USA (New York)
The Procter & Gamble Company	NYSE: PG	83.7	126.0	USA (Ohio)

Source: Supply Chain Insights LLC, Corporate Annual Reports from One Source 2012

If we look at the comparison of the three companies over the past twelve years, they are all different. While patterns can be traced, the impact on market capitalization cannot be determined by this type of analysis. Each company is proud of their performance and feels that they have made significant improvements in supply chain performance.

Figure 3b. Cash-to-Cash Cycle vs. Operating Margin (2000-2012)

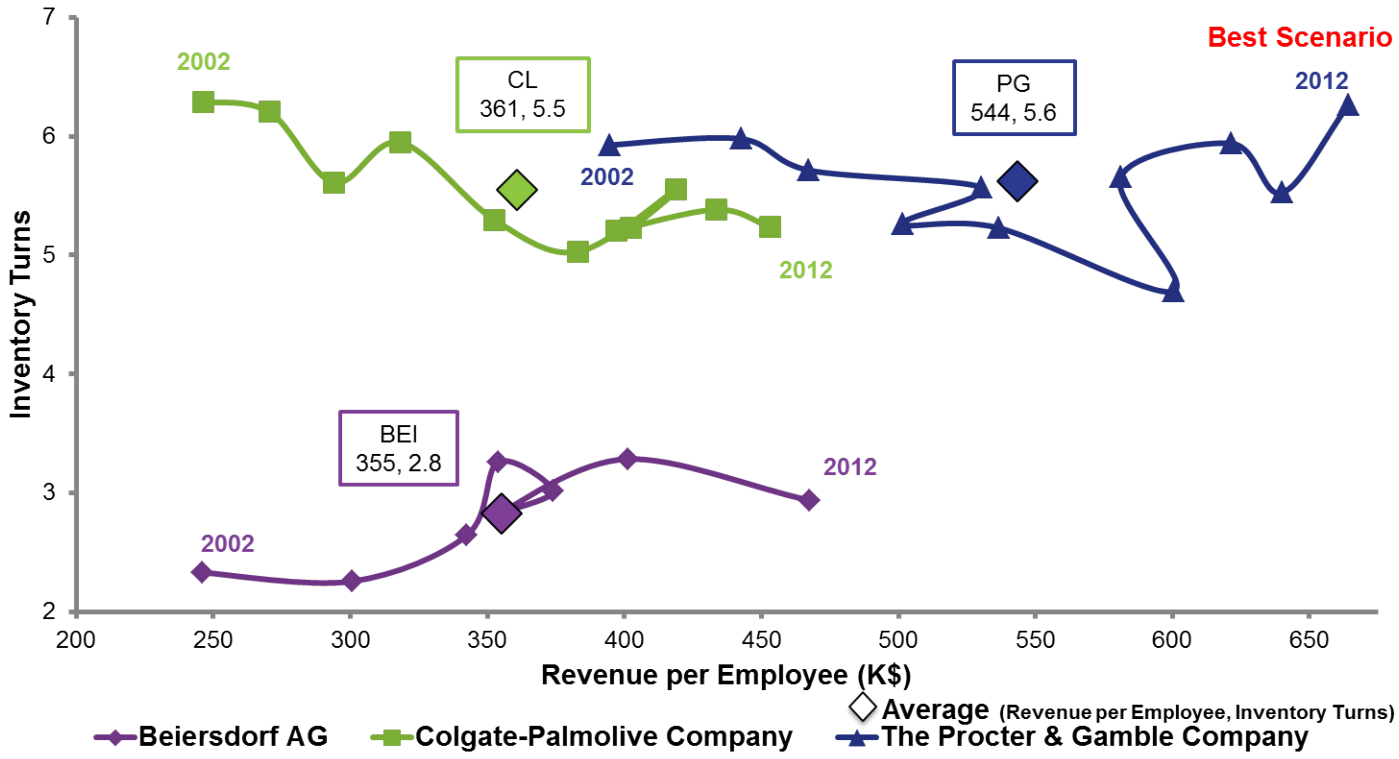


Source: Supply Chain Insights LLC, Corporate Annual Reports from One Source 2000-2012

In the comparison of the cash-to-cash cycle versus operating margin, the improvement of **Beiersdorf** and **Procter & Gamble** on C2C performance is clear, as is the improvement of operating margin for **Colgate** over the time period. What is not clear is whose gains are the best.

When another cut of the data is studied (inventory turns versus revenue per employee), in figure 3c, it is clear that P&G has a productivity edge against its competitors; however, all three companies are making progress on these two critical metrics. It is a stark contrast to the lack of progress in the apparel industry.

