Book It! A Semiconductor Specific Factor Suite

Introducing several operating-metric based indicators for the Semiconductor industry

The semiconductor industry is like no other in its participants' exceedingly competitive need to redefine state-of-the-art both technologically and industrially. Indeed, it has been defined by the well-known Moore's law, named after Intel co-founder Gordon E. Moore, which predicts the doubling of the number of transistors on integrated circuits approximately every two years. However, the smaller standards for transistors have translated into larger standards for research and development costs. With the unique nature of this industry, here we introduce industry-specific indicators which capture the distinct characteristics of semiconductor firms based off of Order Backlog and Order Bookings metrics. We note outperformance to indicators such as *Standardized Unexpected Bookings* with a monthly average return spread of 51bps for a global universe, improving to over 13% on a cumulative annual average. By adding these indicators to our extant Semiconductor model, as well as recently released Intellectual Property and Short Sentiment signals, we achieve additional alpha and greater consistency in positive return spreads.

INTRODUCTION

The technology sector overall contains a set of dynamic and challenging investment opportunities. While these stocks are often coupled with business cyclicality and volatility, many investors accept this risk given the potential for revenue growth and cash generation. Technology companies are characterized by rapid product evolution and innovations meant to satisfy new market demands and product channels.

The semiconductor industry, specifically, stands out due to its higher business cyclicality and capital intensity. Semiconductor stocks are defined by high fixed assets and capital intensity, and investors typically seek evidence of working capital efficiency. While the capital structure has experienced some changes with the introduction of fabless chip makers, a high level of capital intensity is still prevalent overall. The volatile business activity of the semiconductor group also results in the unpredictability of business results. To remain competitive, semiconductor firms must balance inventory levels and order flow. Compounding this struggle is the constant threat of inventory obsolescence and order cancellation.

In this report we use two semiconductor operating metric data items, order backlog and order bookings, to create several new indicators in an attempt to quantify business cycle uncertainty and inventory management

efficiency. We begin with a brief industry overview and define the new semiconductor factor suite. Next, we examine performance of several key indicators. Ultimately, we take advantage of the new metrics and other recent factor library enhancements to improve upon the extant Semiconductor component of our Technology Model.

DATA AND METHODOLOGY

The Semiconductor industry is characterized by three types of companies:

- **Integrated Device Manufacturers** (IDMs) manufacture their own devices. Typically, these are mature vendors dealing in high volume products. IDMs have lots of operating and cyclical leverage.

- **Fabless Chip Makers** design devices themselves but contract the manufacturing to others. These companies are more focused on design, and enjoy greater margin and earnings stability as well as lower capital requirements.

- **Foundries and Assembly and Testers** are specialized third-party manufacturers that perform wafer fabrication or back-end processing for others on a contract basis.

Factor Introduction

There are many operating metrics relevant to semiconductor firms, including process efficiency, order flow, and material purchasing. Two data points of particular relevance to manufacturing companies, which form the basis of our introduction, are order backlog and order bookings.

Order backlog is a commonly reported operating metric in the semiconductor industry. It is defined as product sold that cannot be invoiced because it is unavailable in inventory. Generally, an increase in order backlog is associated with future growth, assuming the firm can deliver by the client specified time. Order backlog is expected to be converted to cash within 12 months.

Order bookings are considered anticipated sales scheduled to be manufactured and delivered to clients within 12 months. Order bookings are subject to final approval from the client before production will begin. Firms plan their production process around order bookings. Bookings are generally considered less readily converted to cash when compared to order backlog. However, similar to order backlog, growth in order bookings is a leading indicator of future sales growth and can be useful in identifying trends.

We also acknowledge that the book-to-bill ratio has historically been a standard industry metric. However, decreased reporting of this item over time precludes it from being used effectively on a systematic basis. Given this, we introduce the following list of bookings- and backlog-based metrics, along with an additional fundamental indicator particularly pertinent to the semiconductor industry on the Data Analytics & Research platform:

Bookings

- Bookings Growth
- Standardized Unexpected Bookings
- Bookings vs R&D Expense
- Bookings vs Capital Expenditures

Backlog

- Backlog Growth
- Standardized Unexpected Backlog
- Backlog Growth vs Inventory Growth
- Sales Growth vs Backlog Growth

Additional

- Sales Growth vs Inventory Growth

See the Appendix (on Pages 8 & 9) for brief factor definitions. We review several key factors here and the others are available for review on the platform.

