Economic Links and Predictable Returns

APPENDIX

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Appendix

Supplier momentum

The main goal of this paper is to test whether market participants take into account returns of economically related firms when setting prices. As we discuss in Section III, in principle there is no reason to restrict the analysis to a customer momentum strategy. A natural extension is to test whether suppliers' stock returns forecast customers' stock returns. Unfortunately, since regulation SFAS No. 131 require firms to report major customers with a 10% sales cutoff but not major suppliers, inverting the links generates only an incomplete sample of suppliers.

We address this issue by using the ratio of supplier sales to a given customer (CSALE) to the customer's total market value to identify "important" suppliers. Customer firms in which the supplier sales received are a large proportion of market equity should, ceteris paribus, have cash flows more affected by shocks to these "major" suppliers. For every customer, we compute IMPSUPP, a dummy variable equal to 1 if the ratio of total sales from the supplier to the customer's total market capitalization at the end of the previous month is greater than the 75th percentile of all firms in that calendar month. We conjecture that if investors overlook the impact of specific information on important suppliers we will observe return predictability going from suppliers to customers. Table A1 reports results from Fama and MacBeth (1973) forecasting regressions of customers' stock returns. The dependent variable is this month's customer stock return. The independent variables are lagged supplier returns and a series on controls. Consistent with the conjectured pattern, and with the results throughout the paper going in the opposite direction of customer to supplier, the results in Table A1 show evidence of supplier momentum: past returns of important suppliers forecast subsequent stock returns of the corresponding customers.

Cross industry momentum

The customer-supplier data allows testing for return predictability of individual stocks arising from company-specific linkages. In the paper, we test the hypothesis that prices of a partner firm adjust with a lag when firm-specific information is released into the market, using individual stock return as a crude measure of news. Is it reasonable to assume that customers' positive (negative) stock returns signal cash flow news about their trading partners? In Section VII we provide evidence that positive (negative) stocks returns of a principal customer do forecast real activity (such as sales or operating income) of the corresponding supplier. On the other hand, one could conjecture that, depending upon the structure of relevant markets, firms may be able diversify away real (idiosyncratic) shocks to their trading partners. In this case it is not obvious that shocks to principal customers necessarily translate into good (bad) news for the corresponding supplier. For example, consider Visteon Corporation, a global auto supplier, whose principal customer is Ford Motor Company. Suppose that General Motors increases its market share at the expense of Ford. Ford's slowing sales do not necessarily signal negative news for Visteon, since the latter may start supplying General Motors. On the other hand, suppose that both Ford and General Motors experience slowing sales due to a general decrease in demand for cars. In this case we should be more likely to see an impact on Visteon's sales, given Visteon's diminished capacity to diversify away the aggregate demand shock. Under the limited attention hypothesis, if investors overlook company-specific linkages, shocks to the entire industry of related customers should have a larger effect on subsequent stock returns of the supplier, given the firm's limited ability to diversify away the demand shock. We test this hypothesis using our customer data to construct cross industry momentum portfolios.

Menzly and Ozbas (2005) provide evidence of cross-industry momentum using upstream and downstream definitions of industries. We use a different approach and construct industry linkages by following the evolution of customer/supplier firm-specific relations over time. At the beginning of every calendar month we assign stocks to 48 industries based on the last available SIC code. For each industry we form a portfolio of related industries using weights equal to the last available flow of goods from the customer-supplier sales. We construct calendar time portfolios as before by sorting stocks on the basis of the return at the end of the previous month of the portfolio of linked industries. We compute portfolios for the sample of customers/supplier and also for the entire CRSP universe by assigning to each stock the corresponding customer industry index. This approach clearly introduces noise since we are using information about our sample of customer and suppliers to infer linkages among all the remaining CRSP firms, but it has the advantage of allowing us to look at predictability for the entire cross section of stock returns. We also report results by sorting industry indexes as opposed to individual stocks.

Results in Table A2 show that separating stocks according to lagged returns of related industry induces large differences in subsequent returns. For the sample of customers and suppliers the effect tends to be slightly larger than customer momentum: the (value weighted) cross industry momentum return based on our customer/supplier links is 2.03% per month (t-statistics = 4.96). However, we are unable to reject the hypothesis that average returns from the cross industry momentum portfolio and the corresponding customer momentum portfolio (either equally weighted or value weighted) are the same. This pattern of predictability across related industries is consistent with the limited attention hypothesis combined with the diminished capacity of firms to diversify away aggregate demand shocks. Figure A1 reports annual buy and hold returns from the cross industry momentum portfolio for our entire sample period.