Figure 3c. Inventory Turns vs. Revenue per Employee (2002-2012)



Source: Supply Chain Insights LLC, Corporate Annual Reports from One Source 2002-2012

After a year of mapping this type of data, our key insight is that studying the patterns does not yield a conclusive supply chain leader. As a result, we believed that we needed to take the analysis a step further and look at the performance of companies' supply chain financial ratios correlated to market capitalization.

Where Are the Industries in Supply Chain Maturity?

Each industry is at a very different place on the evolution of supply chain maturity. As shown in figure 4, it is clear that the chemical, consumer electronics, consumer packaged goods and pharmaceutical industries have made the most progress on employee productivity. In contrast, apparel, food and medical device manufacturers have made very little progress. The largest difference between the industries is in the automation of sales and marketing.

Figure 4. Revenue per Employee Performance

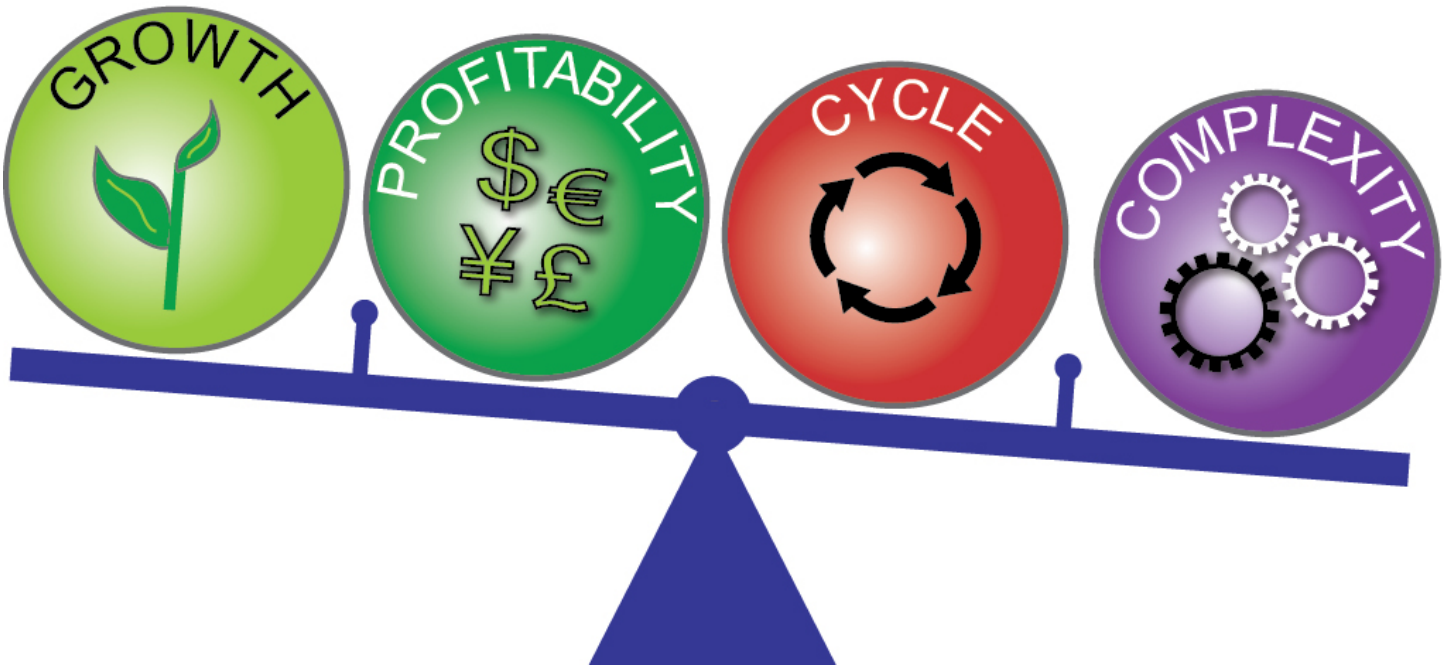
Revenue per Employee (K$)	1990-1999	2000-2009	2010-2011
Apparel	Unavailable	245	230
Chemical	328	685	840
Consumer Electronics	530	644	771
Consumer Packaged Goods	226	371	495
Food	394	367	420
Medical Device Manufacturers	Unavailable	345	379
Pharmaceutical	Unavailable	401	592

Source: Supply Chain Insights LLC, Corporate Annual Reports 1990-2011
Apparel: American Apparel, Inc., Columbia Sportswear Co., Hanesbrands, Inc., PVH Corp, Ralph Lauren Corp., VF Corp.
Chemical: BASF SE, E. I. du Pont de Nemours and Co., The Dow Chemical Co.
Consumer Electronics: Apple Inc., Dell Inc., Intel Corp., Motorola, Inc. (now Motorola Solutions, Inc.)
Consumer Packaged Goods: Colgate-Palmolive Co., The Procter & Gamble Co., Unilever N.V./PLC
Food: Campbell Soup Co., General Mills, Inc., Kellogg Co., Kraft Foods, Inc. (now Kraft Foods Group Inc.)
Medical Device Manufacturers: Boston Scientific Corp., Medtronic, Inc., St. Jude Medical, Inc. Zimmer Holdings Inc.
Pharmaceutical: Eli Lilly and Co., Merck & Co., Inc., Pfizer, Inc.

