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Payment Power and the Cross Section of Stock Returns: *Does it Pay to Pay Consistently Late?*

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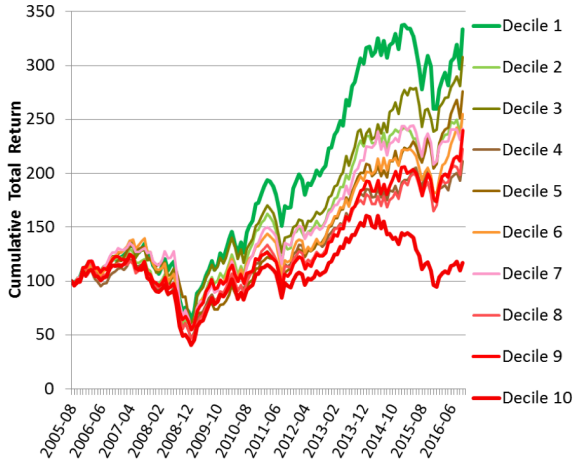
EXECUTIVE SUMMARY*

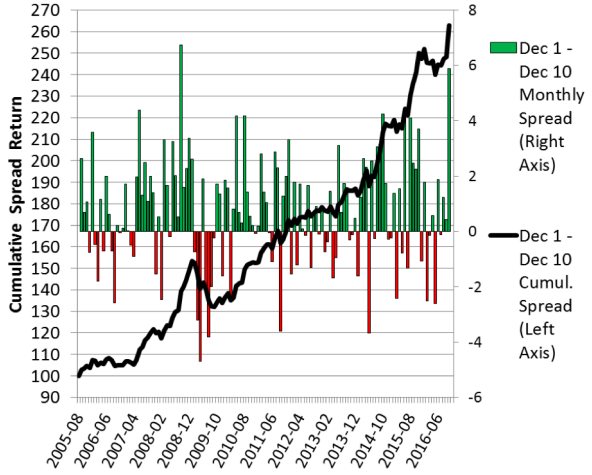
– After controlling for other effects, we find that firms that pay their suppliers *consistently late* are rewarded with higher stock returns while firms that pay their suppliers *inconsistently early* are punished with lower stock returns. In prior research, we found similar results for corporate bond credit spreads.[1] In this study, we specify this exposure with a factor, ISS_PAYNORM, on a monthly basis and find that it generates over 9% of gross annualized alpha for a long top decile / short bottom decile strategy on the largest 3,000 US stocks over the last 12 years. This alpha is persistent across time, across size, across weighting schemes and across sectors. The factor cannot be captured from market data or financial statement analysis.

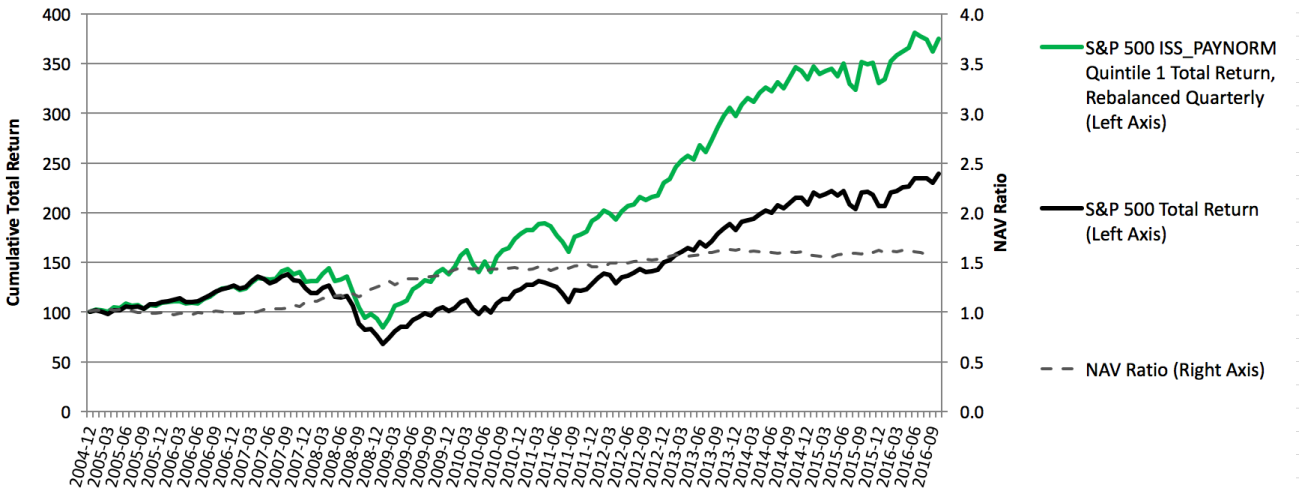
– Using this factor to rank stocks, we show three equity total return graphs below. On the top left, we show the gross cumulative total return for each factor decile portfolio for the largest 3,000 stocks each month; all equally weighted. On the top right, we show the long decile 1 – short decile 10 gross monthly and cumulative total return spread.

– Using the S&P 500 Index weights and constituent history, we show, in the bottom graph, the gross cumulative total return of the top quintile portfolio (a long-only strategy), rebalanced quarterly versus the S&P 500 Index. This strategy outperforms the S&P 500 by 3.91% per year with a lower market beta and a higher return per unit of risk.

EQUITY TOTAL RETURN GRAPHS







Source: Dun & Bradstreet

* We thank everyone from Dun & Bradstreet's Advanced Analytics Services team for their helpful comments and suggestions.

[1] For more information on our corporate bond research, please see our white paper, "Explaining the variation in U.S. corporate bond credit spreads using Dun & Bradstreet data and analytics", November, 2016.

INTRODUCTION

Trade credit is the short-term financing (e.g., 30, 60, 90 days) that a supplier gives to a buyer for the purchase of goods and/or services. For buyers, trade credit is simply measured as accounts payable on the balance sheet. By some estimates, trade credit accounts for approximately 15% to 20% of total assets and about 44% of total liabilities in the US.[2] Given its massive size, economic significance, and high turnover, it should not come as a surprise that, depending on how it's specified, it can have a dramatic influence on corporate growth and stock performance.

In a recent study, Goto, Xiao and Xu find that firms that rely more on trade credit (accounts payable) relative to other debt financing have higher subsequent stock returns.[3] They attribute this to the suppliers' private information about their customers' growth prospects. We note that trade credit (accounts payable) can grow larger due to a firm's decision to pay later, i.e., after due dates, which should also be indicative of suppliers' private information about their customers' growth prospects and market power. Business articles have proposed that larger firms benefit from delaying their payments to their small suppliers[4] while several studies in trade credit have offered economic explanations for late paying behavior. For example, Fabbri and Klapper have found that when buyers with market power make purchases from suppliers *without* market power, trade credit is generously extended.[5] Van Horen finds a strong positive correlation between customer market power and trade credit provision by the supplier.[6] Recently, Fabbri and Klapper find that buyers with bargaining power over their suppliers are able to extend their payment period beyond what has been offered by their suppliers, thereby generating overdue payments.[7] Other studies have found that the market power of buyers and the corresponding fear of harming commercial relationships with clients are important factors in determining whether creditors accept or refuse late payment.[8] These findings suggest that buyers and suppliers use trade credit as a competitive device. Furthermore, our previous research on corporate bonds[9] showed that, after controlling for other effects, companies are rewarded with lower credit spreads when they consistently pay suppliers later. Motivated by these findings, we explicitly link payment behavior of trade credit to stock returns.

In this study, we find strong evidence that buyers that *consistently pay bills later*, experience substantially higher stock returns. Conversely, buyers that *inconsistently pay bills early*, experience substantially lower stock returns. While this likely reflects the suppliers' private information about their customers' growth prospects and market power, we believe that a tactical working capital strategy to pay later can benefit the buyer by improving cash flow while also reducing the need for short-term financing in order to meet accounts payable. Furthermore, regularly delayed payments free up cash for other investments while supplying leverage to negotiate with suppliers on price and/or quantity. Conversely, inconsistent early paying buyers are signaling that they don't have market power over their suppliers because they are trying to maintain a positive cash flow while also trying to appease their suppliers by paying early. In order to understand how we specify this, we have to first introduce Dun & Bradstreet's PAYDEX and PAYNORM scores which measure the *promptness* of bill paying relative to agreed upon terms. These scores have been recognized as the standard in commercial credit reporting for more than thirty-five years.

[2] For more information, please see "What do we know about capital structure? Some evidence from international data," by Raghuram G. Rajan and Luigi Zingales. *Journal of Finance*, Vol. 50, No. 5, Dec. 1995, pp. 1421-1460 and also "Trade credit and its role in entrepreneurial finance," by Vicente Cuñat and Emilia Garcia-Appendini (In: Cumming, D. (Ed.), 2012, Oxford Handbook of Entrepreneurial Finance, Oxford University Press, New York, pp. 526-557).

[3] For more information, please see "As told by the supplier: Trade credit and the cross section of stock returns," by Shingo Goto, Gang Xiao, Yan Xu. *Journal of Banking & Finance*, Vol. 60, Nov. 2015, Pages 296-309.

[4] For more information, please see the following articles:

"Big Companies Don't Pay Their Bills on Time - Bloomberg View", Justin Fox, September 15, 2015, *Bloomberg View.*

"Big Companies Pay Later, Squeezing Their Suppliers" - The New York Times, Stephanie Strom, April 6, 2015, *The New York Times.*

"When Your Big Customer Wants to Pay Late" - CFO.com, David Rosenbaum, January 28, 2013, *CFO.com.*

"Small Firms' Big Customers Are Slow to Pay" - WSJ, Angus Loten, June 6, 2012, *Wall Street Journal.*

[5] For more information, please see "Trade Credit and the Supply Chain" by Daniela Fabbri, Amsterdam Business School and Leora F. Klapper, The World Bank, July, 2009.

[6] For more information, please see "Customer Market Power and the Provision of Trade Credit: Evidence from Eastern Europe and Central Asia" by Neeltje Van Horen, Policy Research Working Paper; No. 4284. *The World Bank*, 2007.

[7] For more information, please see "Bargaining Power and Trade Credit" by Daniela Fabbri and Leora F. Klapper, *Journal of Corporate Finance*, Volume 41, Dec. 2016, Pages 66-80.

[8] For more information, please see The European Communities Commission Staff Working Document, "Proposal for a Directive of the European Parliament and of the Council on combating late payment in commercial transactions – Impact assessment", 2009.

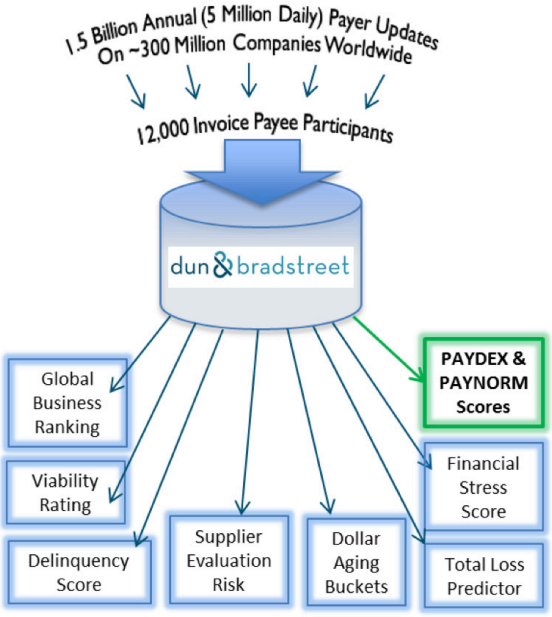
[9] For more information, please see our white paper, "Explaining the variation in U.S. corporate bond credit spreads using Dun & Bradstreet data and analytics", November, 2016.