Looking at the entire sample of CRSP firms, there is substantial stock return predictability across industries but the returns tend to be lower (the long/short abnormal returns range from 41 to 149 basis points per month) perhaps due to noise generated by using our sample of related firms (on average 20% of the CRSP universe) to infer linkages among all the remaining CRSP firms.

Out of sample evidence 1966 – 1980

In Table A3 we perform an out-of-sample test for the period 1966–1980. Publicly traded US firms have been required to disclose the identity of material customers since the year 1977 (fiscal year ending in December 1976) but we were unable to find customer/supplier links on Compustat prior to 1981 (fiscal year ending in 1980)[1]. To compute customer/supplier links for the period 1966–1980 we use the firm's first customer link between the year 1980 and 1985 as a proxy. For example, if firm XYZ

[1] Firms were first required to report principal customers by regulation SFAS No. 14.

reported ABC as a customer for the first time in 1981, we assume it had ABC as a customer for the period 1966–1980. The starting date is of course arbitrary; we use 1966 to balance the tradeoff between the length of the time series (15 years) and the number of firms in the final sample (875 firms).

Is it reasonable to assume that that relations among firms observed subsequent to 1980 are a reliable proxy for linkages over the period 1966-1980? The average duration of the links in our sample is about 3 years, so it appears that the structure of linkages post 1980 is likely to be a noisy measure of customer/supplier relations pre-1980. As a result, we view our out-of-sample test as informative but obviously imperfect. We report customer momentum returns in Table A3. Results in the table show that even over the period 1966 to 1980, stock prices tend to underreact to news that generates price movements of related firms, inducing return predictability across assets.

Analysts' revisions

Analysts' earnings forecasts and stock recommendation revisions contribute to the dissemination of information in financial markets. As such, they provide a useful laboratory to test whether the return predictability across related firms we document can be (at least) partially attributed to a delayed analysts' response to news about a firm's trading partners (in a similar manner to the Coastcast-Callaway example). To test this hypothesis we compute analysts' revisions in earnings' forecasts from the I/B/E/S database. Monthly analysts' revisions are defined as $REV_t=(UP_t-DOWN_t)/EST_t$ where EST_t is the number of estimates in month t of the firm's earnings for the current fiscal year (FY1) and UP_t ($DOWN_t$) is the number of upward (downward) revisions in month t.

Table A4 reports results from Fama-MacBeth forecasting regression of stock returns and of analysts' revisions. Panel A reports results from regressions of individual stock returns. The dependent variable is the monthly supplier stock return. The explanatory variables are the lagged customer analysts' revision, lagged customer returns, the supplier's own lagged revision, lagged revisions of the corresponding industry portfolio, and lagged revisions of the corresponding customer industry portfolio.

We use the stock's own revision to control for the stock's own earnings momentum[2]. The results in Panel A show additional insight into the customer momentum results: customers' earnings revisions (either at the individual firm level or at the industry level) forecast subsequent supplier stock returns, even controlling for customer returns.

Panel B now estimates the same regressions, but with the dependent variable of current earnings forecast revisions of the supplier. So, the test here is whether analysts of supplier firms have inattention to the customer-supplier link, so that last month's customer earnings revisions (customer news) predict this months' supplier earnings revisions. We report average coefficients from these forecasting regressions in Panel B. The results show that, after controlling for the stock's own past return and revisions, lagged customer's stock return and lagged customer's revisions forecast subsequent revision of the firm's earnings for the current fiscal year. The results are consistent with the return of the customer momentum strategy being (at least partially) generated by a lagged analyst's response to news about economically linked firms.

Figure A2 illustrates the result by reporting how customer returns predict earnings' revisions at different horizons. We show the cumulative average returns in month t+k on the long/short customer momentum portfolios formed on customer returns in month t[3]. We also plot the cumulative changes in recommendation on the long/short customer momentum portfolio over time (average revision for suppliers in the top 20% customer return portfolio minus the average revision for suppliers in the bottom 20% customer return portfolio). Looking at the long/short portfolio, analysts' net revisions are close to zero in month 0 (where the sales-weighted customer return portfolio, not reported in this figure (but in Figure 3), jumps by 7.8%). However, subsequent to portfolio formation, net revisions rise by a cumulative 20% over the subsequent 12 months tracking the drift in prices. The predictable revisions persist for about a year and then fade away.