The Supply Chain Effective Frontier

Different industries have been able to make progress through the automation of their company in making the trade-offs between growth, profitability, cycles and complexity. We define this balancing act as the **Supply Chain Effective Frontier** shown in figure 5**.**

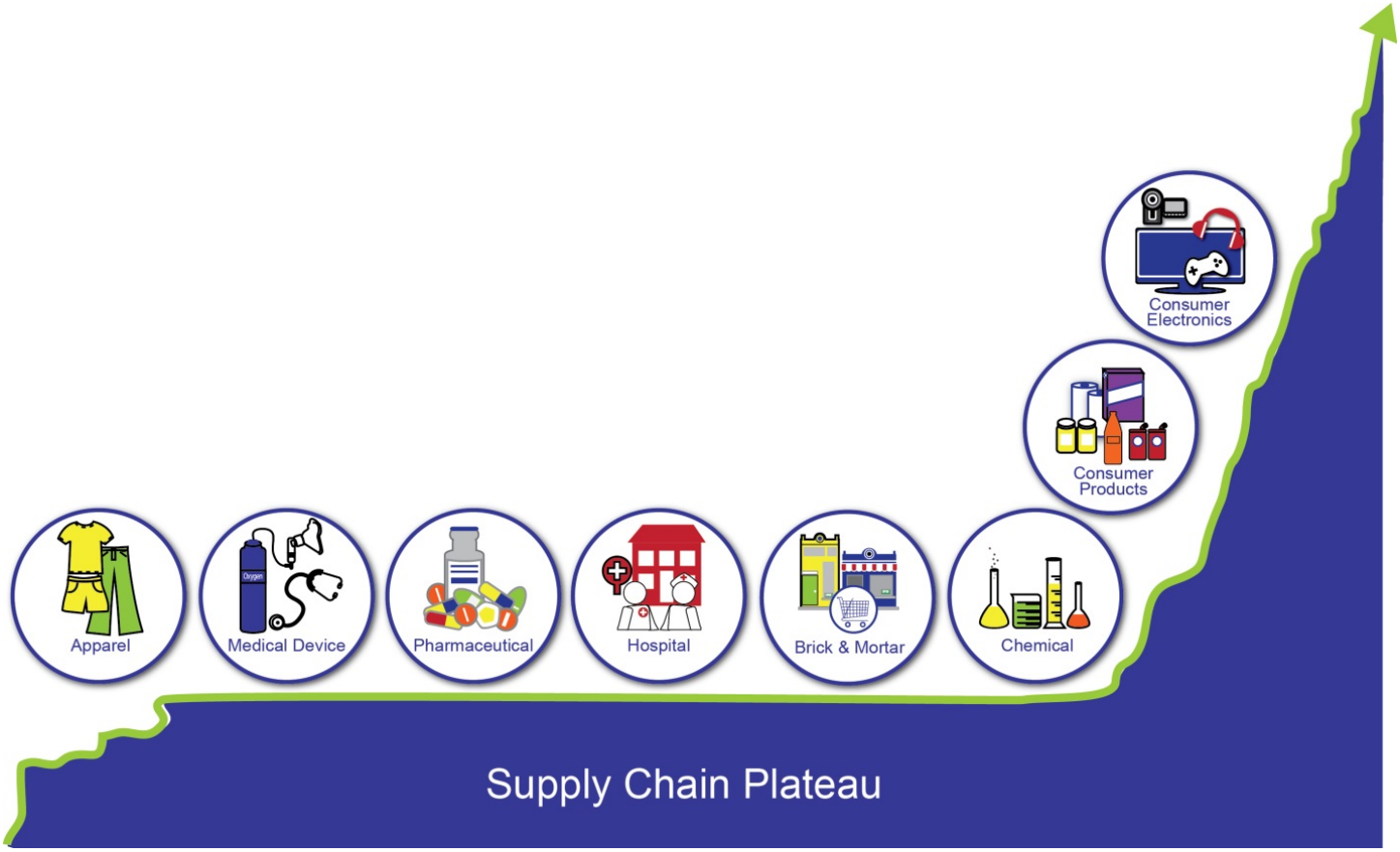
Figure 5. Supply Chain Effective Frontier



Progress of the Industries on the Effective Frontier

In our study of the industries profiled in individual Supply Chain Metrics That Matter reports, we determined that the greatest progress on the Supply Chain Effective Frontier was in the consumer electronics industry, and that the least was in apparel. This determination is based on the eighteen months of study of the industries on their performance on the financial ratios.