DUN & BRADSTREET DATA

Dun & Bradstreet manages the largest B2B commercial database in the world. At the core of this data is a proprietary trade program composed of many thousands of participants that collect detailed payment (invoice) information on approximately 300 million companies worldwide. The information collected allows Dun & Bradstreet to define and better understand how companies pay each other (e.g. how does Apple pay its bills?), to better understand supply chain networks (e.g. who are Apple's most important suppliers?) and to better understand what factors are significant in determining credit risk and growth opportunities. This trade program information is processed and used in many Dun & Bradstreet credit scores, models and data elements, but up until now, has yet to be applied to stock selection.

Below, Figure 1 illustrates this trade credit ecosystem and highlights two scores that use this information, PAYDEX and PAYNORM. The 0 to 100 PAYDEX score is a unique dollar-weighted indicator representing how ***timely*** a firm pays its bills *according to terms*, based on payment experiences reported to Dun & Bradstreet through its trade program. Dun & Bradstreet needs at least three trade experiences from two unique suppliers in order to calculate a PAYDEX score. A PAYDEX score is regularly calculated for five to ten *million* US firms. A score of 80 indicates that payments have been made on time, i.e., are prompt. Scores greater than 80 indicate that payments have been made early; this usually happens because buyers are acting on discounted offers for early payment from their suppliers. Scores that are less than 80 indicate that payments have been made late. The table below outlines the specific 0 - 100 score and what it means.

FIGURE 1. THE DUN & BRADSTREET TRADE CREDIT *ECOSYSTEM* FEEDS INTO MANY SCORES AND MODELS INCLUDING THE PAYDEX AND PAYNORM SCORES.



Source: Dun & Bradstreet

PAYDEX SCORE:	INDICATES THE FOLLOWING PAYMENT PRACTICES:
100	Anticipates
90	Discounts
80	Prompt
70	15 days beyond terms
60	22 days beyond terms
50	30 days beyond terms
40	60 days beyond terms
30	90 days beyond terms
20	120 days beyond terms
0 – 19	Over 120 days beyond terms
UN	Unavailable
PAYNORM Score	The PAYNORM score is the median PAYDEX score for each peer group across SIC primary code industries and size buckets. Specifically, there are 7 size buckets (measured on sales and/or number of employees) and up to 1,005 4-digit SIC industries used. Accordingly, each of these 7,035 peer groups (= 7 x 1,005) has its own PAYNORM value. If there aren't enough companies in a peer group, then the 3-digit SIC industry group is used instead (there are 416 3-digit SIC industry groups).[10]

As described in Figure 1, the PAYNORM score is the median PAYDEX score per peer group of firms. Peer groups are determined using seven size buckets (measured on sales and/or number of employees) and up to 1,005 primary SIC (Standard Industrial Classification) groupings. Because 95% of all US publicly listed equities are in the largest size bucket, most of the peer representation in this space is due to the highly granular primary SIC groupings. In recent months, a little over 500 primary SIC industries and a little over 600 peer groups (each with its own PAYNORM score) were represented within the US publicly listed equities universe with an average of *only about 6 stocks per peer group* – the remaining firms for these peer groups were privately held in order that the minimum number of required firms be represented for each peer group (please see footnote 10 for details). Accordingly, each stock's PAYNORM score can actually reflect payment information from both the public and private markets for its peer group. Given the fact that among companies with 500 or more employees, over 85% are privately held[11], this additional private company information provides far better breadth of coverage for a given peer group. Furthermore, because of the high degree of similarity of firms within a peer group, there should also be a high degree of commonality of suppliers across firms within a peer group. Lastly, because the PAYNORM score is the *median* PAYDEX score per peer group, it is more likely to reflect broad trends within the peer group and less likely to be affected by outliers.

[10] Within each 4-digit SIC, we bucket size on sales; if sales is unavailable, we use total number of employees per the below table. There are a default minimum number of required firms per bucket.

SALES RANGES	DEFAULT MINIMUM NUMBER OF FIRMS	EMPLOYEE RANGES
$1 – 49,999	125	0 – 4
$50,000 – 99,999	175	5 – 9
$100,000 – 249,999	350	10 – 19
$250,000 – 499,999	225	20 – 49
$500,000 – 999,999	150	50 – 99
$1,000,000 –	200	100+
$5,000,000+	75	

If less than the default number of firms are in any particular sample size, a "step-down" logic is used to derive the sample size at the 3-digit SIC level. If there are still an insufficient number of required firms, then the total number of firms in the 3-digit SIC are used. For example, if only 29 firms are present with SIC 5213 and sales between $250,000-499,999 or employee range of 20-49 employees, then records at SIC 521X are selected using the same sales and employee criteria. If there are an insufficient number of firms in the sample size then the total number of firms in SIC 521X is used.

[11] For details, please see Dun & Bradstreet's white paper *"Alternative Data: The Hidden Source of Alpha"* by Robert Iati, 2016.

PAYDEX & PAYNORM SCORES, THE COST OF TRADE CREDIT, U.S. ACCOUNTING PRINCIPLES, MARKET POWER OVER SUPPLIERS, FIRM SIZE AND SIGNALING

Early academic literature showed that the cost of trade credit is much higher than the cost of short-term commercial bank loans because of the two-term early payment discounts that are sometimes offered, e.g., a 2% discount if paid within 10 days, otherwise a 0% discount if paid within 30 days. Early payment discounting implies a high annualized cost if such offers are declined; however, recent studies show that early payment discounts are offered only about 20% of the time.[12] Accordingly, the actual cost of trade credit is, on average, far lower because most suppliers don't offer an early payment discount while the median cost of trade credit is actually zero. If there are any costs associated with trade credit, they are not included in a weighted average cost of capital, or WACC calculation. WACC is calculated only on debt and equity from investors, not accounts payable; accordingly, even though buyers that pay later without incurring any additional costs are *effectively* reducing their short-term borrowing costs while improving their cash-flow, WACC is not affected. Furthermore, Paul reports that nearly 75% of suppliers never impose penalties on late payments.[13] A supplier may, on a discretionary basis, allow a customer to pay after the agreed date without a penalty. Absorbing the cost of late payment without penalties would only be profitable to a supplier if the supplier believed that the benefits or opportunities outweigh the costs. The supplier's perceived opportunities could be due to the size, scale or growth of the buyer as have been suggested by others.[14]

Per U.S.-based accrual accounting practices, companies record expenditures when matched with related earnings, not when actually paid. Accordingly, paying earlier or later has no direct impact on net income. However, it does impact the statement of cash flows. Accounts payable is the summed amount that a firm owes its suppliers that are payable in the near future, e.g., 30, 60, 90 days, etc. Without payables and trade credit, a firm would have to pay for all of its goods and services at the time of purchase. However, with trade credit, a firm can temporarily increase operating cash flow by simply stretching out its accounts payable, i.e., delaying payments to suppliers. If a firm or peer group of buyers has enough market power over its suppliers, it can delay payments for longer and can do it repeatedly without penalty or loss of suppliers. Each day a firm delays paying, it stops cash from flowing out and takes advantage of free trade credit (i.e., free short-term financing) if no penalties are imposed. This free trade credit can be used for investments in operations, share buy-backs, etc… and can be repeated indefinitely if a company or peer group continues to maintain market power over its suppliers. Per Michael Porter's "Five Forces" framework for industry analysis, market power is important in order to avoid loosing key suppliers; market power can also be achieved when there are enough easily substitutable suppliers that allow for a peer group to maintain a low PAYNORM score.[15] While this power over suppliers gives the company or peer group control over its reported quarterly cash-flows, it also gives them bargaining power to negotiate with their suppliers on price (which *would* affect net income) and quantity too.

For 99.9% of the five to ten million US firms that have a PAYDEX score, a lower score means that a firm should be considered less credit-worthy because it pays its bills later. This could imply that a firm doesn't have the cash on hand to pay its suppliers and therefore has to rely on trade credit to make payments – a very legitimate risk for prospective business partners or commercial lenders. On the left side of Figure 2, one can see a strong linear relationship between size and PAYDEX score for the largest **150,000** US firms deciled by sales; larger firms tend to pay earlier. However, when we magnify the largest decile of **15,000** firms and re-decile on the right, we see this relationship begin to invert; now the largest (mostly publicly traded firms) tend to pay later. The rationale for this is that while small firms pay later because they don't have the cash on hand to pay their suppliers, the largest, publicly traded firms pay later, not because they don't have cash, but because they have the market power over their suppliers to do so. Large firms that can pay consistently later without penalty or loss of suppliers will benefit by:

1. Increasing their cash-flow and improving their cash-flow management,
2. Avoiding short-term financing to meet payables,
3. Investing the extra cash,
4. Increasing their bargaining power over suppliers on price and volume.

[12] For more information, please see "What You Sell Is What You Lend? Explaining Trade Credit Contracts," by Mariassunta Giannetti, Mike Burkart and Tore Ellingsen. The Review of Financial Studies, Vol. 24 (4): pages 1261-1298, April, 2011.

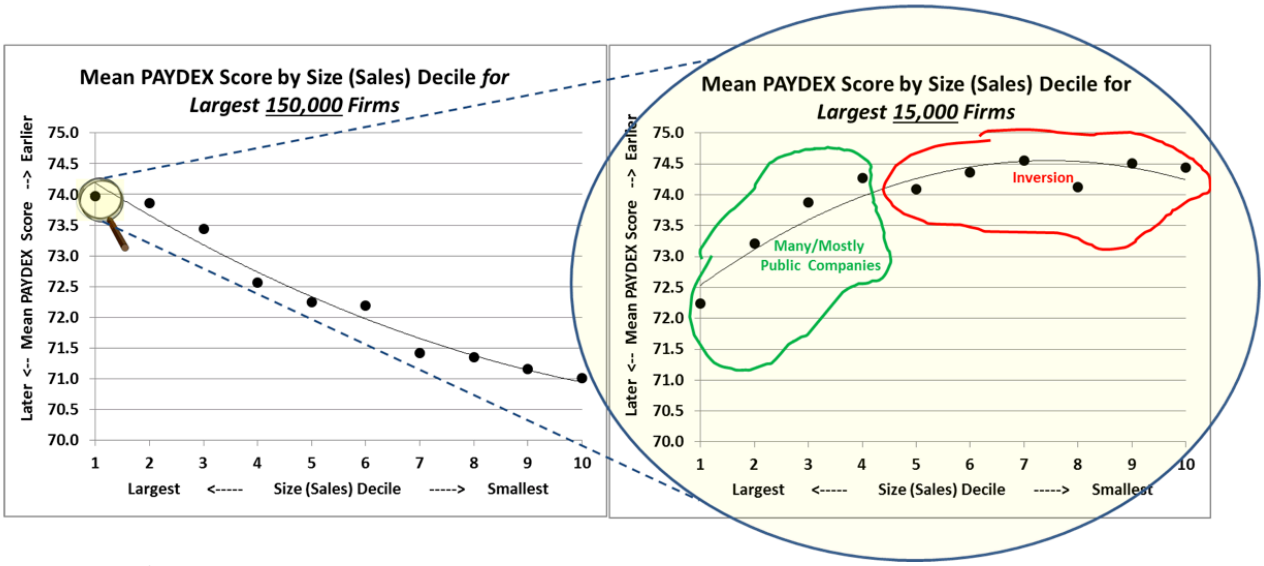
[13] For more information, please see "Strategic Trade Credit: An Empirical Study", by S.Y. Paul, 2010. (Mauritius: VDM Publishing House Ltd).

