Supply chain links and predictability of returns

Frank Moers

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Abstract

In this article I show that returns can be predicted across the supply chain. Information about supplier firms and their customers show signs of investors' inattention and can be used to generate abnormally high returns. Elaboration on this investors' inattention shows that the effect diminishes as the customer news diffuses slowly into the supplier stock price. By measuring the underreaction of the supplier stock prices, this paper shows that supplier stocks respond to customer news for only 65% within the first month. Furthermore, results of this paper suggest that negative news tends to diffuse more slowly into stock prices than positive news. Last, this research shows there is a negative relation between expected volatility and market returns. Prove for a relation between expected volatility and investor's inattention cannot be found.

1 Introduction

In a recent paper by Cohen and Frazzini (2008), research has given proof of presence of investors' inattention at the market, which contradicts the efficient market hypothesis. More specifically, by looking at supply chain links, Cohen and Frazzini (2008) show stock prices of firms can be predicted by analysing the stock prices of their major customers during earlier months. By investigating customer stocks in a certain month and its corresponding supplier stocks a month later, they prove there is a lagged relation between the two. This means it is possible for traders to make profits of this lagged relation by watching the development of the customer stocks closely.

In this paper I will investigate how long it takes for information about the customer firm to get incorporated in the stock price of the supplier firm. This is interesting for traders as it measures the duration of investors' inattention. Cohen and Frazzini (2008) already showed it is profitable to go long in supplier stocks with well performing customers one month later, but maybe it is even more profitable to keep these stocks longer in your portfolio. Furthermore, this is interesting for researchers as it will give us a more complete picture of how the market works and how the EMH is infringed.

Next, I will research if the predictability of returns across the supply chain is affected by the expected volatility in the market. For the expected volatility I will use the VIX. In Whaley (2000) this VIX was proved to have negative effect on market returns, that's why it is often named the"investor fear gauge". In this paper I will research the relation between the VIX and the returns generated by the methods Cohen and Frazzini (2008) use to profit from predictability of returns across the supply chain links. This could be useful for investors as they want to know under which

circumstances they can profit from investors' inattention and thus, failure of the efficient market hypothesis.

2 Literature

Cohen and Frazzini (2008) show there is evidence of investors' inattention by analysing the development of stock returns on the basis of the customer supplier links. For each supplier, the stocks of its major customers are put in a so called customer portfolio. Every month all suppliers are ranked on the basis of the performance of the customer portfolio during the previous month. They show supplier firms at the top of list, so with the best performing customer portfolios, generate higher returns than supplier firms at the bottom of this list. By going short in the 20% supplier firms with the worst performing customer portfolio and going long in the 20% firms with the best performing customer portfolio, they show abnormal returns of circa 1.2% can be generated, evaluated in the Fama and French (1993) three-factor model. Menzly and Ozbas (2010) show similar signs of investors' inattention across the supply chain. They investigate the phenomenon more on an industry level. The paper gives prove that stock returns from industries which are linked as customers and suppliers depend on each other.

Cohen and Frazzini (2008) elaborate on the effect of investors' inattention and explore in what degree this effect is present. By calculating the underreaction coefficient, they show that stock prices of supplier firms underreact to customer stock price development by circa 40%. By extending the time between the ranking of the customer portfolios and the analysis of the supplier stocks, they give significant results that it takes at least 6 months for customer news to get incorporated in the supplier firms stock prices.

Research by Whaley (2000) gives evidence for a negative relation between the expected volatility (the VIX) and stock market returns. The paper shows that the implied volatility calculated on the basis of S&P 500 index options works as an investor fear gauge. In line with these results Sarwar (2012) shows there is a significant correlation between the change in the expected volatility and the market returns. Ang et al. (2006) prove the same negative relation between the change in VIX and the stock returns by adding the change in VIX as a factor in the CAPM model. As the VIX increases, investors are put off and stock prices tend to drop.