The results in Table A4 and Figure A2 show that analysts tend to react with a lag to news about economically linked firms (either in the form of monthly returns or earnings revisions). This supports our hypothesis of investor inattention driving the

[2] See Chan at al. (1995).
[3] The cumulative returns are the same as Figure 3.

substantial return predictability across linked firms that we document (and may help to explain it). Analysts may be prone to overlook company specific links because of institutional constraints: often a single analyst covers firms in a specific industry while most of our links are across different industries. Some support to this hypothesis is given by the fact that common coverage of both customer and supplier by a single analyst is rare in our sample (as opposed to common ownership by mutual funds). An alternative hypothesis is that analysts are aware of company links but nonetheless they underreact to information about related firms, due to some behavioral bias such as anchoring or overconfidence. A complete analysis of the pattern of analysts' response to news about a firm's trading partners is beyond the scope of this paper, but is certainly an interesting area of future research.

Table A1: Supplier momentum

This table reports Fama-MacBeth forecasting regressions of individual stock returns. The dependent variable is the monthly stock return. The explanatory variables are the lagged suppler return (SRET), the stock's own lagged return (RET), lagged return of the corresponding industry portfolio (INDRET), and lag return of the corresponding supplier industry portfolio (SINDRET). IMPSUPP is a dummy variable equal to 1 if the ratio of total sales from the supplier to the customer's total market capitalization at the end of the previous month is greater than the 75th percentile of all firms in that calendar month. Cross sectional regressions are run every calendar month and the estimates are weighted by the cross sectional statistical precision, defined as the inverse of the standard error of the coefficients in the cross sectional regressions. Cross sectional standard errors are adjusted for heteroskedasticity. Fama-MacBeth t-statistics are reported below the coefficient estimates and 5% statistical significance is indicated in bold.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$SRET_{t-1} \times IMPSUPP$	**0.017**	**0.018**	**0.018**	**0.018**	**0.019**	**0.019**	**0.018**	**0.020**
	[2.38]	[2.52]	[2.60]	[2.57]	[2.70]	[2.80]	[2.62]	[2.89]
$SRET_{t-1}$	0.004	0.004	0.004	0.002	0.002	0.002	0.003	0.002
	[1.42]	[1.47]	[1.61]	[0.83]	[0.69]	[0.90]	[1.06]	[0.91]
$SRET_{t-12,t-2}$		0.000	-0.001		0.000	-0.001		-0.001
		[0.36]	[-0.68]		[-0.21]	[-0.80]		[-0.96]
$IMPSUPP$	0.001	0.001	0.001	0.001	0.001	0.000	0.001	0.000
	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]
RET_{t-1}			**-0.030**			**-0.037**		**-0.038**
			[-3.57]			[-4.56]		[-4.63]
$RET_{t-12,t-2}$						**0.006**		**0.006**
						[3.15]		[3.23]
$INDRET_{t-1}$				**0.068**	**0.069**	**0.093**	**0.058**	**0.084**
				[2.88]	[3.27]	[4.75]	[2.76]	[4.59]
$INDRET_{t-12,t-1}$					0.005	0.000		-0.001
					[1.00]	[-0.07]		[-0.19]
$SINDRET_{t-1}$							0.013	0.011
							[0.78]	[0.75]
$SINDRET_{t-12,t-1}$								-0.001
								[-0.19]
R^2	0.025	0.028	0.063	0.037	0.049	0.078	0.039	0.081

Table A2: Cross industry momentum portfolios based in customer/supplier links, 1981–2004

This table shows calendar time portfolio returns. At the beginning of every calendar month we assign stocks to 48 industries based on the available SIC code. Industry definitions are from Ken French's website. For each industry we form a portfolio of related industries. Industries are weighted using the last available total dollar flow of goods from the customer-supplier sales. Stocks are ranked in ascending order on the basis of the return at the end of the previous month of the portfolio of linked industries. The ranked stocks are assigned to one of 5 quintile portfolios. All stocks are value (equally) weighted within a given portfolio, and the portfolios are rebalanced every calendar month to maintain value (equal) weights. This table includes all available stocks with stock price greater than $5 at portfolio formation. Alpha is the intercept on a regression of monthly excess return from the rolling strategy. The explanatory variables are the monthly returns from Fama and French (1993) mimicking portfolios and Carhart (1997) momentum factor. L/S is the alpha of a zero-cost portfolio that holds the top 20% high customer return stocks and sells short the bottom 20% low customer return stocks. Returns and alphas are in monthly percent, t-statistics are shown below the coefficient estimates, and 5% statistical significance is indicated in bold.