Factor performance and attribution results are available over numerous universes on the Data Analytics & Research Platform. For this industry factor introduction, we review results over Global Standard Cap (GLOBAL) and Global All Cap (ALLCAP) Semiconductor universes. GLOBAL is derived from the Markit World Universe. Recall that Markit global universes are constructed to represent 95% of the cumulative free float market cap of each member country, subject to $250 million and $100 million market cap minimums for developed and emerg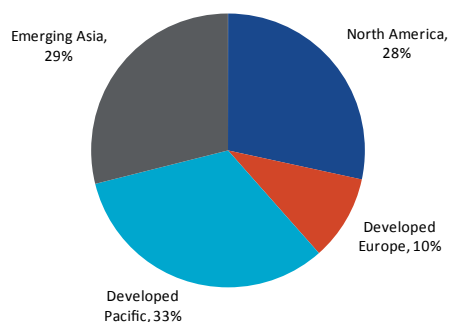ing market securities, respectively. We filter for companies classified as semiconductors, and also add back industrial firms that report operating metrics relevant to the semiconductor space e.g., Samsung, Applied Materials, etc. This ensures that multinational conglomerates are not excluded. The same methodology is applied in creating ALLCAP. However, instead of using Markit World as the base universe, we use Markit World All Cap, defined as firms in the top 99.9% of cumulative free float market cap for each country, subject to a $15 million minimum capitalization.

The ALLCAP breakdown by region (Figure 1) shows that over 60% of firms come from the Asia-Pacific region, with 29% from

Figure 1: ALLCAP region distribution, Mar 2013

Emerging Asia. The universe also exhibits an expected small cap bias (Figure 2) with over 50% of firms at or below $250 Million. We observe similar regional concentrations for GLOBAL, but with a larger average market cap, as expected.

The newly introduced semiconductor indicators have varying degrees of universe coverage. The data used to calculate many of the measures is self-reported operating metric information, i.e., not required like many financial statement items. As such, semiconductor-specific factor coverage is lower than that of standard financial ratio style indicators. For example, ALLCAP coverage for order backlog indicators is 25%-40% of the full universe (approximately 160 firms reporting globally). Coverage for indicators based on order bookings are15%-20% of total (approximately 80 firms reporting globally). The same coverage percentage ranges are observed for the larger-cap GLOBAL universe as well.
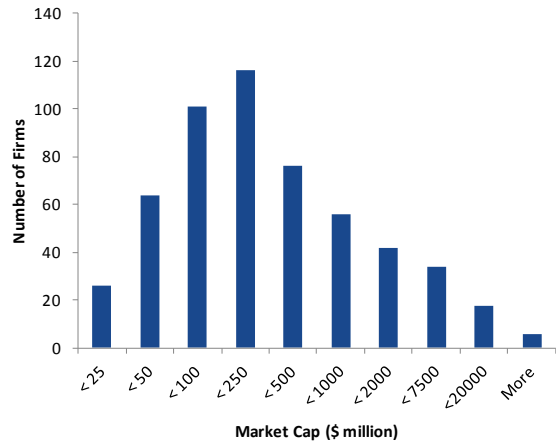

Figure 2: ALLCAP market cap distribution, Mar 2013

The Data Analytics & Research Platform includes several methods for testing factor efficacy. Cross-sectional performance is gauged by the information coefficient, or IC, computed as the correlation of factor scores and future returns. To capture performance at the extremes, we report equal-weight quintile spreads. The spread is calculated based on an investment strategy that simultaneously buys (sells) the highest (lowest) rated quintile. We also report the information ratio (IR), a risk-adjusted measure computed as the average divided by the standard deviation, along with the hit rate, which captures the percent of months registering positive observations.

Factor scores are tabulated on a monthly basis, and performance is computed in local currency for 1-, 3-, 6-and 12-month (cumulative) returns with a common date range of January 2005 through March 2013.

KEY FACTORS

Backlog Growth

First, we consider a base backlog indicator, *Backlog Growth*, which measures the most recent year-on-year change in order backlog. An increase in backlog is associated with greater future sales as preliminary orders (bookings) are confirmed for production but cannot be invoiced because they are not yet available. A consistent positive growth rate is a leading indicator of future sales. Markit ranks this factor in descending order such that those with the highest growth receive the best scores.