3 Data

Companies in the United Stated are obliged by U.S. law[1] to report firms which account for more than 10% of their total sales. This enables me to research the customer supplier links between 1980 and 2004, which are reported in a list by Frazzini. This list is publicly accessible at his personal website.[2]

For the stock prices I will consult the CRSP database, in which the monthly stock prices of the companies on the list of customer supplier links can be found. In accordance with Cohen and

[1] Regulation SFAS No. 131

[2] $http://www.econ.yale.edu/\sim af227/data\_library.htm$

Frazzini (2008) I will exclude all stocks below 5 dollars, because these stocks are very volitile and might interfere with my results. In their paper they point out leaving out these stocks does not significantly affect the outcomes.

In this paper I will check if methods for predictions of returns using customer-supplier links lead to abnormal returns. To test if these methods can outperform the market significantly I will use the CAPM model and the Fama and French (1993) three-factor model. For this I need to know the risk-free rate (one-month Treasury bill rate from Ibbotson) and the Fama French factors. These can be found on the website of Kenneth R. French.[3]

For research of the relation between the expected volatility and the quintile returns I will use the VIX volatility index. This VIX measures the expected 30-day market volatility. Calculation of this VIX is based on the S&P 500 index option prices nowadays. Until 2003 calculation of the VIX was based on options of the S&P 100 (which is now called: VXO.) In analysis of the effect of expected volatility on the quintile returns I use the VXO for the data until 2003 and the newer VIX for the period after 2003. The VIX can be seen as the annualized percentage that the S&P 500 is expected to move in the following 30 days. The VIX and VXO data between 1986 and now are downloadable at CBOE's website.[4]

4 Methods

In this section the methods of research will be discussed. In 4.1 the duration of the inattention effect will be analysed by replicating and elaborating on the methods of Cohen and Frazzini (2008). In section 4.2 the method of calculation of the Underreaction Coefficient from Cohen and Frazzini (2008) article will be described. This part will be extended by investigating the URC for positive and negative news. In section 4.3, I will discuss the methods to analyse the relation between the inattention effect and the expected market volatility.

4.1 Duration of the inattention effect

In order to analyse how long it takes for customer news to get incorporated in the price of the supplier stock, I will replicate a method described in Cohen and Frazzini (2008). First of all, I construct a customer portfolio for every supplier every month. This customer portfolio contains all stocks of customers accounting for at least 10% of the yearly sales. To ensure the supplier-customer relations are known before they are used to cross-predict the returns, I set a 6-month lag between the end of the fiscal year in which the customer is reported and analysis of the returns of the customer portfolio. This lag is similar to the standard gap set to match accounting variables to subsequent stock prices and returns, investigated by Fama and French (1993). From then, this customer portfolio will be used for one year. Secondly, I sort the supplier firms on the basis of the return of their customer portfolio, which is calculated by giving all customer stocks equal weights in this portfolio. Finally, I divide these supplier firms over 5 different quintiles: the first quintile containing the 20% supplier stocks with customer portfolios with the lowest returns, the fifth quintile containing the 20% supplier stocks with customer portfolios with the highest returns. Also, a

[3] $http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data\_library.html$
[4] $http://www.cboe.com/micro/vix/historical.aspx$

self-financing portfolio will be constructed by going short in supplier stocks of the first quintile and going long in stocks of the fifth quintile, this is the so called customer momentum portfolio.

In order to research the duration of the inattention effect, I will first investigate the returns of the supplier stocks in the same months as for the customers. Then, I will explore the effect of investors' inattention by exploring the returns of the supplier stocks one month after construction of the customer momentum portfolio. Subsequently I will increase this lag up to 12 months, to see how the effect develops over time. By plugging the average monthly returns of every quintile and the customer momentum portfolio into the CAPM model and the Fama and French (1993) three-factor model, I will analyse whether this method leads to abnormal returns. In equations (1) and (2) these models are given. R_m represents the average return of the value-weight return rate of all NYSE, AMEX and NASDAQ stocks. R_f is the risk-free rate, SMB represents the "small minus big" (market capitalization) factor and HML represents the "high minus low" (book-to-market ratio) factor.

$$r_i - R_f = \alpha_i + \beta_{3,i}(R_m - R_f) + \epsilon_i \tag{1}$$

$$r_i - R_f = \alpha_i + \beta_{3,i}(R_m - R_f) + b_{s,i}SMB + b_{v,i}HML + \epsilon_i \tag{2}$$

Constructing the portfolio on a monthly basis from December 1980 until April 2006 results into 305 observations for this regression. I will perform this regression for all lags, from 0 up to 12 months, between the date of forming the customer portfolio and investigating the supplier returns.