[14] For more information, please see, "Trade credit and its role in entrepreneurial finance," by Vicente Cuñat and Emia Garcia-Appendini (In: Cumming, D. (Ed.), 2012, Oxford Handbook of Entrepreneurial Finance, Oxford University Press, New York, pp. 526-557).
"Ending late payment – Part 1: Taking Stock," by Manos Schizas, 2012, The Association of Chartered Certified Accountants, February 2015.

[15] Porter's "Five Forces" theory is a popular framework for industry analysis and strategy development, designed by Harvard University professor Michael E. Porter, which posits that competitive intensity and attractiveness of any market is determined by the bargaining power of customers, the threat of substitute products or services, the bargaining power of suppliers, the threat of new entrants and rivalry among existing competitors. For more information, please see "How Competitive Forces Shape Strategy" by Michael E. Porter, Harvard Business Review, March, 1979.

As alluded to above, the consistency of bill paying is vitally important. Dun & Bradstreet has, in some credit modeling, specifically included a PAYDEX volatility term. Generally, the higher the volatility of PAYDEX, the bigger the credit risk because it indicates that a company's payment behavior is less predictable. A volatile PAYDEX score likely indicates that the firm's own accounts receivables is also volatile—that is, the firm is only paying suppliers when it has the cash on hand. Alternatively, this might indicate that the firm doesn't have a working capital strategy and, accordingly, is paying without much thought to its own cash flow management. Either way, we expect that a more volatile PAYDEX score should have a negative impact on corporate performance and stock returns.

FIGURE 2. MEAN PAYDEX SCORE BY SIZE (SALES) DECILE FOR THE LARGEST 150,000 US FIRMS ON THE LEFT. WE MAGNIFY THE LARGEST DECILE OF 15,000 FIRMS ON THE RIGHT AND RE-DECILE. *WITHIN THE LARGEST 15,000 FIRMS ON THE RIGHT, THE RELATIONSHIP BEGINS TO INVERT → NOW, THE LARGEST FIRMS (MANY/MOSTLY PUBLICLY TRADED) PAY LATER.*

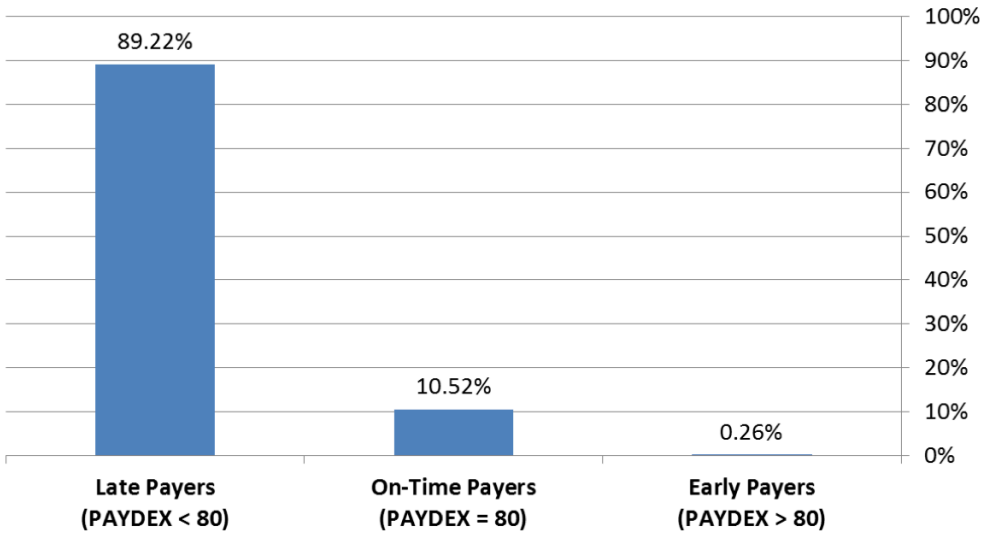


Source: Dun & Bradstreet

In Figure 3, we see that almost 90% of all publicly listed companies pay their bills late. Given the four potential accounting and economic benefits listed above, we aren't entirely surprised by this. We believe that most of these late payers are using trade credit as a competitive device. Interestingly, of the ~10.5% of on-time payers with PAYDEX scores equal to 80, the overwhelming majority (~99%) have a 12 mo. standard deviation of PAYDEX equal to zero. We believe that these firms have the steady stream of receivables to meet their accounts payables, but they choose not to use trade credit as a competitive device. These firms tend to be only slightly smaller than average while their stock performance isn't noticeably different from all other firms. The firms that pay early (PAYDEX > 80) are so few in number, that we can't generalize findings for this group. Having said that, these firms also tend to be smaller than average while their stock performance, although above average, is not significantly different from all other firms. In Figure 4 below, we show monthly PAYDEX score versus market capitalization for all US listed stocks over the past 12 years. We see that larger-caps tend to concentrate in the later paying PAYDEX range of 40 to 80 while only micro-caps can be found with PAYDEX scores below 40 (severely delinquent) and above 83 (recipients of early payment discounts). Given the above discussion of PAYDEX versus firm size, accounting principles and market power, we provide some signaling interpretation for these groupings in Figure 4. However, a buyer that consistently pays late can be categorized as either:

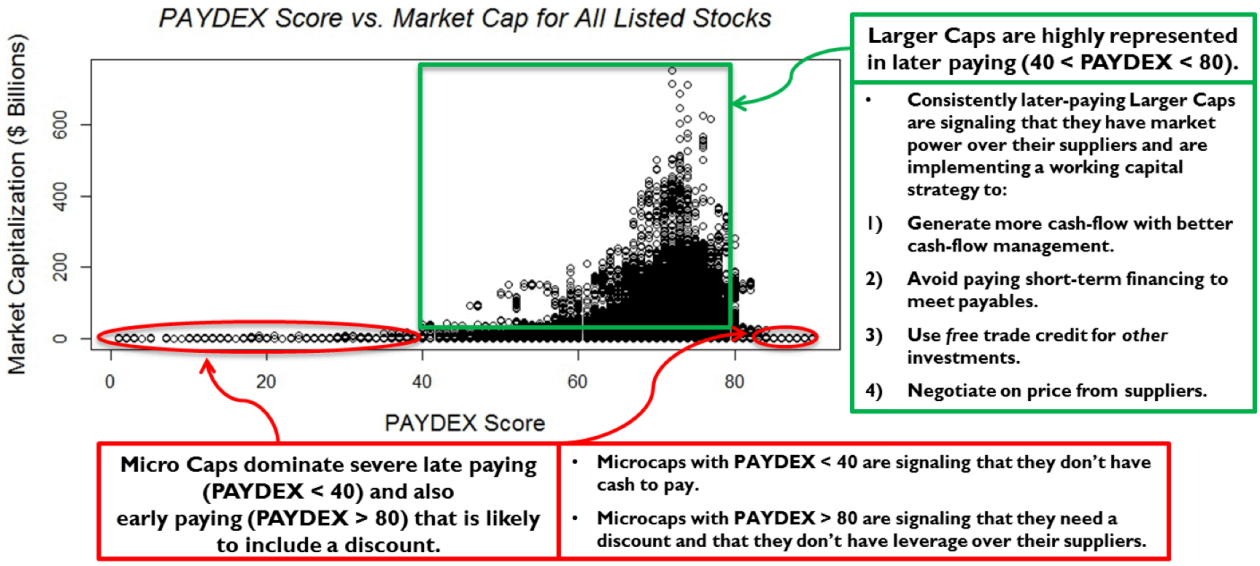
1. A firm that is exerting its market power by implementing a tactical working capital strategy to maximize cash-flow; or
2. A firm that is experiencing cash-flow problems of its own and is actually a default risk.

FIGURE 3. PERCENTAGE OF ALL U.S. LISTED COMPANIES FROM 2005 TO 2016 THAT ARE LATE PAYERS (PAYDEX < 80), ON-TIME PAYERS (PAYDEX = 80), AND EARLY PAYERS (PAYDEX > 80).



Source: Dun & Bradstreet

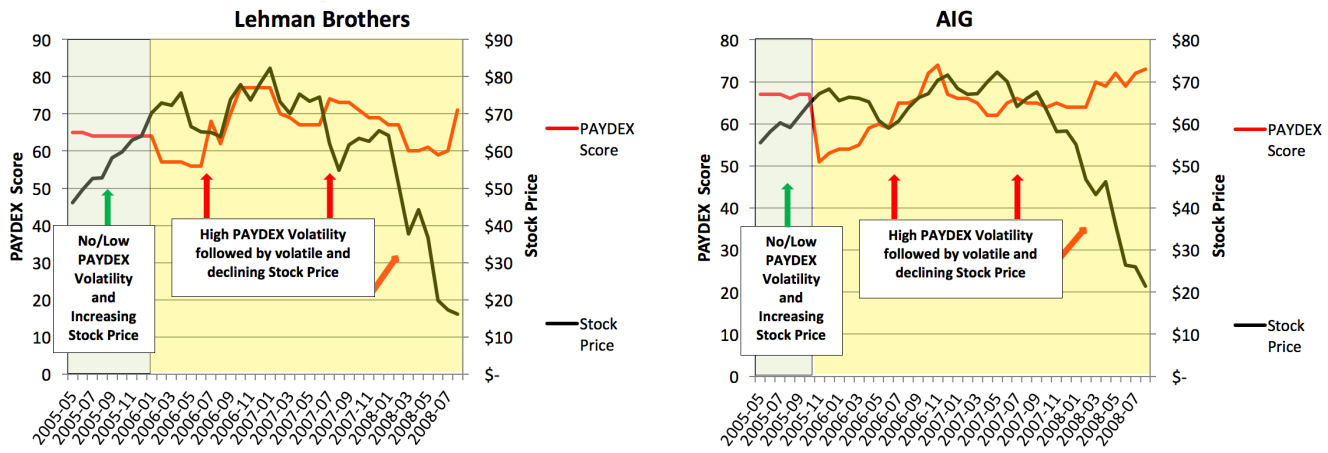
FIGURE 4. PAYDEX SCORE VS. MARKET CAPITALIZATION AND SIGNALING. MONTHLY PAYDEX SCORES FOR ALL U.S. LISTED STOCKS FROM 2005 TO 2016.