ALLCAP performance across all holding periods tested is detailed in Table 1 and GLOBAL results are included in the Appendix (see Table A1 on Page 8). We report average return spreads (Rtn Spr), standard deviations (Std Dev), IRs and hit rates. The time series of 1-month quintile return spreads is displayed in Figure 3.
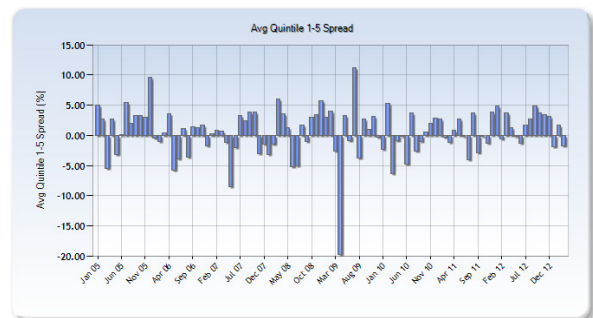

Figure 3: ALLCAP Backlog Growth 1-month quintile return spreads, Jan 2005 – Mar 2013

Holding Period	Rtn Spr (%)	Std Dev	IR	Hit Rate (%)
1-month	0.56	3.9	0.14	57.6
3-month	1.80	6.7	0.27	59.6
6-month	1.91	11.8	0.16	55.6
12-month	3.92	12.5	0.32	64.6

Table 1: ALLCAP Backlog Growth performance statistics, Jan 2005 – Mar 2013

Factor Introduction

Backlog Growth performs well as a standalone indicator. We report a 1-month return spread of 0.56% and IR of 0.14. At the 12-month holding period, the average (overlapping periods) return spread reaches 3.92% with an IR of 0.32. Additionally, hit rates are above 50% for all periods tested, and over 60% at the 12-month time horizon. The time series trend of 1-month quintile return spreads confirms positive results with no extended periods of underperformance, and only one exogenous outlying negative observation in April 2009. That period, however, proved to be quite an anomaly as excessive risk-on trades fueled a global market surge from extreme troughs.

Sales Growth vs Backlog Growth

Next, we present two derivatives of backlog growth. *Sales Growth vs Backlog Growth* measures the year-on-year change in sales relative to the change in order backlog. While we view sales growth as a positive trend, this factor is more concerned with backlog growth as backlog growth is a better indicator of future revenues. This indicator favors firms experiencing the largest backlog growth.

To account for multiple scenarios inherent to this indicator, e.g., divergent sales and backlog growth changes, we separate the indicator into four groups with the ordering designed to favor firms with greater backlog growth and a secondary grouping on sales growth. Hence, the first group includes firms with positive backlog and sales growth and the second group those with positive backlog growth but negative sales growth. The third group encompasses firms with negative backlog growth and positive sales growth and the final group those with both negative backlog and sales growth. Intra- group ranks are then assigned again favoring high backlog growth and finally the groups are combined with group one (four) having the most (least) attractive scores.

ALLCAP performance is detailed in Table 2 and 1-month return spreads are displayed in Figure 4. By using backlog growth to
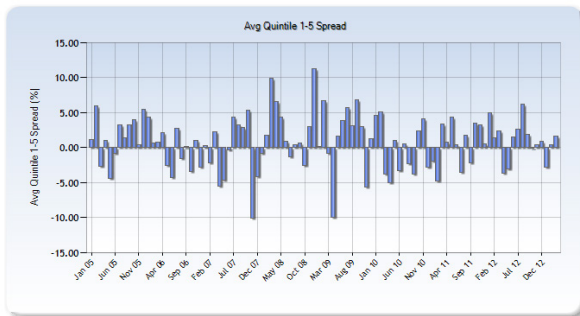

Figure 4: ALLCAP Sales Growth vs Backlog Growth 1-month quintile return spreads, Jan 2005 – Mar 2013

scale sales growth, we create a better short-term indicator that outperforms *Backlog Growth* on average over a 1-month holding period. Indeed, *Sales Growth vs Backlog Growth* (*Backlog Growth*) posted a 1-month return spread of 0.73% (0.58%) and IR of 0.20 (0.14). Similar outcomes are reported for GLOBAL (see Table A2 on Page 8 of the Appendix). We also compared our new factor against a simple sales growth indicator (not reported here) and found *Sales Growth vs Backlog Growth* to outperform for all holding periods considered (1-, 3-, 6- and 12-month) in ALLCAP, although differences were not statistically significant (t-stat 1.18), with less conclusive results in GLOBAL.