4.2 Underreaction Coefficient

In this section I will investigate the reaction of the supplier stocks on the returns of the corresponding customer portfolio. I will analyse this reaction by calculating the Underreaction Coefficient (URC) which measures the extent to which supplier stocks follow the development of their customer portfolio within one month. For calculation of the URC I need the RET, which is the abnormal return (according to the Fama and French (1993) three-factor model) for the customer momentum portfolio at time t and the CAR which is the cumulative abnormal return over the subsequent 6 months. This CAR is calculated by adding the three-factor Fama French alphas of the long-short strategy of the 1-month lag until the 6-month lag. Now, the URC is defined as the fraction of the total returns over months t until $t+6$ that occurs at month t: $URC = RET/(RET+CAR)$. So it is a proxy for the amount of underreaction of the supplier stocks. If the market works according to the Efficient Market Hypothesis the URC should be equal to 1. Values of the coefficient below 1 suggest that supplier returns underreact to customer news. On the other hand, values of the URC above 1 indicate an overreaction of the supplier stocks to the stock returns of the corresponding customers.

In order to check whether there is a difference between the reaction of supplier stocks to negative and positive news of the customers, I will also calculate the URC for the first and fifth quintile, in the same way as described above.

4.3 The effect of expected volatility

To investigate whether the effect of the investors' inattention is dependent on the expected volatility I will investigate the cross-correlations between the returns of the 1-month lag quintiles and the customer momentum portfolio and the VIX. Furthermore, I will research the cross-correlations between these returns and the change in VIX, which is the first difference of the monthly closing VIX: ΔVIX. Also, like Ang et al. (2006), I will add the ΔVIX as a factor to the CAPM model, to investigate whether it is an explanatory factor for the quintile returns and the long-short strategy. To complete the picture I will also add this ΔVIX to the Fama and French (1993) three-factor model. Both models are described in equation (3) and (4).

$$r_i - R_f = \alpha_i + \beta_{3,i}(R_m - R_f) + \beta_{\Delta VIX}\Delta VIX + \epsilon_i \tag{3}$$
$$r_i - R_f = \alpha_i + \beta_{3,i}(R_m - R_f) + \beta_{\Delta VIX}\Delta VIX + b_{s,i}SMB + b_{v,i}HML + \epsilon_i \tag{4}$$

A positive relation between the VIX or ΔVIX and the returns of the customer momentum portfolio, would suggest investors can profit most from this strategy during times of high expected volatility. It might be possible to profit from the fall of stock prices as the VIX increases. A negative relation will suggest the long-short strategy is less effective when high volatility is expected.

5 Results

In this section the results of this paper will be presented and analysed. The change in effect over time, the underreaction coefficient and the effect of the expected volatility will be discussed in the same order as in the previous section.

5.1 Effect over time

Table 1 reports the abnormal returns for the quintiles and the customer momentum portfolio. Both the excess returns and the three-factor alphas show an increasing pattern over the quintiles. We find very significant results for all quintiles and see that the long-short strategy leads to abnormal returns of 3.505% above the market. These results prove that supplier stocks follow the returns of their customers. However, because customer portfolio and supplier stocks are analysed contemporaneously it is not possible to predict stock returns. That is why the results in table 2 are more interesting, while a lagged relation between supplier stocks and customer portfolios is analysed.

Table 2 reports the excess returns and three-factor Fama and French (1993) alphas of the quintiles and the long-short strategy. Panel A shows the magnitude and significance of the abnormal returns is of course not as large as for the contemporaneous analysis, but the effect of investors inattention is clearly present during the first month. The supplier returns of the worst performing customers, which are in the first quintile, are significantly lower than the average market return. The results follow an increasing pattern from the lowest to the highest quintile. Furthermore the table shows that the customer momentum portfolio on average generates abnormal returns of 0.970% above the market.