Figure 6. Progress on the Supply Chain Effective Frontier



As the next step in our research, we wanted to understand the patterns in supply chains and the relationship of supply chain to market capitalization, especially as seen through the lens of more or less mature industries.

What Matters to Financial Markets?

So, we took this analysis one step further and began to examine the impact of supply chain financial performance on capital market performance. We formed a team to analyze and correlate the individual ratios and build a formula to express market capitalization as defined from the selected supply chain financial ratios for each unique Morningstar sector. Using this formula, we compared the results of the peer group companies for seven years of supply chain results on an annual basis. The output of this analysis is shown in table 1.

What did we learn from this analysis?

- **Supply chain performance matters.** While supply chain performance is only part of the story, the correlation of the formula built from the supply chain financial ratios has a very tight correlation in distribution-intensive industries. It is less significant in product-intensive supply chains based on product innovation. There is a pattern between the correlation coefficients in table 1 and the supply chain maturity model in figure 6.
- **The financial ratios that matter vary by Morningstar sector.** There is a different composite of metrics that matter for each industry. The industry segments are very different. The degree of difference surprised us.
- **Balance.** The best result in year-over-year performance (with the best correlation to market capitalization) is when there is balance between growth, profitability, cycles and complexity. Financial markets do not reward one-directional improvements in singular metrics.

Table 1. Supply Chain Index Equation Summary

Supply Chain Index Equation Summary												
Morningstar Sector	Discount Stores	Medical Distribution	Medical Care	Household & Personal Products	Chemical	Drug Manufacturers-Major	Medical Instruments & Supplies	Medical Devices	Apparel Manufacturing	Apparel Stores	Packaged Food	Manufacturers-Specialty & Generic
Number of Companies	11	9	38	31	25	43	65	78	27	40	41	60
Formula Correlation (r^2)	0.89	0.84	0.73	0.68	0.64	0.59	0.46	0.44	0.39	0.39	0.36	0.35
Current Ratio (CR)		x	x	x		x	x	x	x	x		x
Days of Inventory (DOI)	x	x	x	x	x	x	x		x	x	x	x
Days of Payables Outstanding (DPO)			x	x	x		x	x		x	x	
Days of Sales Outstanding (DSO)			x				x	x	x	x	x	x
DPO/DSO (DPODSO)	x	x					x	x		x		x
Free Cash Flow Ratio (FCF)		x	x	x		x	x	x	x	x		x
Operating Margin (OM)	x	x	x	x	x	x	x	x	x	x	x	x
Return on Assets (ROA)					x			x		x	x	x
Return on Invested Capital (ROIC)	x	x		x					x			
Return on Net Assets (RONA)		x						x		x	x	x
SG&A to COGS Ratio (SGAC)			x	x			x	x	x		x	x
Working Capital Ratio (WC)	x	x	x			x	x	x	x	x		x
Year-over-Year Revenue Growth (YOY)			x				x	x			x	

Source: Supply Chain Insights LLC
Note: The number of companies is the number listed in the Morningstar sector when the peer group was defined between March and June 2013. The number of companies included in the analysis may be smaller due to data availability issues.
Current equation progress as of 6/7/2013

To understand the relative importance of these metrics, we built a formula for each industry. We define this formula as the Supply Chain Index. The **Supply Chain Index** is a formulaic representation of how companies manage growth, profitability, cycle and complexity measures on selected supply chain financial ratios to improve market capitalization

The Supply Chain Index

The Supply Chain Index is a way to understand the impact of companies' supply chains (relative to peers within an industry sector) to market capitalization based on a set of preselected supply chain ratio metrics.

The representation of supply chain excellence per the Supply Chain Index is shown in table 2 with abbreviations previously defined in table 1 for the specific ratios.