Source: Dun & Bradstreet

There are several ways to distinguish between these two groups. First, there is size. Typically, larger firms implement tactical working capital strategies while smaller firms do not. Second, there is the degree of lateness. A firm that is consistently paying 22 days beyond terms (a PAYDEX score of 60) is more likely implementing a tactical working capital strategy than a firm that is consistently paying 90 days beyond terms (a PAYDEX score of 30). The latter firm is also more likely to have penalties imposed, especially if it is a smaller, less significant buyer without market power. Given the distribution in Figure 4, a strong argument can be made that firms with PAYDEX scores between 40 and 80 are using trade credit, within reason, to their advantage. Since there are no large capitalization firms with PAYDEX scores below 40, *severe* delinquency is *not* likely a tactical or repeatable cash flow management strategy, but is likely an indication that a firm is experiencing cash-flow problems of its own. A more telling indicator of the market power of large cap firms over their suppliers is the *volatility* of PAYDEX. If a large firm can pay its suppliers consistently late (i.e., a low average PAYDEX score with low volatility), it could mean that the firm is finding little resistance from it's suppliers and that its cash flow management is stable. However, if there is an uptick in PAYDEX volatility, it could mean that a firm is loosing market power over its suppliers (e.g., suppliers begin imposing late payment penalties) and that it is encountering a period of instability in cash flow management. For example, in Figure 5, we show the monthly PAYDEX scores and stock prices for Lehman Brothers and AIG going into the financial crisis of 2007 / 2008. In 2005, we see a period of low PAYDEX volatility and increasing stock prices for both firms. Then, in early 2006, we see PAYDEX scores for both firms suddenly drop, perhaps as a first indication that these firms were attempting to improve their cash flow. However, over the course of 2006, PAYDEX scores crept back up, albeit, with increased volatility. As the mortgage crises evolved into a broad financial crisis, suppliers likely began demanding earlier payment while many financial companies were likely compelled to pay earlier in order to quell the fears of their investors and clients. Interestingly, we see PAYDEX scores for both firms increase somewhat dramatically in August, 2008, the month *before* the respective bankruptcy and bailout for each firm. In fact, we see this pattern of earlier, but more volatile payment behavior in the PAYNORM scores for many peer groups in the Financial sector over this period. This was likely due to the commonality of suppliers and the financial conditions across firms within these peer groups.

FIGURE 5. PAYDEX SCORES AND STOCK PRICES FOR LEHMAN BROTHERS AND AIG GOING INTO THE FINANCIAL CRISIS OF 2007/2008.



Source: Dun & Bradstreet

PAYDEX AND PAYNORM SCORES *CANNOT* BE EXTRACTED FROM FINANCIAL STATEMENTS

Financial analysts know that they can extract certain key metrics from financial statements like Days Inventory Outstanding (DIO) and Days Sales Outstanding (DSO) and Days Payables Outstanding (DPO) in order to calculate the Cash Conversion Cycle (CCC), or the number of days it takes a company to convert its investment in inventory and other resource inputs into cash over an operating cycle.[16] The shorter the CCC, the more efficient a company is, the quicker it can turn unfinished product into cash. Therefore, companies strive to reduce their CCC by 1) selling their inventory more quickly (reducing DIO), 2) collecting receivables more quickly (reducing DSO) or 3) paying accounts payable more slowly (increasing DPO). Sometimes, selling inventory or collecting receivables more quickly is hard to control, but if a company has market power over its suppliers, it can pay more slowly without loosing suppliers or incurring penalties and earn a bigger and/or more consistent return on its working capital.

As useful as the CCC is, it has the following major flaws:

1. The CCC can only be calculated for retail and manufacturing industries that deal in actual inventories. For consulting businesses, software companies, insurance companies and banking companies, the cash conversion cycle is essentially meaningless and cannot be extracted from financial statements.
2. Certain industries like jewelry, for example, have much longer cash conversion cycles relative to other shorter shelf-life industries like groceries. Accordingly, while the CCC might be useful to compare companies within an industry, it might be less effective across industries.
3. Cash conversion cycles can only be calculated using quarterly financial statements. Information that is updated more frequently would be better.
4. CCC and DPO do not explicitly capture days relative to agreed upon terms. PAYDEX and PAYNORM scores are normalized metrics *per agreement terms* that are updated more frequently and are applicable and comparable across all industries. Because these scores are based on agreed upon terms, they effectively measure the extent to which a firm or peer group deviates from agreed upon terms.

DATA

STOCK UNIVERSE, PRICES, FUTURE RETURNS AND DUN & BRADSTREET DATA

We received stock data directly from Standard & Poor's. We investigate all stocks in the Standard & Poor's Total Market Index (TMI) on a monthly basis from September, 2005 to November, 2016. This index includes all seasoned primary exchange listed common stocks and REITs on ten U.S. exchanges[17] with between 3,452 and 4,638 constituents over the 135 months. From within this universe, for each month, we investigate a relatively liquid and investable universe of the largest 3,000 capitalization stocks (Top 3,000). Separately, we do the same for the S&P 500 Index and its constituent weights. Month-end prices are primary exchange closing prices while total returns are calculated by Standard & Poor's. We merge these data sets with Dun & Bradstreet's monthly Credit Score Archive Database (CSAD) file which is updated over the first weekend of every calendar month and includes PAYDEX and PAYNORM scores. In order to avoid any look-ahead bias, we specify that, for a given calendar month's CSAD data, we explore the *subsequent* calendar month's total return (calendar month-end close to calendar month-end close). Accordingly, in practice, a user would receive updated CSAD data on the first weekend of calendar Month t in order to forecast returns for calendar Month t+1 and beyond. This means that there is always a ~3 to 4 week lag between the updated PAYDEX and PAYNORM scores during the first weekend of calendar Month t and the beginning of the calendar Month t+1 return period.

[16] CCC = DIO + DSO - DPO.

[17] For more information, please see "S&P U.S. Indices Methodology" February, 2017 at http://us.spindices.com/index-finder/.

FACTOR SPECIFICATION

In order to capture consistent late paying behavior versus inconsistent early paying behavior, we specify two inverted standardized scores (ISS), one for PAYDEX and another for PAYNORM:

$$1)\ \text{ISS\_PAYDEX} = \frac{(100 - \text{12mo average PAYDEX score})}{(\text{12mo standard deviation PAYDEX score})}$$

$$2)\ \text{ISS\_PAYNORM} = \frac{(100 - \text{12mo average PAYNORM score})}{(\text{12mo standard deviation PAYNORM score})}$$

While we employ a 12-month period in order to avoid seasonality, we also require at least 3 consecutive months of PAYDEX or PAYNORM scores, but this is typically only needed for new issues (companies that enter the universe due to IPOs, spin-offs etc). In order to avoid zero denominator errors, we replace zero standard deviations with 0.25 which is regularly below the next lowest standard deviation for both PAYDEX and PAYNORM across all stocks and time periods.

Generally, the higher the ISS_PAYDEX, the more consistently late the company pays while the lower the ISS_PAYDEX, the more inconsistently early the company pays. Similarly, the higher the ISS_PAYNORM, the more consistently late the *peer group* pays while the lower the ISS_PAYNORM, the more inconsistently early the *peer group* pays.

We expect stocks with high ISS_PAYDEX scores to do better than stocks with low ISS_PAYDEX scores. We also expect stocks with high ISS_PAYNORM scores to do better than stocks with low ISS_PAYNORM scores. However, we believe that the signal will be stronger for ISS_PAYNORM because of the commonality of suppliers for firms within a peer group. As pointed out by Michael Porter, the degree of bargaining power that a company might experience is largely a function of industry analysis. A buyer might try to deviate from its competitors by paying consistently later, but if it doesn't have a competitive advantage, it will loose suppliers to its competition. However, if an entire peer group can pay consistently late, suppliers might not have an alternative, but to accept those conditions.

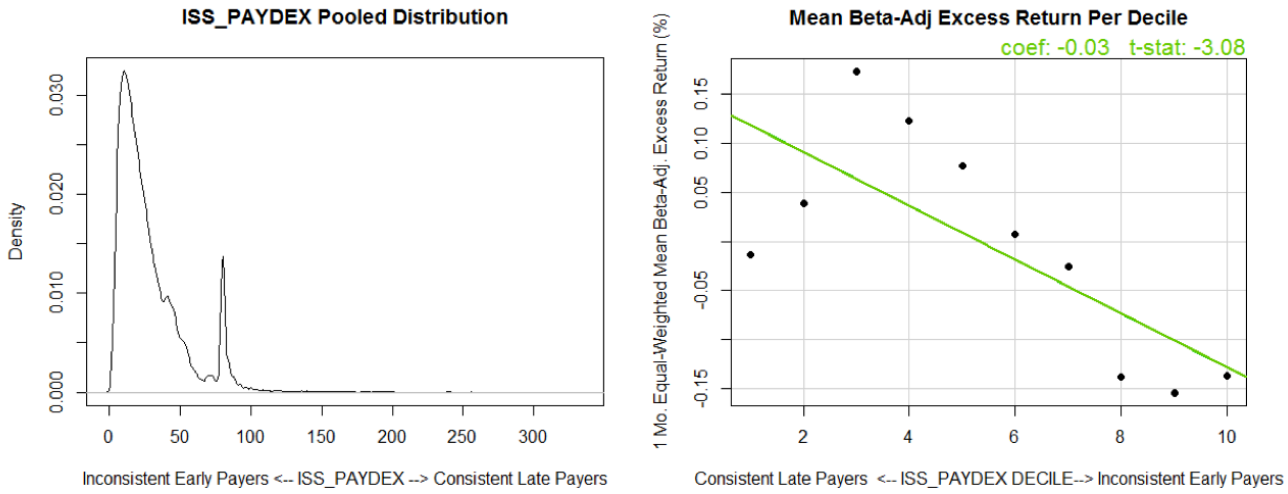
EMPIRICAL DESIGN

We first explore ISS_PAYDEX and ISS_PAYNORM for a broad, yet investable universe of the top 3,000 largest market capitalization stocks each month from September, 2005 to November, 2016 (we generically refer to this universe as the Top 3,000 from this point forward). For both factors, we begin by exploring the entire pooled distribution. We determine if portfolios with higher ISS_PAYDEX and higher ISS_PAYNORM scores earn higher market beta-adjusted excess stock returns. Using the Top 3,000 universe at each month t, we sort the sample of firms into 10 decile portfolios with Decile 1 having the highest ISS scores and Decile 10 having the lowest ISS scores (deciling and other forms of ranking linearize the data, a beneficial quality for modeling and testing). For each decile portfolio, we calculate the mean equal-weighted market beta-adjusted excess stock return for month t+1 and rebalance the portfolios at each month-end. Stock betas are calculated for month t using the prior 60 trading days with the TMI Index as the market. We'll also explore the time series of total returns for each decile. If we find significant results, we'll neutralize sector exposures (using Global Industry Classifications) and re-test. With time series analysis, we determine if the total returns can be explained by the Fama-French five-factor model, price momentum, price reversion, accruals, cash flow/price or low volatility. We'll explore performance for equal-weighted portfolios and capitalization-weighted portfolios. We'll also explore the S&P 500 Index with its respective constituent history and weights from January, 2005 to November, 2016 and determine if there is evidence for a long-only strategy. All returns are shown as gross returns (no transaction costs or market impact costs are deducted, unless specified).