Holding Period	Rtn Spr (%)	Std Dev	IR	Hit Rate (%)
1-month	0.73	3.8	0.20	65.7
3-month	1.42	6.5	0.22	51.5
6-month	2.42	9.4	0.26	51.5
12-month	2.95	12.2	0.24	53.54

Table 2: ALLCAP Sales Growth vs Backlog Growth performance statistics, Jan 2005 – Mar 2013

While individual Q1 and Q5 results are not reported here, we remark that outperformance in spreads was driven to a greater extent by identifying underperforming Q5 names. Lastly, we note a more cyclical pattern to 1-month performance trends displayed in Figure 4, along with a significant reduction in the negative performance spike noted above for *Backlog Growth* in April 2009.

Standardized Unexpected Backlog

Our second backlog-growth variant, *Standardized Unexpected Backlog*, again measures the change in backlog from the previous year but in this case is scaled by the standard deviation of this change over the past three years. This indicator assesses the relative magnitude of current backlog changes compared to historical changes and favors firms with higher growth and more stability in order backlog. As order backlog growth is a precursor to revenue increases, higher indicator values are preferred.

Holding Period	Rtn Spr (%)	Std Dev	IR	Hit Rate (%)
1-month	0.76	3.6	0.21	60.6
3-month	1.30	5.8	0.22	54.6
6-month	2.14	8.3	0.26	61.6
12-month	4.77	12.8	0.37	67.7

Table 3: ALLCAP Standardized Unexpected Backlog performance statistics, Jan 2005 – Mar 2013

Similar to the other order backlog indicators, we observe positive *Standardized Unexpected Backlog* quintile return spread performance. ALLCAP (Table 3) posts a 1-month average return spread of 0.76% with an IR of 0.21 and 60.6% hit rate (see Table A3 on Page9 of the Appendix for GLOBAL results). While some incremental improvement is reported at 3- and 6-month horizons, we note a healthier 4.77% average return spread at the 12-month holding period with a robust IR (0.37) and hit rate (67.7%) associated with this dispersion-based metric.
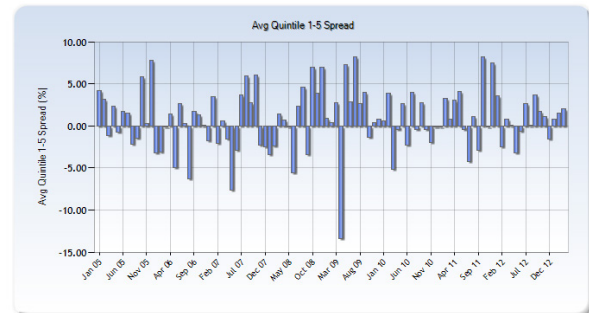

Figure 5: ALLCAP Standardized Unexpected Backlog 1-month quintile return spreads, Jan 2005 – Mar 2013

Additionally, in comparing 1-month quintile returns displayed in Figure 5 versus *Backlog Growth* (see Figure 3 on Page 3), we observe reduction, in general, to extreme downside observations (spreads <-5%). We also highlight more optimal tail performance versus *Backlog Growth* with higher (lower) average Q1 (Q5) returns (individual quintile results not reported here).

Standardized Unexpected Bookings

Turning to bookings, we focus on *Standardized Unexpected Bookings*, which calculates unexpected bookings as the change in bookings from the previous year scaled by the standard deviation of the previous three year changes. This indicator gauges the relative magnitude of current bookings changes compared to historical values, and favors firms with growth in bookings along with lower volatility.