Table 2. Supply Chain Index Equations (Consumer and Healthcare Value Networks)

Supply Chain Index Equations (Consumer & Healthcare Value Networks)		
Morningstar Sector	**Supply Chain Index (Ln(market capitalization))**	**Formula Correlation (r^2)**
Discount Stores	10.41 + 52.67(OM) -34.72(WC) – 16.02(ROIC) – 0.09(DPODSO) + 0.02(DOI)	0.89
Medical Distribution	6.04 + 33.39(OM) - 24.69(ROIC) + 15.23(FCF) -11.11(WC) + 1.49(RONA) + 1.37(DPODSO) + 0.83(CR) + 0.02(DOI)	0.84
Medical Care	6.24 + 16.33(FCF) + 10.34(WC) + 5.72(OM) – 2.39(SGAC) + 1.09(YOY) – 1.01(CR) + 0.02(DSO) + 0.01(DOI) + 0.01(DPO)	0.73
Household & Personal Products	3.37 + 2.11(OM) + 1.62(FCF) – 1.29(ROIC) – 1.17*ln(CR) + 0.25(SGAC) + 0.02(DPO) – 0.01(DOI)	0.68
Chemical*	7.85(OM) – 4.84(ROA) + 1.81* ln(DPO) + 0.01(DOI)	0.64
Drug Manufacturers- Major	9.13 + 10.25(FCF) + 2.88(OM) – 1.20(WC) – 0.71(CR) + 0.01(DOI)	0.59
Medical Instruments & Supplies	7.56 – 2.39(DPODSO) + 1.90(WC) + 1.76(OM) + 1.04(FCF) + 0.70(YOY) – 0.48(SGAC) – 0.33(CR) + 0.01(DSO) + 0.01(DPO) – 0.01(DOI)	0.46
Medical Devices	5.06 + 5.00(OM) + 4.83(FCF) – 4.76(ROA) + 2.48(WC) – 2.37(DPODSO) + 1.71(RONA) + 1.10(YOY) – 0.27(CR) + 0.14(SGAC) + 0.01(DPO) + 0.01(DSO)	0.44
Apparel Manufacturing	6.15 + 30.65(OM) – 16.08(ROIC) + 7.01(WC) – 6.79(FCF) + 1.65(SGAC) – 0.45(CR) – 0.01(DSO) – 0.01(DOI)	0.39
Apparel Stores	6.98 + 11.49(OM) – 7.19(ROA) + 4.77(WC) + 3.96(RONA) – 2.87(FCF) – 0.44(CR) - 0.04(DSO) – 0.04(DPODSO) + 0.02(DPO) – 0.01(DOI)	0.39
Packaged Food	6.72 – 10.60(ROA) + 8.56(OM) + 4.06(RONA) – 0.65(SGAC) – 0.53(YOY) + -0.03(DPO) – 0.03(DSO) – 0.01(DOI)	0.36
Drug Manufacturers- Specialty & Generic	8.63 + 2.05(OM) + 1.73(FCF) – 1.59(ROA) – 1.31(DPODSO) + 0.75(WC) – 0.50(CR) + 0.46(RONA) – 0.24(SGAC) – 0.01(DSO) + 0.01(DOI)	0.35

Source: Supply Chain Insights LLC,
*Outlier values were defined and excluded as those 3 times larger than the interquartile range. All others were defined and excluded as those 5 times larger than the interquartile range.

Supply Chain Index Rankings for Household and Personal Products

The Supply Chain Index for the household and personal products industry has a high correlation to market capitalization ($r^2 = 0.68$). It is also one of the clearest examples of a supply chain leader, **Procter & Gamble**, balancing the supply chain financial ratios over the Supply Chain Effective Frontier. Note that in the seven years of rankings shown in tables 4 through 10, P&G tops the list in six of the years. While **Colgate** has driven significant improvements in operating margin, they have not been able to drive a portfolio of metrics that balances both profitability and cycles. P&G's improvements in inventory and cash-to-cash power better performance on the Supply Chain Index.

Table 3. Colgate-Palmolive Company and The Procter & Gamble Company (2000-2012)

	Colgate-Palmolive Company					The Procter & Gamble Company				
Metrics	**Average**	**2000-2003**	**2004-2007**	**2008-2011**	**2012**	**Average**	**2000-2003**	**2004-2007**	**2008-2011**	**2012**
COGS & Revenue Ratio	**0.43**	N/A	0.44	0.42	0.42	**0.49**	N/A	0.48	0.49	0.50
Days of Inventory	**65**	59	67	68	70	**65**	61	67	67	58
Operating Margin	**0.21**	0.21	0.19	0.22	0.23	**0.18**	0.15	0.19	0.20	0.16
Return on Assets	**18%**	17%	16%	20%	18%	**9%**	10%	9%	9%	8%
SG&A Margin	**0.66**	0.67	0.65	0.65	0.65	**0.72**	0.74	0.70	0.69	0.83
Year-over-Year Sales Growth	**6%**	N/A	9%	5%	2%	**7%**	N/A	14%	3%	1%

Source: Supply Chain Insights LLC, Corporate Annual Reports 2000-2012 from One Source
COGS & Revenue Ratio: (COGS)/ (revenue)
Days of Inventory: (average inventory/ COGS) * 365
Operating Margin: (operating income)/ (revenue)
Return on Assets: (net income)/ (total assets)
SG&A Margin: (revenue-SG&A)/revenue
Year-over-Year Sales Growth: (revenue year y – revenue year x)/ (revenue year x)

However, not all metrics are equally valued by the financial markets. When the Supply Chain Index is applied, P&G tops the list for six of the seven years studied. This gap is driven by their superior ability to balance competing priorities and demonstrate improvement on a wide variety of the supply chain financial ratios that correlate to market capitalization within the Morningstar sector. Tables 4 through 10 show the Supply Chain Index rankings of Household and Personal Products for the last 7 years.