DISTRIBUTION AND MEAN MARKET BETA-ADJUSTED EXCESS RETURNS PER DECILE FOR ISS_PAYDEX

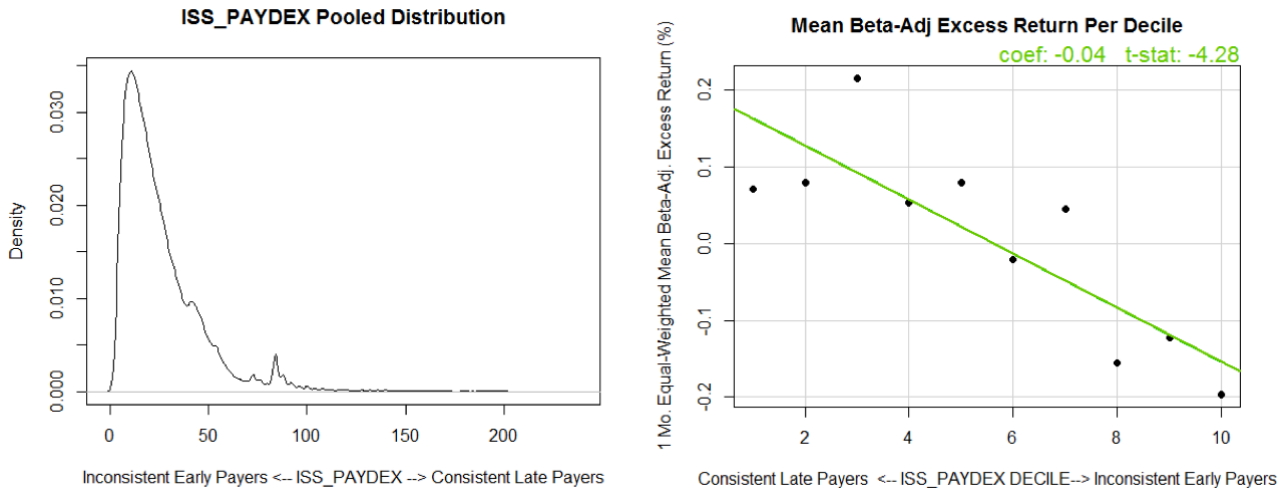
In Figure 6's graph on the left, we see a peculiar spike in the ISS_PAYDEX distribution at around 80. In the graph on the right, we see a fairly negative, monotonic relationship across the mean market beta-adjusted excess returns per decile, except for Deciles 1 and 2; the monthly mean historical Long Decile 1 – Short Decile 10 market beta-adjusted excess spread return is 0.155 % with a t-value of 1.35 and p-value of 0.089. As it turns out, the unusual spike in the distribution and the under-performance of Deciles 1 and 2 are related. The distribution spike is due to the ~9% of Top 3,000 firms that have an average PAYDEX of 80 with zero volatility and, consequently, have a relatively high ISS_PAYDEX score of 80 (= (100 – 80) / 0.25). As previously mentioned, these firms don't use trade credit as a competitive tool to help manage cash flow, but instead, opt to pay perfectly on-time. However, on a monthly basis, these firms almost always rank in Deciles 1 or 2, helping to bring down the mean performance for these two deciles. Furthermore, we find many stocks in Deciles 1 and 2 with average PAYDEX scores below 40. Per this finding and the previous signaling discussion, we believe that a strong argument is made to restrict the ISS_PAYDEX universe to stocks with PAYDEX scores between 40 and 80. This way, we are left with firms that are likely trying to use trade credit as competitive device to manage cash flow while also managing their supplier relationships. In doing so, we are left with, on average, about 91% of the Top 3,000 largest stocks. For these stocks, the distribution and re-deciled mean excess returns are shown in Figure 7. The distribution spike is much reduced (there is still a bump near 80 due to stocks with average PAYDEX scores of 79 with zero volatility) while the mean excess returns per decile are now more negatively monotonic. Now, the mean monthly historical Long Decile 1 – Short Decile 10 excess spread return is 0**.289% with a t-test of 2.37** and p-value of 0.009.

FIGURE 6. ISS_PAYDEX POOLED DISTRIBUTION (ON LEFT) AND 1-MO. EQUAL-WEIGHTED MEAN MARKET BETA-ADJUSTED EXCESS RETURN PER ISS_PAYDEX DECILE (ON RIGHT) FOR TOP 3,000 US LISTED STOCKS EACH MONTH FROM 2005 TO 2016.



Source: Dun & Bradstreet

FIGURE 7. ISS_PAYDEX POOLED DISTRIBUTION (ON LEFT) AND 1-MO. EQUAL-WEIGHTED MEAN MARKET BETA-ADJUSTED EXCESS RETURN PER ISS_PAYDEX DECILE (ON RIGHT) FOR TOP 3,000 US LISTED STOCKS EACH MONTH FROM 2005 TO 2016 *WITH PAYDEX SCORES BETWEEN 40 AND 80.*



Source: Dun & Bradstreet

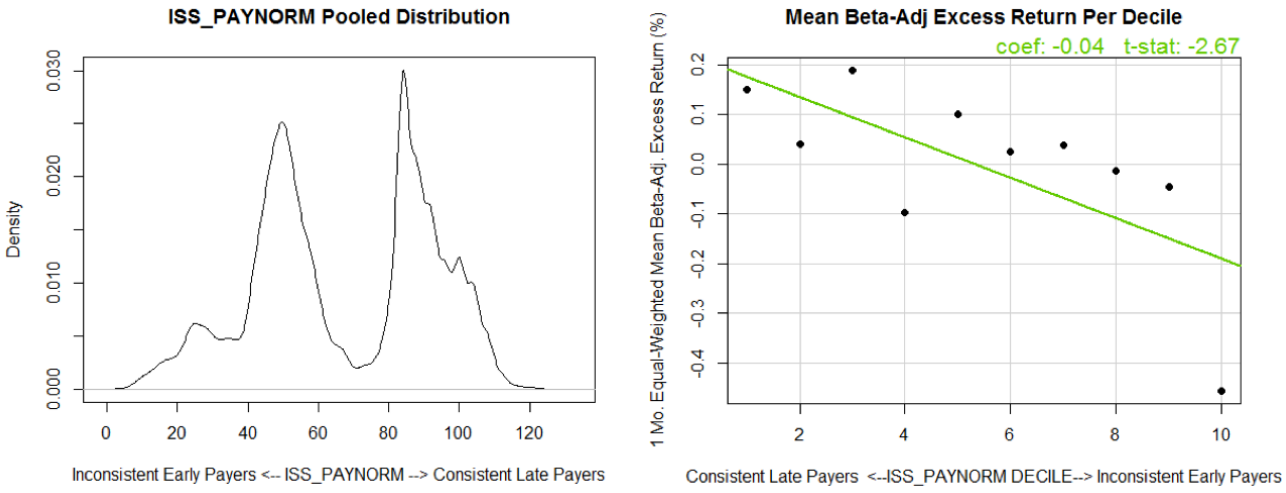
DISTRIBUTION AND MEAN MARKET BETA-ADJUSTED EXCESS RETURNS PER DECILE FOR ISS_PAYNORM

In Figure 8's graph on the left, we see a bimodal distribution of ISS_PAYNORM. The distribution peak on the right side is made up of multiple peer groups with average PAYNORM scores in the 70's with zero deviations. The distribution peak on the left side is made up of multiple peer groups with average PAYNORM scores also in the 70's, but with standard deviations in the 0.30 to 0.55 range. ISS_PAYNORM scores below 40 are due mostly to PAYNORM standard deviations rising above 1. Since peer groups with average PAYNORM scores of 80 occur only 1.5% of the time and are found across ISS_PAYNORM Deciles 2 to 6, they don't have a meaningful impact on the performance of the ISS_PAYNORM factor.

In Figure 8's graph on the right, we see a negative, monotonic relationship across the mean market beta-adjusted excess returns per decile; the -2.67 t-stat on the graph would be more negative if not for the highly negative Decile 10 performance. Importantly, the monthly mean Long Decile 1 – Short Decile 10 market beta-adjusted spread return of **0.644% has a highly significant t-test of 3.66** and p-value of 1.8×10^{-4}.

Given the size and significance of this Decile 1 - Decile 10 spread, we devote the remainder of this study to ISS_PAYNORM.

FIGURE 8. ISS_PAYNORM POOLED DISTRIBUTION (ON LEFT) AND FUTURE 1-MO. EQUAL-WEIGHTED MEAN MARKET BETA-ADJUSTED EXCESS RETURN PER ISS_PAYNORM DECILE (ON RIGHT) FOR TOP 3,000 US LISTED STOCKS, OCT-2005 TO NOV-2016.

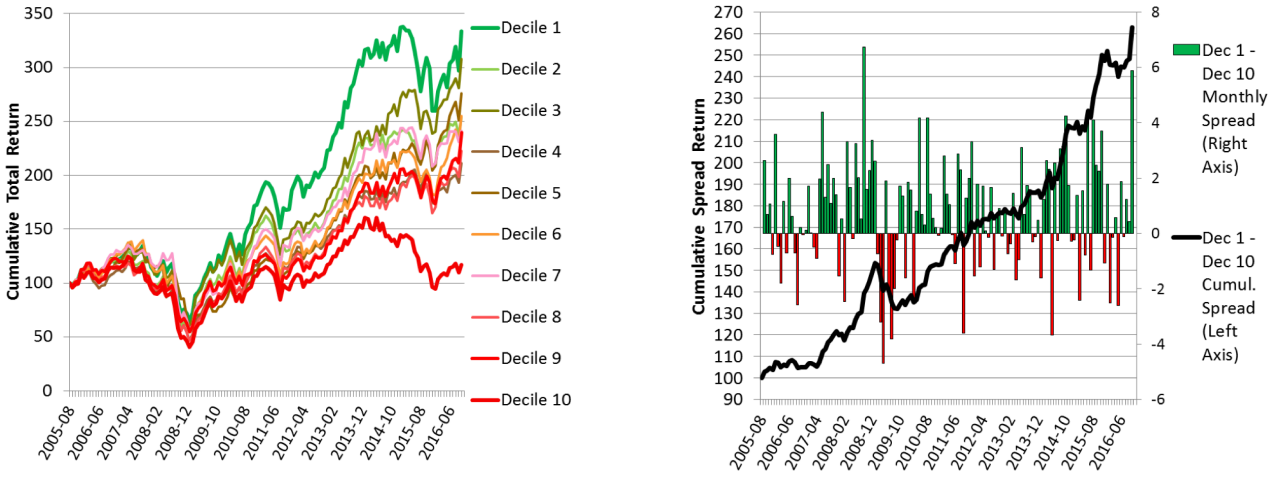


Source: Dun & Bradstreet

DECILE TOTAL RETURNS FOR ISS_PAYNORM

In Figure 9's graph on the left, we show the cumulative total returns for each ISS_PAYNORM Decile for the Top 3,000 stocks each month. On the right, we show the Long Decile 1 – Short Decile 10 monthly and cumulative total return spread. All stocks are equally weighted. In Figure 10, we show total return performance statistics for this dollar-neutral strategy when equally weighted, capitalization weighted, sector-neutralized (deciled within each Global Industry Classification sector) and equally weighted. In each case, the Long Decile 1 – Short Decile 10 total return t-tests are significant. However, at the industry-group level (not shown), t-tests become marginally significant. Given that PAYNORM peer groups are defined by primary SIC codes, this doesn't come as a surprise. Clearly, a large part of the importance of the ISS_PAYNORM factor is the ability to rotate in and out of sectors, industries and sub-industries as the market power of these peer groups of buyers changes over time.