Table 4 summarizes ALLCAP performance of *Standardized Unexpected Bookings* and a time series of monthly return spreads is displayed in Figure 6. Overall, this is our top performing semiconductor-specific indicator. Quintile return spreads and hit rates perform well over all holding periods and show particular strength on a 12-month basis. Indeed, we report an average annual return of 11.71% with an IR of 0.48 and hit rate of 66.7%.
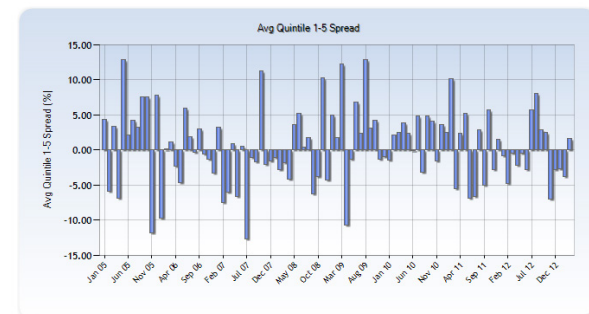

Figure 6: ALLCAP Standardized Unexpected Bookings 1-month quintile return spreads, Jan 2005 – Mar 2013

Holding Period	Rtn Spr (%)	Std Dev	IR	Hit Rate (%)
1-month	0.44	5.3	0.08	51.5
3-month	2.71	9.7	0.28	60.6
6-month	5.16	13.9	0.37	62.6
12-month	11.71	24.6	0.48	66.7

Table 4: ALLCAP Standardized Unexpected Bookings performance statistics, Jan 2005 – Mar 2013

MODEL

With this groundwork laid, we now turn to multifactor approaches in the semiconductor industry. Markit's original Semiconductor model, Tech Model-SEMC (SEMC), is an industry-specific model which focuses on metrics tailored to address the industry's high cyclicality and capital intensity (see *Technology Model* August 2010). Consequently, management quality and valuation indicators make up the majority of this signal. Indicators such as *Working Capital to Sales*, *Change in Receivables*, *Net Asset Value to Price*, and *Change in Quarterly Sales vs. Change in Quarterly Inventory* are included to capture targeted fundamental characteristics. The final SEMC model is organized into 5 modules capturing the following stylistic themes: Earnings Momentum (EM), Earnings Quality (EQ), Historical Growth (HG), Management Quality (MQ) and Valuation (VAL).

Our new model, SEMC2, is designed to improve upon this framework by introducing six new factors: four new semiconductor-specific operating metric indicators and one from each of our proprietary Intellectual Property and Short Sentiment factor suites.

From the Semiconductor operating metric group, we include the four indicators highlighted above: *Backlog Growth*, *Sales Growth vs Backlog Growth*, *Standardized Unexpected Backlog*, and *Standardized Unexpected Bookings*.

From Markit's Intellectual Property model, we incorporate the Technology Quality indicator (see Intellectual Property Model April 2012). Technology Quality assesses the relative quality of patented chips and processes. In the model framework, this indicator rewards companies with higher patent production and stronger citation trends, and adds a technology component that was not available at the time of original model construction.

From the Short Sentiment factor suite, we add Demand Supply Ratio (see Shining the Light on Short Interest October 2012), a measure of the total amount of shares borrowed relative to lendable inventory. Demand Supply Ratio is an improvement over standard short interest factors as it is global in nature (versus US only), and compares the total shares borrowed relative to the total amount of lendable securities (versus scaling by total shares outstanding), giving a more precise representation of available supply. In the model framework, this factor penalizes (rewards) securities with negative (positive) market sentiment.

Table 5 compares and contrasts the components of SEMC and SEMC2. The largest impact is noted for the Management Quality group where the addition of our new industry-specific metrics provides additional measures of operating efficiency, thus decreasing the weight allocated to the original component.

SEMC	Weighting	SEMC2	Weighting**
Valuation	35%	Valuation	25%
Management Quality	35%	Management Quality	20%
Earnings Quality	10%	Earnings Quality	10%
Historical Growth	10%	Historical Growth	10%
Earnings Momentum	10%	Earnings Momentum	10%
		Backlog Growth	4%
		Sales Growth vs Backlog Growth	4%
		Standardized Unexpected Backlog	4%
		Standardized Unexpected Bookings	4%
		Technology Quality	4%
		Demand Supply Ratio	4%

Table 5: SEMC and SEMC2 sub module weightings*

Moving to performance analytics, Tables 6 and 7 (see Page 7) compare SEMC2 and SEMC results, respectively, for ALLCAP and GLOBAL. First we remark that SEMC2 covers the majority of ALLCAP and GLOBAL universes, while the availability of our newly introduced semiconductor metrics is highly restricted as noted above. Therefore, we expect only marginal differences based on the new model construction (reweighted proportionately to account for unavailable data items), but strove for a more intuitive composition that capitalizes on recent factor library enhancements including the Semiconductor, Short Sentiment and IP factor suites.