Table 4. Supply Chain Index Ranking of Household & Personal Products - 2012

Household & Personal Products Ranking (2012)									
Rank	Company	CR	DOI	DPO	FCF	OM	ROIC	SGAC	Equation Output
1	The Procter & Gamble Company	0.880	58.3	68.7	0.111	0.159	0.101	0.341	$e^{4.7}$
2	The Clorox Company	0.668	44.3	47.5	0.077	0.145	0.182	0.252	$e^{4.6}$
3	Revlon Incorporated	1.194	82.7	73.4	0.058	0.132	0.153	1.402	$e^{4.3}$
4	Colgate-Palmolive Company	1.219	69.7	65.8	0.154	0.228	0.290	0.827	$e^{4.3}$
5	Church & Dwight Company, Inc.	1.287	54.2	58.0	0.154	0.187	0.133	0.458	$e^{4.2}$

Source: Supply Chain Insights LLC, Corporate Annual Reports 2012 from One Source
Rankings only include companies that had annual data available through One Source at time of calculation (May 2013).

Table 5. Supply Chain Index Ranking of Household & Personal Products - 2011

Household & Personal Products Ranking (2011)									
Rank	Company	CR	DOI	DPO	FCF	OM	ROIC	SGAC	Equation Output
1	The Procter & Gamble Company	0.805	67.6	73.5	0.124	0.191	0.112	0.365	$e^{4.9}$
2	Colgate-Palmolive Company	1.185	76.8	63.6	0.141	0.230	0.302	0.808	$e^{4.3}$
3	The Clorox Company	0.937	47.1	52.2	0.090	0.108	0.135	0.248	$e^{4.2}$
4	Kimberly Clark Corporation	1.164	60.2	61.0	0.063	0.117	0.126	0.263	$e^{4.0}$
5	Tupperware Brands Corporation	1.143	130.1	67.6	0.079	0.132	0.185	1.554	$e^{4.0}$

Source: Supply Chain Insights LLC, Corporate Annual Reports 2011 from One Source
Rankings only include companies that had annual data available through One Source at time of calculation (May 2013).

Table 6. Supply Chain Index Ranking of Household & Personal Products - 2010

Household & Personal Products Ranking (2010)									
Rank	Company	CR	DOI	DPO	FCF	OM	ROIC	SGAC	Equation Output
1	The Procter & Gamble Company	0.773	62.9	71.4	0.168	0.203	0.123	0.388	$e^{5.0}$
2	Colgate-Palmolive Company	1.001	70.1	66.9	0.171	0.224	0.312	0.851	$e^{4.5}$
3	The Clorox Company	0.905	41.6	51.2	0.118	0.154	0.177	0.252	$e^{4.4}$
4	Kimberly Clark Corporation	1.185	65.6	61.0	0.090	0.140	0.140	0.278	$e^{4.1}$
5	Revlon, Inc.	1.495	92.2	70.8	0.062	0.144	0.175	1.464	$e^{4.0}$

Source: Supply Chain Insights LLC, Corporate Annual Reports 2010 from One Source
Rankings only include companies that had annual data available through One Source at time of calculation (May 2013).

Table 7. Supply Chain Index Ranking of Household & Personal Products - 2009

Household & Personal Products Ranking (2009)									
Rank	Company	CR	DOI	DPO	FCF	OM	ROIC	SGAC	Equation Output
1	The Procter & Gamble Company	0.709	64.9	56.4	0.152	0.200	0.114	0.585	$e^{4.9}$
2	The Clorox Company	0.609	45.2	47.1	0.105	0.137	0.155	0.238	$e^{4.7}$
3	Colgate-Palmolive Company	1.059	69.8	67.7	0.176	0.236	0.325	0.844	$e^{4.5}$
4	Kimberly Clark Corporation	1.191	58.5	55.2	0.138	0.148	0.147	0.276	$e^{4.1}$
5	Revlon, Inc.	1.305	91.7	63.4	0.074	0.127	0.208	1.325	$e^{3.9}$

Source: Supply Chain Insights LLC, Corporate Annual Reports 2009 from One Source
Rankings only include companies that had annual data available through One Source at time of calculation (May 2013).