In panel B, where the supplier returns are investigated two months after the customer portfolios, the increasing pattern is not as clear as in panel A. Only the two lowest quintiles give us significant

Table 1: **Monthly quintile returns for the period 1980 − 2006**

Contemporaneous	**Q1**	**Q2**	**Q3**	**Q4**	**Q5**	**L/S**
Excess returns	-2.186***	-0.920***	-0.349*	0.520***	1.559***	3.745***
Three-factor alpha	-2.078***	-1.013***	-0.499***	0.328**	1.427***	3.505***

*This table shows the excess returns and three-factor alphas for all quintiles and the customer momentum portfolio. All returns are in excess of the risk-free return rate. ***, ** and * indicate that the coefficient estimate is different from zero at a 1%, 5% and 10% confidence level, respectively. In case of significant indications of heteroskedasticity (applying a significance level of 5% at the Breusch-Pagan test), White heteroskedasticity-consistent standard errors are used.*

results, with returns below the market. It is striking that also the returns in the higher quintiles are below the market, although these are not significant. However, the customer momentum portfolio again generates significantly abnormal returns of 0.584% according to the CAPM model.

Looking at panel C until F, where the lag is increased to 6 months, learns us there are no more significant results for the long-short strategy. It is striking though, that even at a lag of 6 months, there are significant results for the lower quintiles which perform worse than the market. Also, in general, the returns of the customer momentum portfolio are mainly caused by the negative returns of the first quintile. These results are in line with market friction (like short-sale restrictions), which increase the delay of diffusion of negative news. Furthermore the larger magnitude in the first quintiles is also caused by the fact supplier stocks underperform the market. Analysis of the average return of the supplier stocks between 1980 and 2006 learns us that these stocks' returns are 0.468% below the market. According to Cohen and Frazzini (2008), these low values are probably explained by the increase of international competition for U.S. suppliers.

In figure 1 we find a graph which reports the development of the abnormal returns of the long-short strategy when increasing the lag between the analysis of the customer portfolio and the supplier returns. First of all, it is clear that the excess returns and the three-factor alpha develop almost identically. Between the contemporaneous analysis and the 1-month lag both coefficients decrease rapidly. After that, we see still abnormally high returns for the first two months after ranking the supplier stocks. In the 3-month lag we see a drop in the returns, both the excess returns and the three-factor alpha are around zero. However, at the 4-, 5-, and 6-month lag the strategy results into returns above the market, although these are not significant. Increasing the lag to 7 months and larger leads to returns which fluctuate around zero, from which we can conclude that the effect of inverstors' inattention has disappeared.