FIGURE 9. CUMULATIVE MONTHLY TOTAL RETURNS FOR ISS_PAYNORM DECILES (ON LEFT) AND LONG DECILE 1 – SHORT DECILE 10 SPREAD RETURN (ON RIGHT). DECILE PORTFOLIOS ARE EQUAL-WEIGHTED FOR THE TOP 3,000 US LISTED STOCKS EACH MONTH FROM SEP-2005 TO OCT-2016 WITH TOTAL RETURNS SHOWN FOR THE SUBSEQUENT MONTH. [AS SHOWN IN THE EXECUTIVE SUMMARY].



Source: Dun & Bradstreet

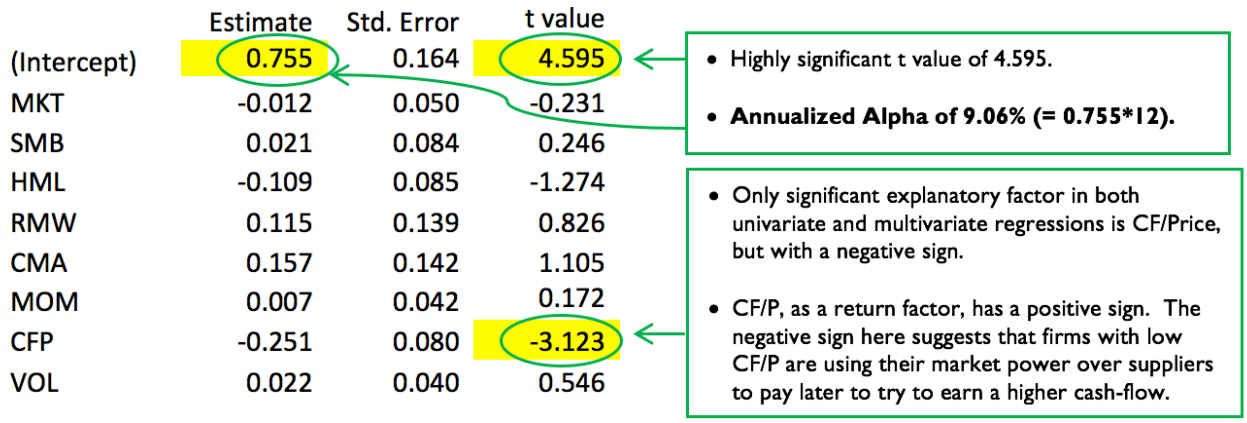
FIGURE 10. ISS_PAYNORM LONG DECILE 1 – SHORT DECILE 10 TOTAL RETURN SPREAD PERFORMANCE STATISTICS FOR THE TOP 3,000 US LISTED STOCKS EACH MONTH FROM SEP-2005 TO OCT-2016 WITH TOTAL RETURN STATISTICS SHOWN FOR THE SUBSEQUENT MONTH.

DOLLAR-NEUTRAL STRATEGY	UNIVERSE	WEIGHTING SCHEME	ANN. RETURN	ANN. VOLATILITY	RETURN/ RISK RATIO	% POSITIVE MONTHS	T-TEST
ISS_PAYNORM Decile 1 - Decile 10 Spread Return	Top 3,000	Equal Weighted	8.89%	6.94%	1.28	63.4%	4.28
ISS_PAYNORM Decile 1 - Decile 10 Spread Return	Top 3,000	Capitalization Weighted	7.98%	9.27%	0.86	59.7%	2.88
ISS_PAYNORM Decile 1 - Decile 10 Spread Return within Sectors (Sector Neutral)	Top 3,000	Equal Weighted	3.08%	5.03%	0.61	56.7%	2.05

Source: Dun & Bradstreet

To determine if the source of ISS_PAYNORM returns can be explained by other common sources of returns, we run time series regressions against the Fama-French five-factor model (MKT, SMB, HML, RMW and CMA), price momentum (MOM), short-term price reversion (REV), accruals (ACC), cash flow/price (CFP), and low volatility (VOL).[18] In univariate regressions, we don't find significance to accruals, short-term price reversion or CMA (Conservative Minus Aggressive, one of the new Fama-French factors). However, we keep CMA since it is part of the five-factor model and we keep MOM, CFP and VOL. The remaining model results are shown below in Figure 11. The intercept estimate (alpha), is actually higher than the raw total return spread in Figure 10. This means that *with* the other exposures explained, the source of alpha actually grows larger and more significant. That's because the long/short returns are *negatively* correlated to some strong, positively returning factors like MKT and CFP. The most significant factor in both univariate and multivariate regressions is CFP which has intuitive appeal. As pointed out in Figure 11, CFP factor returns are generally positive (i.e., higher CF/P stocks outperform lower CF/P stocks) as can be seen in Figure 12, but the regression against ISS_PAYNORM has a highly significant *negative* exposure. The implication is that firms with low CF/P are using their market power over suppliers to pay later in order to earn a higher CF/P or at least protect the little CF/P that they do have. In other words, companies with low CF/P are more likely to pay suppliers consistently later in order to preserve or improve their CF/P while companies with high CF/P are more likely to pay their suppliers inconsistently earlier, perhaps because there is no need for cash-flow improvement. Accordingly, equity managers already using CF/P as a predictor would likely benefit with the integration of ISS_PAYNORM.

FIGURE 11. TIME SERIES REGRESSION OF ISS_PAYNORM DECILE SPREAD RETURNS (EQUAL WEIGHTED) FOR THE TOP 3,000 US LISTED STOCKS FROM OCT-2005 TO NOV-2016 AGAINST THE FAMA & FRENCH 5 FACTOR MODEL + MOMENTUM (MOM) + CASH-FLOW/PRICE (CFP) + LOW VOLATILITY (VOL) FACTOR RETURNS.

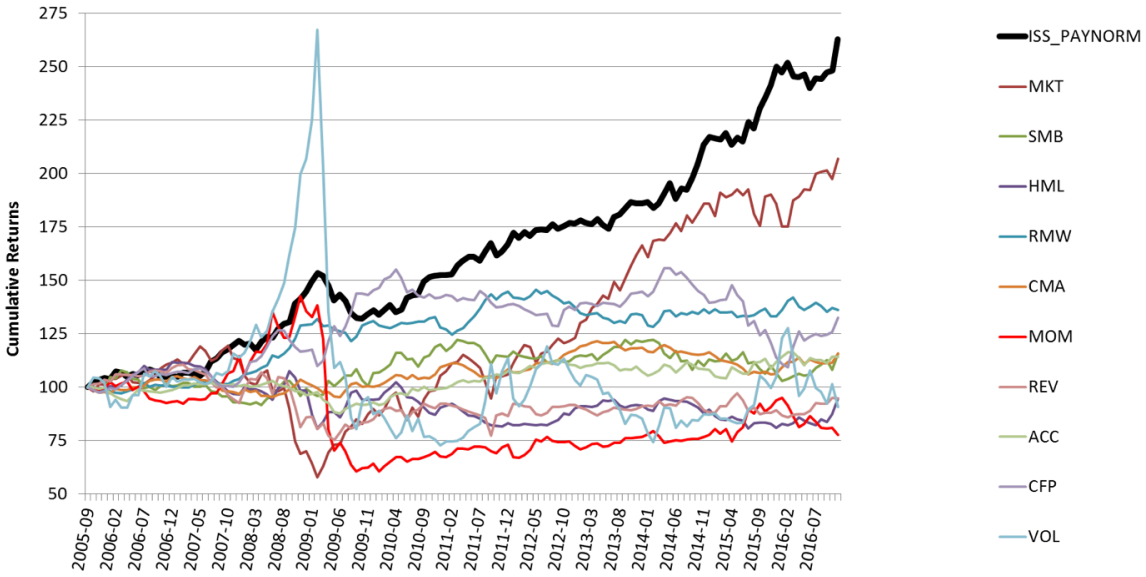


Source: Dun & Bradstreet

[18] For more information, please see http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html. The VOL factor that we use is actually Fama and French's low variance factor (similar exposure to volatility). CFP and VOL are the equal-weighted monthly factor returns.

In Figure 12, we compare the equal-weighted ISS_PAYNORM decile spread returns for the Top 3,000 stocks versus other common stock factor returns from Kenneth French's data library. Admittedly, many practitioners have improved upon the specifications used by Fama and French.[19] However, given the vast academic literature (and some practioner literature) that benchmark's factor performance against this library of factor returns, we thought it warranted a separate graph. Here, we clearly see ISS_PAYNORM outperformance, even relative to the long-only factor of the market (MKT is the market return minus the risk-free rate). Here, one can graphically detect the negative correlation between ISS_PAYNORM and CFP.

FIGURE 12. ISS_PAYNORM CUMULATIVE FACTOR RETURN VERSUS OTHER CUMULATIVE FACTORS RETURNS.



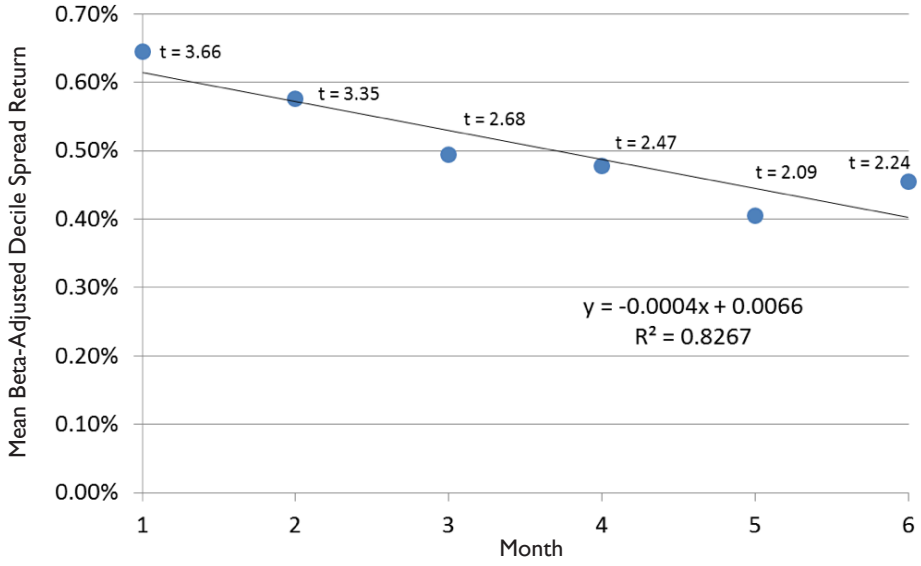
Source: Dun & Bradstreet

RATE OF ALPHA DECAY FOR ISS_PAYNORM

Figure 13 shows that the equal-weighted ISS_PAYNORM Decile beta-adjusted spread return is likely to persist for up to 16 months, but that the statistical significance is likely to persist for only a little more than 6 months. That is, the rate of alpha decay is relatively slow. Accordingly, depending on re-balancing costs, investment managers should feel comfortable using ISS_PAYNORM for quarterly or even semi-annual investment horizons. Readers should note that we are using betas calculated at the *beginning* of Month 1 for all subsequent monthly alphas; accordingly, the alpha decay could also be due, in part, to the staleness (i.e., decay) of the estimated betas.