Table 8. Supply Chain Index Ranking of Household & Personal Products - 2008

Household & Personal Products Ranking (2008)*									
Rank	Company	CR	DOI	DPO	FCF	OM	ROIC	SGAC	Equation Output
1	The Procter & Gamble Company	0.792	78.2	63.0	0.151	0.202	0.111	0.612	$e^{4.8}$
2	The Clorox Company	0.753	45.2	49.2	0.106	0.131	0.147	0.223	$e^{4.5}$
3	Colgate-Palmolive Company	1.256	65.8	58.3	0.106	0.202	0.311	0.807	$e^{4.0}$
4	Avon Products, Inc.	1.221	94.7	68.1	0.035	0.126	0.218	1.350	$e^{4.0}$
5	Newell Rubbermaid Inc.	1.071	78.4	46.0	0.047	0.023	0.022	0.348	$e^{3.7}$

Source: Supply Chain Insights LLC, Corporate Annual Reports 2008 from One Source
Rankings only include companies that had annual data available through One Source at time of calculation (May 2013).
*USANA Health Sciences, Inc. (#6 in 2007) is excluded from ranking due to missing data.

Table 9. Supply Chain Index Ranking of Household & Personal Products - 2007

Household & Personal Products Ranking (2007)*									
Rank	Company	CR	DOI	DPO	FCF	OM	ROIC	SGAC	Equation Output
1	The Procter & Gamble Company	0.782	70.4	58.9	0.144	0.200	0.105	0.638	$e^{4.8}$
2	The Clorox Company	0.723	40.9	43.6	0.116	0.153	0.207	0.233	$e^{4.5}$
3	Colgate-Palmolive Company	1.144	72.6	66.1	0.121	0.197	0.269	0.836	$e^{4.3}$
4	Avon Products, Inc.	1.151	96.5	74.1	0.031	0.088	0.153	1.242	$e^{4.1}$
5	Newell Rubbermaid Inc.	1.034	85.1	55.8	0.080	0.117	0.110	0.348	$e^{4.0}$

Source: Supply Chain Insights LLC, Corporate Annual Reports 2007 from One Source
Rankings only include companies that had annual data available through One Source at time of calculation (May 2013).
*Inter Parfums, Inc. (#4 in 2006) is excluded from ranking due to missing data.

Table 10. Supply Chain Index Ranking of Household & Personal Products - 2006

Household & Personal Products Ranking (2006)									
Rank	Company	CR	DOI	DPO	FCF	OM	ROIC	SGAC	Equation Output
1	Colgate-Palmolive Company	0.952	68.9	71.1	0.110	0.177	0.236	0.807	$e^{4.6}$
2	The Procter & Gamble Company	1.217	72.1	56.2	0.135	0.195	0.092	0.628	$e^{4.2}$
3	The Clorox Company	0.891	39.7	44.7	0.074	0.141	0.181	0.235	$e^{4.2}$
4	Inter Parfums, Inc.	2.119	176.4	149.1	0.015	0.113	0.108	0.981	$e^{4.1}$
5	Avon Products, Inc.	1.320	96.2	70.1	0.071	0.087	0.145	1.275	$e^{4.0}$

Source: Supply Chain Insights LLC, Corporate Annual Reports 2006 from One Source
Rankings only include companies that had annual data available through One Source at time of calculation (May 2013).

Rankings for the other eleven industries profiled in this report are available in the Supply Chain Insights Community.

Over the course of the summer of 2013, we will continue to populate the industry tables and publish the results for the remaining Morningstar sectors we have identified for the Supply Chain Index work. We are completing this work for our Supply Chain Insights Global Summit. At this event, we will review all of the formulas and hear from Wall Street and supply chain leaders on our search for the supply chain metrics that truly matter.

Conclusion

This work is just starting. It is clear in some industries that the right mix of performance on financial ratios clearly matters. It does not have as high of a correlation in others. There is a parallel trend between the determination of supply chain maturity and the ability to correlate financial ratios to market capitalization. This research raises many questions.

- Does supply chain performance impact market capitalization? In most industries, based on this analysis, we believe that the answer is yes.
- As supply chains in various industries mature, will there be a greater correlation to market capitalization? We do not know the answer to this question. We believe that more research is needed.
- Do financial markets reward functional metrics or singular metrics? We believe strongly that supply chain leaders need to hold themselves to supply chain financial ratios on the balance sheet and income statement, and that functional metrics should align to drive the desired financial outcome. We also believe that it is not about singular metrics.

Instead it is about a value-based portfolio approach of making systemic trade-offs on the Supply Chain Effective Frontier. Companies must actively balance competing priorities of growth, profitability, cycles and complexity.