In spite of the lower coverage for the new indicators, SEMC2 does indeed add value when compared to SEMC, particularly for shorter holding periods, which is opportune in this cyclical sector of the market. For the 1-month holding period, we report

	1-month			3-month			6-month			12-month		
	IC	Rtn Spr (%)	Hit Rate (%)	IC	Rtn Spr (%)	Hit Rate (%)	IC	Rtn Spr (%)	Hit Rate (%)	IC	Rtn Spr (%)	Hit Rate (%)
ALLCAP	0.054	1.43	71.7	0.078	3.66	80.8	0.096	6.73	78.8	0.114	14.53	92.9
GLOBAL	0.039	1.05	60.6	0.060	2.46	73.7	0.070	4.06	68.7	0.083	7.74	79.8

Table 6: SEMC2 performance statistics, Jan 2005 – Mar 2013

	1-month			3-month			6-month			12-month		
	IC	Rtn Spr (%)	Hit Rate (%)	IC	Rtn Spr (%)	Hit Rate (%)	IC	Rtn Spr (%)	Hit Rate (%)	IC	Rtn Spr (%)	Hit Rate (%)
ALLCAP	0.052	1.40	71.7	0.075	3.39	78.8	0.091	6.51	77.8	0.109	13.87	89.9
GLOBAL	0.035	0.90	60.6	0.057	2.43	71.7	0.066	4.42	68.7	0.077	8.57	76.8

Table 7: SEMC performance statistics, Jan 2005 – Mar 2013

an ALLCAP SEMC2 average return spread of 1.43% versus 1.40% for SEMC (although differences are not statistically significant). Figure 7 illustrates the consistent outperformance of ALLCAP SEMC2 quintile return spreads with no extended periods of negative outcomes (see Figure A1 on Page 8 of the Appendix for SEMC results). Furthermore, SEMC2 ALLCAP outperformance over SEMC is persistent across all holding periods for all reported performance metrics. We also cite a GLOBAL SEMC2 1-month average return spread of 1.05% versus 0.90% for SEMC.
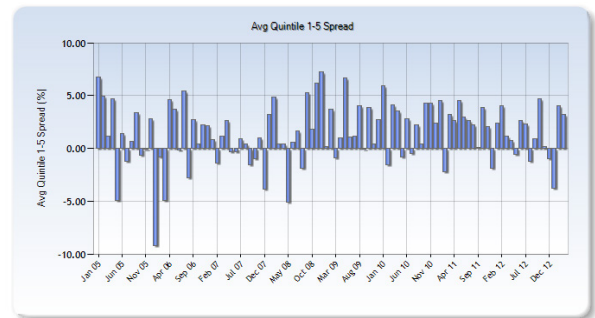
Figure 7: ALLCAP SEMC2 1-month quintile return spreads, Jan 2005 – Mar 2013

Focusing on quintile returns, Figure 8 displays ALLCAP SEMC2 averages over the test period. We observe the highest results for Q1 (1.23%), while Q5 posts an overall negative average (-0.22%). We also highlight the monotonic distribution, which is a desirable statistical attribute and more robust versus SEMC outcomes (see Figure A2 on Page 8 of the Appendix). Furthermore, incrementally decreased volatility (not reported here) on top of incrementally improved return spreads contribute to enhanced Q1 versus Q5 cumulative monthly active returns (Figure 8) over the test period versus SEMC results (see Figure A3 on Page9 of the Appendix).
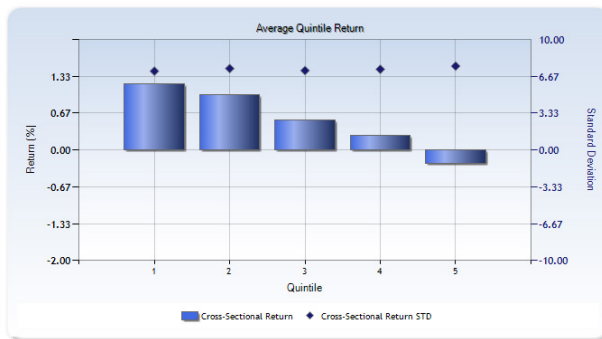