[19] For example, please see AQR's value and momentum research and data sets at https://www.aqr.com/library/data-sets/value-and-momentum-everywhere-factors-monthly.

FIGURE 13. RATE OF ALPHA DECAY FOR ISS_PAYNORM DECILE SPREAD EQUAL-WEIGHTED FOR THE TOP 3,000 US LISTED STOCKS. MEAN SUBSEQUENT MONTHLY BETA-ADJUSTED RETURNS (NOT CUMULATIVE). ESTIMATED RATE OF DECAY SUGGESTS AN ALPHA WITH UP TO A 16-MONTH LIFE-SPAN; HOWEVER, MONTHLY T-VALUES SUGGEST THAT STATISTICAL SIGNIFICANCE DISAPPEARS AFTER 6-MONTHS.



Source: Dun & Bradstreet

RATE OF TURNOVER FOR ISS_PAYNORM FOR EQUAL-WEIGHTED TOP 3,000

For an equal-weighted, monthly rebalanced strategy on the top *and* bottom ISS_PAYNORM deciles for the Top 3,000 stocks (which naturally has higher turnover because of the monthly market cap selection process, than say, a more static universe like the S&P 1500, for example), we estimate annualized turnover to be approximately 200%; however, a quarterly rebalance would produce an annualized turnover of 150% while a semi-annual rebalance would produce an annualized turnover of 100%. Given the alpha decay estimates from Figure 13 and given our estimates for market impact, we estimate that there is considerable return potential net of all transaction costs for an implementable strategy. However, with an equal-weighted strategy for such a large universe, the scalability of the net return will be limited. Accordingly we turn our attention to the liquid universe of the S&P 500, using the exact same float-adjusted market value (FAMV) weighting scheme used by Standard & Poor's.[20]

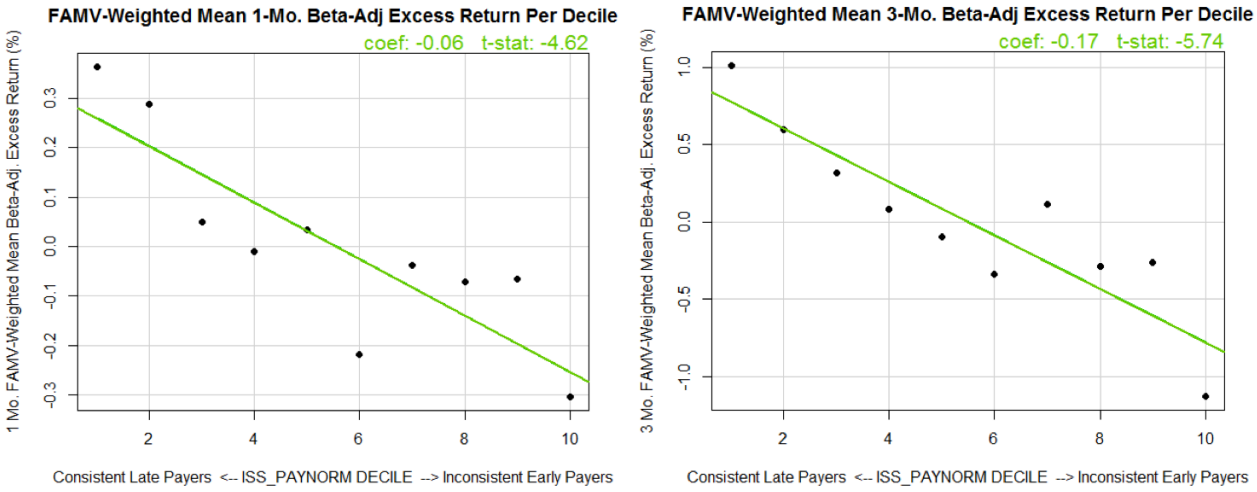
RESULTS FOR THE S&P 500 INDEX

While we find signicant results for both ISS_PAYDEX and ISS_PAYNORM for S&P 500 constituents, the results tend to be stronger for ISS_PAYNORM. Furthermore, ISS_PAYNORM results are stronger when using the index's float-adjusted market value (FAMV) weighting versus equal-weighting. As with the Top 3,000 stocks, we find that the alpha signal persists out to six-months for the S&P 500 universe.

In Figure 14, we see a significant montonic relationship for the mean market beta-adjusted excess return per ISS_PAYNORM decile; this can be seen for both the coefficient and t-stat for the deciled linear regressions for both 1-month and 3-month future returns. Importantly, the monthly mean Long Decile 1 – Short Decile 10 market beta-adjusted spread return of **0.581% has a statistically significant t-test of 2.36** and p-value of 0.0098.

[20] For details, please see https://us.spindices.com/documents/methodologies/methodology-sp-us-indices.pdf.

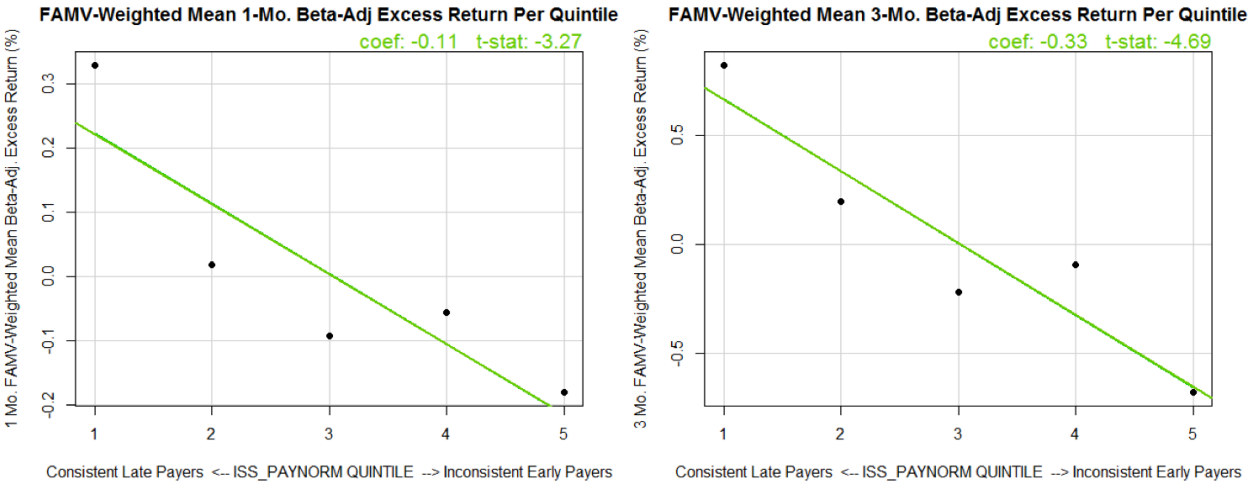
FIGURE 14. *DECILED PERFORMANCE:* USING HISTORICAL FLOAT-ADJUSTED MARKET VALUE (FAMV) WEIGHTS AND CONSTITUENTS FOR THE S&P 500 PROVIDED BY STANDARD & POOR'S WE SHOW FUTURE 1-MONTH (LEFT) AND 3-MONTH (RIGHT) MEAN MARKET BETA-ADJUSTED EXCESS RETURN PER ISS_PAYNORM DECILE, JAN-2005 TO NOV-2016.



Source: Dun & Bradstreet

In Figure 15, we show similar results per quintile. Importantly, the monthly mean Long Quintile 1 – Short Quintile 5 market beta-adjusted spread return of **0.486% has a statistically signficant t-test of 2.59** and p-value of 0.0053.

FIGURE 15. *QUINTILED PERFORMANCE:* USING HISTORICAL FLOAT-ADJUSTED MARKET VALUE (FAMV) WEIGHTS AND CONSTITUENTS FOR THE S&P 500 PROVIDED BY STANDARD & POOR'S WE SHOW FUTURE 1-MONTH (LEFT) AND 3-MONTH (RIGHT) MEAN MARKET BETA-ADJUSTED EXCESS RETURN PER ISS_PAYNORM QUINTILE, JAN-2005 TO NOV-2016.



Source: Dun & Bradstreet

A LONG-ONLY STRATEGY BENCHMARKED AGAINST THE S&P 500 INDEX

As previously mentioned, the alpha signal persists through six months. A long-only strategy of purchasing Quintile 1, under holding periods of 1 to 6 months seems quite tenable, even with considerable assets under management. Assuming a linear relationship between turnover and market impact costs [21], and assuming a $10 billion investment in an S&P 500 Quintile 1 strategy, we show estimated turnover, estimated market impact costs and estimated net excess returns in Figure 16. While some readers might speculate that a 112% turnover rate for a quarterly rebalance sounds high, it actually falls well within 1 standard deviation of the mean US mutual fund turnover of 63%.[22]

FIGURE 16. ESTIMATED NET ANNUALIZED EXCESS RETURNS OF A CAP-WEIGHTED $10 BILLION LONG-ONLY ISS_PAYNORM QUINTILE-1 STRATEGY FOR THE S&P 500 UNDER VARIOUS REBALANCING PERIODS, JAN-2005 TO NOV-2016.

REBALANCING PERIOD	ESTIMATED GROSS RAW EXCESS RETURN	ESTIMATED GROSS ANNUALIZED EXCESS RETURN	ESTIMATED ANNUAL TURNOVER	ESTIMATED ANNUAL MARKET IMPACT COST FOR $10 BILLION	ESTIMATED NET ANNUAL EXCESS RETURN
Every 1-Mo.	0.33%	3.95%	173%	1.73%	2.22%
Every 2-Mo.	0.58%	3.50%	148%	1.48%	2.02%
Every 3-Mo.	0.82%	3.28%	112%	1.12%	2.17%
Every 4-Mo.	1.03%	3.09%	108%	1.08%	2.01%
Every 5-Mo.	1.18%	2.83%	101%	1.01%	1.82%
Every 6-Mo.	1.31%	2.61%	89%	0.89%	1.72%