Appendix

Metrics Formulae:

Current Ratio

`BalanceSheets.[TotalCurrentAssets]`/`BalanceSheets.[TotalCurrentLiabilities]`

Days of Inventory

`FinancialStatements.[PeriodLength]`*`BalanceSheets.[Inventory]`/`IncomeStatements.[CostOfRevenue]`

Days of Payables Outstanding

`FinancialStatements.[PeriodLength]`*`BalanceSheets.[AccountsPayableBS]`/`IncomeStatements.[CostOfRevenue]`

Days of Sales Outstanding

`FinancialStatements.[PeriodLength]`*`BalanceSheets.[AccountsReceivableBS]`/`IncomeStatements.[TotalSales]`

DPO/DSO Ratio

`BalanceSheets.[AccountsPayableBS]`/`BalanceSheets.[AccountsReceivableBS]`

Free Cash Flow Ratio

(`CashFlows.[TotalCashFromOperations]` + `CashFlows.[CapitalExpenditures]`)/`IncomeStatements.[TotalSales]`

Operating Margin

`IncomeStatements.[OperatingIncome]`/`IncomeStatements.[TotalSales]`

Return on Assets

`IncomeStatements.[NetIncome]`/`BalanceSheets.[TotalAssets]`

Return on Invested Capital

`IncomeStatements.[OperatingIncome]`/`BalanceSheets.[TotalLiabilitiesShareholdersEquity]`

Return on Net Assets

`IncomeStatements.[NetIncome]`/(`BalanceSheets.[PropertyPlantEquipmentNet]`+`BalanceSheets.[TotalCurrentAssets]`-`BalanceSheets.[TotalCurrentLiabilities]`)

Revenue Growth

(`IncomeStatements.[TotalSales]`-`Last Period.[Revenue]`)/`Last Period.[Revenue]`

SG&A to COGS Ratio

`IncomeStatements.[SellingGeneralAdministrativeExpense]`/`IncomeStatements.[CostOfRevenue]`

Working Capital Ratio

(`BalanceSheets.[TotalCurrentAssets]`-`BalanceSheets.[TotalCurrentLiabilities]`)/`IncomeStatements.[TotalSales]`

Definitions:

- **Supply Chain Index:** A formulaic representation of how companies are trading off growth, profitability, cycle and complexity performance on selected supply chain financial metrics against market valuation**.**
- **Supply Chain Effective Frontier:** The balance of growth, profitability, cycle and complexity metrics to deliver the supply chain strategy. It may or may not maximize the company's market valuation.
- **Supply Chain Excellence:** The ability for a company to maximize value through the setting of targets and aligning metrics to drive a value chain strategy.

Other Related Reports:

Supply Chain Metrics That Matter: A Focus on Retail
Published by Supply Chain Insights in August 2012.

Supply Chain Metrics That Matter: A Focus on Consumer Products
Published by Supply Chain Insights in September 2012.

Supply Chain Metrics That Matter: A Focus on the Chemical Industry
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Published by Supply Chain Insights in May 2013

About Supply Chain Insights LLC

Supply Chain Insights LLC is a research and advisory firm focused on reinventing the analyst model. The services of the company are designed to help supply chain teams improve value-based outcomes through research-based Advisory Services, a dedicated Supply Chain Community and public training. Formed in February 2012, the company is focused on delivering **independent, actionable and objective advice for supply chain leaders**.

About Lora Cecere

Lora Cecere (twitter ID @lcecere) is the Founder of Supply Chain Insights LLC and the author of popular enterprise software blog Supply Chain Shaman currently read by 5,000 supply chain professionals. Her book, ***Bricks Matter***, (co-authored with Charlie Chase) published on December 26th, 2012. She is currently working on a second book Metrics that Matter to publish in 2013.

With over nine years as a research analyst with **AMR Research, Altimeter Group, and Gartner Group** and now as a Founder of Supply Chain Insights, Lora understands supply chain. She has worked with over 600 companies on their supply chain strategy and speaks at over 50 conferences a year on the evolution of supply chain processes and technologies. Her research is designed for the early adopter seeking first mover advantage.

About Abby Mayer

Abby Mayer (twitter ID @indexgirl), Research Associate, is one of the original members of the Supply Chain Insights LLC team. She is also the author of the newly-founded blog, Supply Chain Index. Her supply chain interests include connecting financial performance and supply chain excellence, as well as talent management issues and emerging markets.

Abby has a B.A. in International Politics and Economics from Middlebury College and a M.S. in International Supply Chain Management from Plymouth University in the United Kingdom. She has also completed a thru-hike of Vermont's 280 mile Long Trail, the oldest long distance hiking trail in the United States. As part of the planning and food prep process, she became interested in supply chain management when she was asked to predict hunger pangs for the entire three-week trip before departure. If that isn't advanced demand planning, what is?!?!