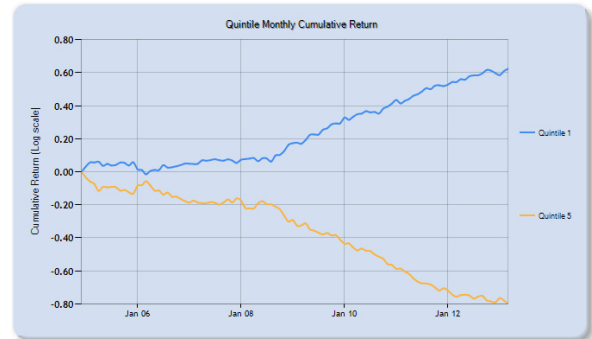Figure 8: ALLCAP SEMC2 1-month average quintile returns, Jan 2005 – Mar 2013

Figure 9: ALLCAP SEMC2 1-month quintile cumulative active returns, Jan 2005 – Mar 2013

CONCLUSION

The Semiconductor industry is inherently more volatile than many other sectors as it is highly sensitive to the effects of the broader economic cycle and characterized by ever-shortening product lifecycles and increasing peer competition. In this research note we introduce several industry-specific indicators which capture the distinct characteristics of semiconductor firms by utilizing detailed order backlog and bookings metrics.

In all, we introduce nine indicators including bookings- and backlog-based metrics along with an additional fundamental factor particularly pertinent to the semiconductor industry. Examples include *Backlog Growth*, *Standardized Unexpected Bookings*, *Bookings vs Capital Expenditures* and *Sales Growth vs Inventory Growth*. We include performance for several key metrics and report robust results in general. For instance, *Backlog Growth* posts an ALLCAP average 1-month return spread of 0.39% which increased out to a 12-month holding period (4.21%) and had a robust 62.6% hit rate. We also report an ALLCAP *Standardized Unexpected Bookings* 1-month average return spread of 0.51% reaching 13.53% at the 12-month horizon with a 73.7% hit rate.

Ultimately we improve the existing SEMC model by incorporating semiconductor industry-specific data from nonstandard datasets, including the Operating Metrics information and our proprietary Short Sentiment and Intellectual Property factor suites. The resulting SEMC2 model outperforms SEMC in general over all universes tested. Indeed, we observe an ALLCAP 1-month average return spread of 1.45% versus 1.40% for SEMC with a hit rate improvement of 5%. At a 12-month holding period, we observe an ALLCAP average return spread of nearly 15% and a hit rate above 90%.

APPENDIX

Definitions

Backlog Growth - Change in order backlog. Markit ranks this factor in descending order.

Backlog Growth vs Inventory Growth - Change in order backlog relative to change in inventory. Markit ranks this factor in ascending order.

Bookings Growth- Change in order bookings. Markit ranks this factor in descending order.

Bookings vs Capital Expenditures - Order bookings relative to capital expenditures. Markit ranks this factor in descending order.

Bookings vs R&D Expense - Order bookings relative to R&D expense. Markit ranks this factor in descending order.

Sales Growth vs Backlog Growth - Change in sales relative to change in order backlog. Markit ranks this factor in ascending order.

Sales Growth vs Inventory Growth - Change in sales relative to change in inventory. Markit ranks this factor in descending order.

Standardized Unexpected Backlog - Change in backlog relative to the historical standard deviation. Markit ranks this factor in descending order.

Standardized Unexpected Bookings - Change in bookings relative to the historical standard deviation. Markit ranks this factor in descending order.