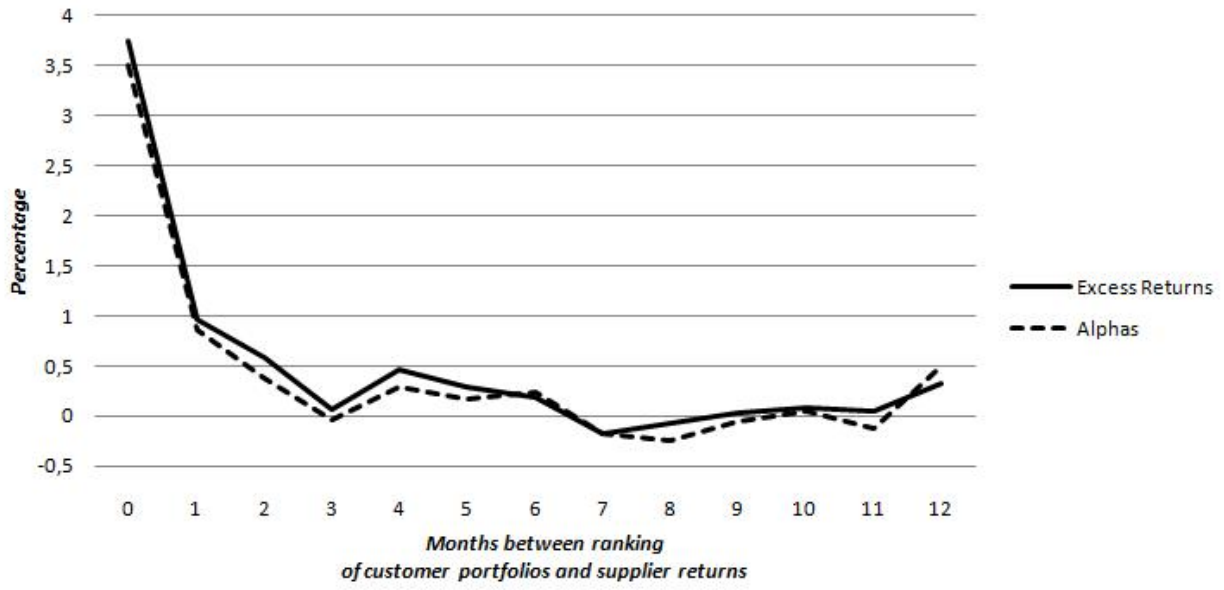
On the whole, we can conclude that the effect of investors' inattention is only significant for the first two months. So only short after an increase (decrease) in the returns of the customers' portfolio it is profitable for traders to go long (short) in the corresponding supplier stocks.

Table 2: **Monthly quintile returns based on customer portfolios for the period 1980 − 2006**

Panel A: 1-month lag	**Q1**	**Q2**	**Q3**	**Q4**	**Q5**	**L/S**
Excess returns	-0.660***	-0.345*	-0.179	0.178	0.310	0.970***
Three-factor alpha	-0.651***	-0.509***	-0.416***	0.045	0.203	0.855***
Panel B: 2-month lag	**Q1**	**Q2**	**Q3**	**Q4**	**Q5**	**L/S**
Excess returns	-0.659***	-0.220	-0.224	0.030	-0.076	0.584**
Three-factor alpha	-0.586***	-0.324**	-0.328**	-0.063	-0.211	0.376*
Panel C: 3-month lag	**Q1**	**Q2**	**Q3**	**Q4**	**Q5**	**L/S**
Excess returns	-0.318	-0.279	-0.102	-0.038	-0.281	0.037
Three-factor alpha	-0.320	-0.265	-0.211	-0.200	-0.401**	-0.081
Panel D: 4-month lag	**Q1**	**Q2**	**Q3**	**Q4**	**Q5**	**L/S**
Excess returns	-0.483*	-0.305	0.016	-0.266	-0.017	0.467*
Three-factor alpha	-0.364*	-0.425**	-0.061	-0.451***	-0.075	0.289
Panel E: 5-month lag	**Q1**	**Q2**	**Q3**	**Q4**	**Q5**	**L/S**
Excess returns	-0.583**	-0.073	-0.231	-0.181	-0.293	0.289
Three-factor alpha	-0.462**	-0.203	-0.350**	-0.266*	-0.290*	0.172
Panel F: 6-month lag	**Q1**	**Q2**	**Q3**	**Q4**	**Q5**	**L/S**
Excess returns	-0.390	-0.452**	-0.127	0.007	-0.211	0.179
Three-factor alpha	-0.449**	-0.482***	-0.216	-0.084	-0.203	0.245

*This table shows the excess returns and three-factor alphas for all quintiles and the customer momentum portfolio. All returns are in excess of the risk-free return rate. The 3-month lag in Panel C implies a gap of three months between ranking the suppliers on the basis of their customer portfolios and the analysis of the supplier returns. ***, ** and * indicate that the coefficient estimate is different from zero at a 1%, 5% and 10% confidence level, respectively. In case of significant indications of heteroskedasticity (applying a significance level of 5% at the Breusch-Pagan test), White heteroskedasticity-consistent standard errors are used.*

Figure 1: **Development of three-factor alpha and excess returns when increasing the lag**



This figure shows the excess returns and three-factor alpha of the long-short strategy. We see it changes as we increase the lag between the ranking of the suppliers based on their customer portfolio and the month at which we investigate the supplier return.