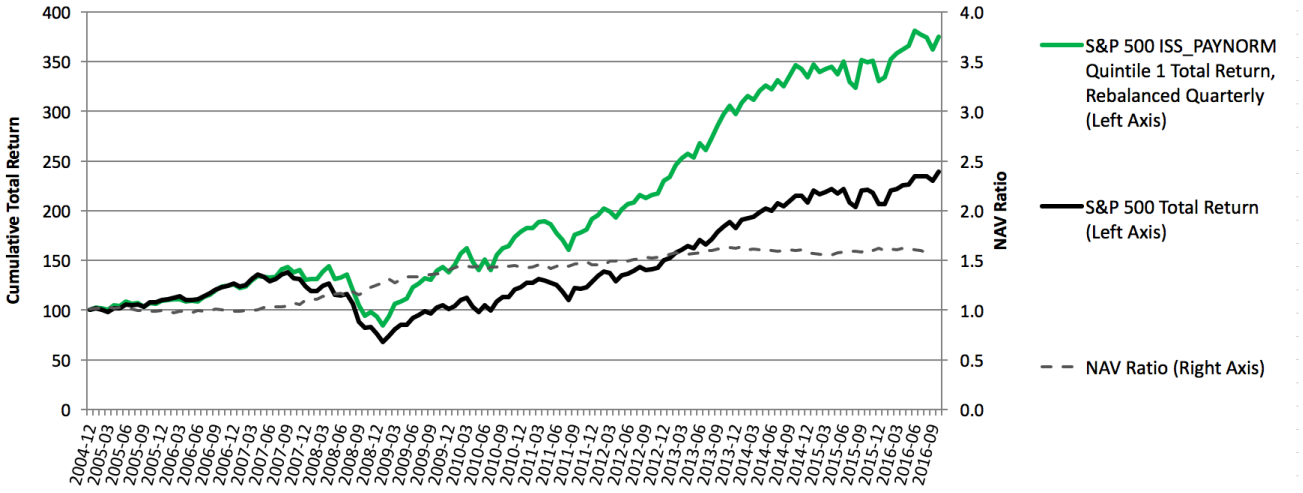
Source: Dun & Bradstreet

Using S&P 500 Index weights and constituent history, we produce an **S&P 500 ISS_PAYNORM Quintile 1 strategy**, rebalanced quarterly. We compare the performance of this strategy (in total, gross returns) versus the S&P 500 in Figure 17. We see annualized *outperformance* of 3.91% with a 43% increase in return per unit of risk. With an estimated 1.12% annualized market impact for a $10 billion portfolio, there appears to be ample room for implementation as a separate fund or as an added factor in a model. As can be seen in the graph, the NAV (Net Asset Value) ratio between the normalized total return levels of S&P 500 ISS_PAYNORM Quintile 1 over the S&P 500 shows the relative performance at any point in time. Here, we see that Quintile 1 consistently outperformed from 2007 to 2014. For 2005 and 2006, performance was in-line. For 2015 and 2016, performance was slightly below the S&P 500, but still, well within range, given historical performance statistics.

[21] For details on our assumptions for market impact costs please see "A Practical Approach to Measuring Market Impact in Investment Management" by James Twiss of First State Investments, January 20, 2017. Using the formula, *Impact=0.152(turnover)((AUM)m(holdings))*0.6, Twiss estimates an annual market impact cost of approximately 25 basis points for a portfolio of 80 large-cap stocks (similar to our quintile portfolios) with $10 billion invested that have a 25% annual turnover. We assume a linear relationship between turnover and market impact costs; accordingly, a 50% turnover would imply a 50 basis point annual market impact cost.

[22] For details, please see "How Smart Are the Smart Guys? A Unique View from Hedge Fund Stock Holdings" by John M. Griffin and Jin Xu, *The Review of Financial Studies* May 1, 2009.

FIGURE 17. S&P 500 ISS_PAYNORM QUINTILE 1 (REBALANCED QUARTERLY) VERSUS THE S&P 500 INDEX. [AS SHOWN IN THE EXECUTIVE SUMMARY].



Source: Dun & Bradstreet

	S&P 500 ISS_PAYNORM QUINTILE 1 TOTAL RETURN, REBALANCED QUARTERLY	S&P 500
Annualized Total Return	12.32%	8.41%
Annualized Volatility	14.85%	14.28%
Return/Risk Ratio	0.83	0.58
Maximum Cumulative Monthly Drawdown	-41.13%	-49.01%
Beta to S&P 500	0.98	1.00
Annualized Outperformance vs. S&P 500	3.91%	0.00%
Annualized Tracking Error to S&P 500	4.72%	0.00%
Information Ratio vs. S&P 500	0.83	0.00

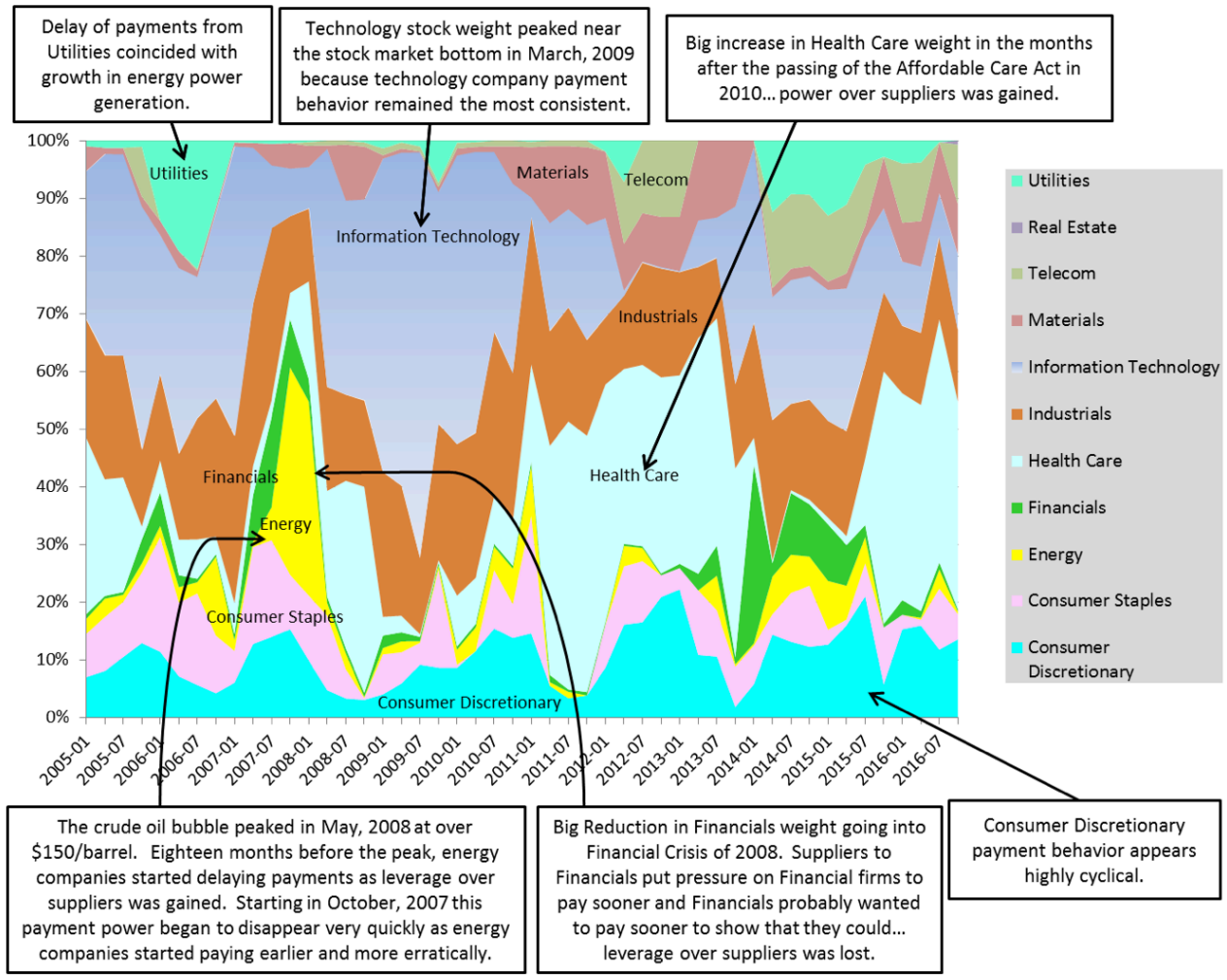
Source: Dun & Bradstreet

QUARTERLY SECTOR WEIGHTINGS FOR S&P 500 ISS_PAYNORM QUINTILE 1

A significant portion of the explanatory power of the ISS_PAYNORM factor is the ability to rotate in and out of sectors, industries and sub-industries as the payment behavior of peer groups of buyers changes over time. From the results shown in Figure 10, we can surmize that roughly half of the return and half of the statistical signficance of the return can be explained by sector rotation. We see this clearly in Figure 18. However, with up to only 100 stocks in S&P 500 Quintile 1, we should naturally expect to see a certain amount of variation in sector weights over time. In fact, we find many instances of dramatic sector weight changes that precede, coincide, or proceed major economic or regulatory events. For example, we see a dramatic run-up in the Energy sector weight in 2007, going from 1% in April 2007 to 36% in October 2007 as WTI crude oil increased from $77 to $110 and energy stocks soared. Then, as oil company payment behavior became more erratic, the Energy sector weight dropped back down to 2% in April, 2008, weeks before WTI's peak price and the subsequent fall in both oil prices and oil stocks. We see a similar modification in Energy company payment behavior when WTI dropped from $100+ in June 2014 to below $30 in January 2016.

As the Financial sector entered the Financial Crisis of 2008, we see payment behavior become much more volatile. The Financials weight for Quintile 1 went from 15.6% in July 2007 to 0.81% in July of 2008 as money-center banks, brokers and insurance companies tried to manage their deteriorating cash-flow. Quintile 1 Financial exposure remained negligble for the next five years as many of these firms tried to pay their suppliers earlier under the watchful eye of multiple government agencies and ensuing lawsuits. This proved to be auspicious as Financials underperformed during much of this period.

FIGURE 18. QUARTERLY SECTOR WEIGHTINGS FOR S&P 500 ISS_PAYNORM QUINTILE 1.



Source: Dun & Bradstreet

In March of 2009, Technology stocks were the beneficiaries of a major volatility spike in payment behavior across most other sectors. As this weight remained relatively large over much of the next three years, Technology stocks outperformed.

The Affordable Care Act was signed into law in March 2010. However, provisions of the new law and court rulings only went into effect over the subsequent 18 months. With the passage of each provision and court ruling, we saw the Health Care sector weight increase from about 8% in April 2010 to 46% in July 2011 and remain large (30%+) until January 2014 as health care insurers and providers implemented more consistently late paying working captial strategies. Over this April 2011 to January 2014 period, the Health Care sector outperformed. However, the Health Care exposure and performance in 2015 and 2016 was not as well timed. This could have been due to the uncertainty over the US elections and subsequent changes to the ACA and its provisions. Furthermore, it was over this period that both presidential candidates were discussing ways to regulate health care prices.

CONCLUSION AND AREAS FOR FURTHER RESEARCH

Although we have introduced compelling empirical evidence that firm and peer group payment behavior is linked to stock performance, further research is required. To that end, we suggest the following areas of further research:

- Analyzing ways to better capture and enhance the ISS_PAYNORM and ISS_PAYDEX factors. For example, instead of 0.25, other minumum standard deviation levels could be tested. Also, if a consistent number of stocks isn't critical and one is trying to minimize turnover, then other screening strategies could be tested; for example, keeping the maximum PAYDEX or maximum PAYNORM level for all stocks in a portfolio below a certain level over the past year. Another way to minimize turnover for ISS_PAYNORM and ISS_PAYDEX is to substitute range (maximum – minimum) for the more unstable standard deviation term in the denominator.
- Investigate the differences between PAYDEX and PAYNORM at the stock level. These differences highlight the differences between firm and peer group payment behavior.
- The analysis of other trade credit factors like the number of suppliers, the amount owed etc which could help explain the buyer – supplier relationship.
- Grouping of firms based on the *commonality* of suppliers instead of size and primary SIC codes as is currently done for PAYNORM might reveal more specific information about the market power / payment power that a group of buyers has over a common set of suppliers.

For more information please contact Paul K. Lieberman, Director, Analytics Innovation Advanced Analytics Services | LiebermanP@DNB.com | 973.921.5960