Holding Period	Rtn Spr (%)	Std Dev	IR	Hit Rate (%)
1-month	0.41		0.09	53.5
3-month	0.11		0.01	44.4
6-month	-1.43	9.8	-0.15	40.4
12-month	-1.39	18.2	-0.08	45.5

Table A1: GLOBAL Backlog Growth performance statistics, Jan 2005 – Mar 2013

Holding Period	Rtn Spr (%)	Std Dev	IR	Hit Rate (%)
1-month	0.40		0.09	53.5
3-month	0.09		0.01	54.6
6-month	-1.20	10.7	-0.11	42.4
12-month	-0.12	18.8	-0.01	43.4

Table A2: GLOBAL Sales Growth vs Backlog Growth performance statistics, Jan 2005 – Mar 2013

Holding Period	Rtn Spr (%)	Std Dev	IR	Hit Rate (%)
1-month	-0.01		-0.00	45.5
3-month	-0.85		-0.11	46.5
6-month	-0.38	11.2	-0.03	47.5
12-month	0.24	18.6	0.01	46.5

Table A3: GLOBAL Standardized Unexpected Backlog performance statistics, Jan 2005 – Mar 2013

Holding Period	Rtn Spr (%)	Std Dev	IR	Hit Rate (%)
1-month	0.73		0.11	51.5
3-month	2.18		0.19	51.5
6-month	3.36	16.4	0.20	52.5
12-month	10.87	32.3	0.34	59.6

Table A4: GLOBAL Standardized Unexpected Bookings performance statistics, Jan 2005 – Mar 2013
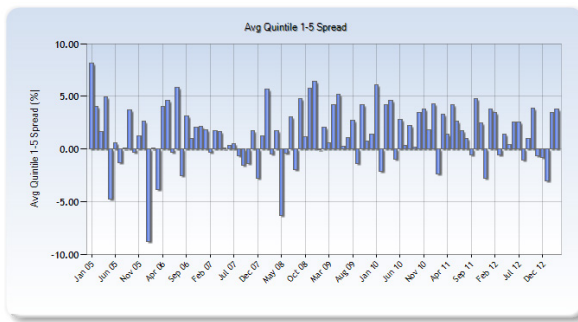
Figure A1: ALLCAP SEMC 1-month quintile return spreads, Jan 2005 – Mar 2013
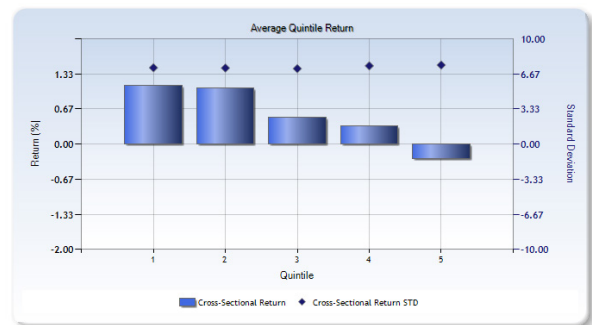
Figure A2: ALLCAP SEMC 1-month average quintile returns, Jan 2005 – Mar 2013
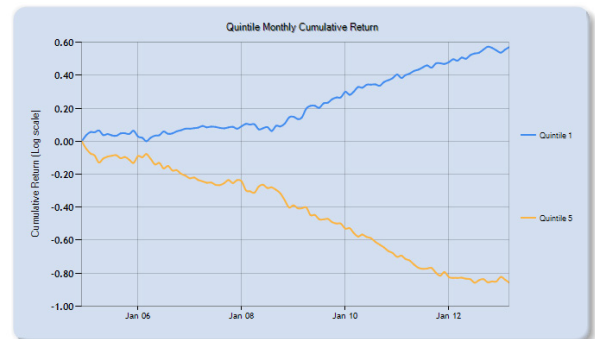
Figure A3: ALLCAP SEMC 1-month quintile cumulative active returns, Jan 2005 – Mar 2013

About Markit

Markit is a leading, global financial information services company with over 2,200+ employees.

The company provides independent data, valuations and trade processing across all asset classes in order to enhance transparency, reduce risk and improve operational efficiency.

Its client base includes the most significant institutional participants in the financial marketplace.

More Information

For more information on the products and services from Markit, please contact us at **sales@markit.com** or call one of our regional offices:

London	+ 44 20 7260 2000
New York	+ 1 212 931 4900
Naperville	+ 1 630 637 8088
Dallas	+ 1 972 560 4420
Sydney	+ 61 2 0 89 89 80
Tokyo	+ 81 3 6402 0130
Singapore	+ 65 6499 0088
Frankfurt	+ 49 69 299 868 140
Amsterdam	+ 31 20 502 5800