5.2 Underreaction Coefficient

Table 3 reports the results of the Underreaction Coefficient.[5] The values of the RET are significant in all three cases. For the long-short method, the URC is equal to 0.649, which implies that supplier stocks adapt to their customers' news for around 65% within 1 month. During the next 6 months, the news slowly diffuses into the price. The URC for the first quintile is equal to 0.419, which indicates that supplier stock prices react more slowly to negative news. The URC of the fifth quintile, which is 3.225, even suggests an overreaction of the supplier stocks when customer stocks increase in price. However, this result is probably interfered by the fact that suppliers mainly underperform the market. This can be deduced from the large number of negative signs in the excess returns and abnormal returns in table 2 and general underperfomance of the supplier stocks as explained in the previous section.

5.3 The effect of expected volatility

Table 4 reports cross-correlations between the VIX, ΔVIX, average returns of first and fifth quintiles and the long-short strategy. (Adding averages of second, third and fourth quintile returns gives similar correlations.) As expected, the VIX functions as an investor fear gauge (Whaley

[5]There is a large difference between the results of the URC for the first and fifth quintile compared to Cohen and Frazzini (2008). The reason for this is that the quintiles are defined in a different way. In Cohen and Frazzini (2008), these quintiles are based on the percentage of sales a customer portfolio covers, while here they are based on the returns of the customer portfolios, just as in the rest of this paper.

Table 3: **Underreaction Coefficient**

	RET	CAR	URC
Quintile 1	-2.078	-2.884	0.419
Quintile 5	1.427	-0.985	3.225
L/S	3.505	1.899	0.649

This table reports the RET, CAR and URC for the first and fifth quintile and the customer momentum portfolio.

(2000)), regarding the significant negative correlation between this VIX and the average quintile returns. The magnitude of the correlation between ΔVIX and the quintile returns is even larger, which suggest this ΔVIX is even more reliable as a so called investor fear gauge: stock prices tend to go down as expected volatility increases. The returns of the L/S-strategy are not significantly correlated with VIX or ΔVIX. This implies that the effect of investors' inattention is not related to the expected market volatility. Relying on these results only, it is impossible to judge whether investors are able to profit more from investor's attention during times of either high, or low expected volatility in the market.[6]

Table 5 reports the values of $\beta_{\Delta VIX}$ of the regressions of the CAPM model and the Fama and French (1993) three-factor including a vector for the change in VIX, which are stated in equation (3) and (4). The results show a significant negative influence of ΔVIX, especially in the lower quintiles. For example, an increase of 1 in ΔVIX leads to a fall of approximately 0.16% in average returns of the lowest quintile. As seen before in analysis of the excess returns and the three-factor alpha, regression of the higher quintiles results into insignificant coefficents, in this case for the ΔVIX. Investigating $\beta_{\Delta VIX}$ for the customer momentum portfolio leads to the same conclusions as the cross-correlations do: it does not prove a relation between investors' inattention and expected volatility.

6 Conclusion

In this paper I research the possibilities of predicting the stock returns using supply chain links. I try to find to which extent the Efficient Market Hypothesis is infringed by investors' intattention

[6] I have also researched the relation between these returns and volatility. Earlier literature on this effect has been mixed on the sign of this relation. Some papers, like Campbell and Hentschel (1992) give proof for a postive relation between the two. While others, like Bekaert and Wu (2000), provide evidence for a negative relation.

For my research, I took the monthly root average of the squared daily returns on an equally-weighted market portfolio (VOL) as a proxy for the monthly volatility. Also, I took the first differences of this proxy (ΔVOL) to analyse the effect of change in volatility. The cross-correlations between the quintile returns and $(\Delta)VOL$ are significanlty negative and are presented in table 4, suggesting that supplier stock prices tend to drop as volatility rises. However, further research by using these proxies in regressions have not led to any new insights. Moreover, the (change in) volatility does not seem to affect the investor's inattention either, as the correlations with the L/S-returns are insignificant. These are the reasons for not going deeply into this relation in the paper and only mention it in this footnote.

Table 4: **Correlations for the period 1980 − 2006**

Correlations	**Q1**	**Q5**	**L/S**	**VIX**	**ΔVIX**	**VOL**	**ΔVOL**
Q1	1	0.806	-0.378	-0.282	-0.567	-0.317	-0.371
		[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]
Q5	0.806	1	0.244	-0.301	-0.559	-0.356	-0.346
	[0.00]		[0.00]	[0.00]	[0.00]	[0.00]	[0.00]
L/S	-0.378	0.244	1	-0.010	0.055	-0.037	0.066
	[0.00]	[0.00]		[0.88]	[0.39]	[0.56]	[0.31]
VIX	-0.282	-0.301	-0.010	1	0.307	0.669	0.164
	[0.00]	[0.00]	[0.88]		[0.00]	[0.00]	[0.01]
ΔVIX	-0.567	-0.559	0.055	0.307	1	0.374	0.615
	[0.00]	[0.00]	[0.39]	[0.00]		[0.00]	[0.00]
VOL	-0.317	-0.356	-0.037	0.669	0.374	1	0.542
	[0.00]	[0.00]	[0.56]	[0.00]	[0.00]		[0.00]
ΔVOL	-0.371	-0.347	0.066	0.164	0.615	0.542	1
	[0.00]	[0.00]	[0.31]	[0.00]	[0.00]	[0.00]	

This table shows the correlations between the returns of the first and fifth quintile and the customer momentum portfolio, VIX, ΔVIX, the volatility and the first differences of the volatility. All returns are in excess of the risk-free return rate. The volatility is calculated by taking the monthly root mean squared daily returns. Corresponding P-values are presented between brackets below the value of correlation to show whether two variables are significantly correlated.

Table 5: **Values for the ΔVIX factor for the period 1980 − 2006**

$\beta_{\Delta VIX}$	**Q1**	**Q2**	**Q3**	**Q4**	**Q5**	**L/S**
CAPM-model	-0.159**	-0.193***	-0.226***	-0.101	-0.106*	0.053
Three-factor model	-0.074	-0.102**	-0.130***	-0.003	-0.014	0.060

*This table shows the value of $\beta_{\Delta VIX}$ in regressions of the returns of all quintiles and the customer momentum portfolio. All returns are in excess of the risk-free return rate. ***, ** and * indicate that the coefficient estimate is different from zero at a 1%, 5% and 10% confidence level, respectively. In case of significant indications of heteroskedasticity (applying a significance level of 5% at the Breusch-Pagan test), White heteroskedasticity-consistent standard errors are used.*

to customer and supplier links and how investors can profit most from this effect.

As in Cohen and Frazzini's (2008) paper I prove it is possible to generate abnormal returns of 0.97% above the market with the customer momentum portfolio. This portfolio is constructed in two steps. First, suppliers are ranked on the basis of performance of their customer portfolio during the month before. Second, I go long in the 20% supplier stocks with the best performing customer portfolios and go short in the 20% supplier stocks with the worst performing customer portfolios. Furthermore, I show the effect of investors' inatttention is still present 2 months after the customer news. This research learns us that in the subsequent months, this effect has mostly diminished.

Results of the Underreaction Coefficient prove that approximately 65% of the customer news only gets incorporated in the supplier stock within one month. The remaining 35% slowly diffuses into the prices over the next 6 months. Also, other results of the URC suggest that supplier stock prices tend to respond more slowly to negative news than to positive news. Although the fact that supplier stocks seem to underperform the market on the whole, may interefere with these results. Further research on this topic is necessary to draw more precise conclusions.

In the last part I prove that the (change in) expected volatility negatively influences supplier stock returns, by research of cross-correlations and a ΔVIX factor in the CAPM model and the Fama and French (1993) three-factor model. However, I cannot find any evidence for a relation between the effect of the investor's inattention and the expected volatility, as the correlations between the returns of the customer momentum portfolio are nog significantly correlated with the VIX or the ΔVIX.

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