	Sample of supp/customers			All CRSP stocks			Industry indexes		
Panel A: VW	Q1(low)	Q5(high)	L/S	Q1(low)	Q5(high)	L/S	Q1(low)	Q5(high)	L/S
Excess returns	-0.857	**1.179**	**2.036**	0.305	**0.911**	**0.605**	0.352	**0.904**	0.552
	[-1.91]	[2.72]	[4.96]	[0.99]	[3.13]	[2.44]	[1.07]	[2.83]	[1.94]
3-factor alpha	**-1.597**	**0.604**	**2.200**	-0.293	**0.303**	**0.596**	**-0.543**	0.152	**0.695**
	[-5.02]	[2.10]	[5.14]	[-1.91]	[2.16]	[2.29]	[-2.90]	[0.74]	[2.34]
4-factor alpha	**-1.367**	**0.579**	**1.946**	-0.144	0.268	0.412	**-0.451**	0.228	**0.680**
	[-4.28]	[1.97]	[4.49]	[-0.95]	[1.86]	[1.58]	[-2.37]	[1.10]	[2.23]
Panel B: EW	Q1(low)	Q5(high)	L/S	Q1(low)	Q5(high)	L/S	Q1(low)	Q5(high)	L/S
Excess returns	-0.687	**1.556**	**2.243**	-0.016	**1.395**	**1.411**	0.352	**0.904**	0.552
	[-1.45]	[3.21]	[5.53]	[-0.04]	[4.05]	[5.46]	[1.07]	[2.83]	[1.94]
3-factor alpha	**-1.508**	**0.995**	**2.503**	**-0.825**	**0.666**	**1.492**	**-0.543**	0.152	**0.695**
	[-4.70]	[3.52]	[6.05]	[-3.82]	[3.99]	[5.56]	[-2.90]	[0.74]	[2.34]
4-factor alpha	**-1.061**	**1.173**	**2.233**	**-0.498**	**0.821**	**1.319**	**-0.671**	**0.724**	**1.395**
	[-3.49]	[4.10]	[5.35]	[-2.47]	[4.96]	[4.87]	[-2.99]	[3.46]	[4.38]

Table A3: Customer momentum, 1966 - 1980

This table shows calendar time portfolio abnormal returns. At the beginning of every calendar month, stocks are ranked in ascending order on the basis of the return of a portfolio of its principal customers at the end of the previous month. The ranked stocks are assigned to one of 5 quintile portfolios. All stocks are value (equally) weighted within a given portfolio, and the portfolios are rebalanced every calendar month to maintain value (equal) weights. This table includes all available stocks with stock price greater than $5 at portfolio formation. Alpha is the intercept on a regression of monthly excess return from the rolling strategy. The explanatory variables are the monthly returns from Fama and French (1993) mimicking portfolios and Carhart (1997) momentum factor. L/S is the alpha of a zero-cost portfolio that holds the top 20% high customer return stocks and sells short the bottom 20% low customer return stocks. Returns and alphas are in monthly percent, t-statistics are shown below the coefficient estimates, and 5% statistical significance is indicated in bold.

Panel A: value weights	Q1(low)	Q2	Q3	Q4	Q5(high)	L/S
Excess returns	0.017	0.152	0.199	0.694	0.992	**0.975**
	[0.03]	[0.33]	[0.44]	[1.46]	[1.90]	[2.71]
3-factor alpha	-0.442	-0.307	-0.183	0.415	**0.511**	**0.953**
	[-1.68]	[-1.51]	[-1.00]	[1.80]	[2.00]	[2.59]
4-factor alpha	**-0.583**	-0.141	-0.167	0.27	0.251	**0.835**
	[-2.15]	[-0.68]	[-0.88]	[1.14]	[0.98]	[2.18]
5-factor alpha	**-0.549**	-0.099	-0.148	0.272	0.266	**0.815**
	[-2.02]	[-0.48]	[-0.77]	[1.14]	[1.03]	[2.12]

Panel B: equal weights	Q1(low)	Q2	Q3	Q4	Q5(high)	L/S
Excess returns	0.172	0.304	0.592	0.978	**1.37**	**1.198**
	[0.29]	[0.57]	[1.14]	[1.86]	[2.31]	[4.10]
3-factor alpha	**-0.541**	**-0.397**	-0.024	**0.363**	**0.683**	**1.223**
	[-2.66]	[-2.65]	[-0.14]	[1.97]	[2.92]	[4.11]
4-factor alpha	**-0.592**	**-0.414**	-0.108	0.182	0.357	**0.949**
	[-2.80]	[-2.65]	[-0.62]	[0.98]	[1.57]	[3.15]
5-factor alpha	**-0.556**	**-0.398**	-0.104	0.174	0.367	**0.923**
	[-2.63]	[-2.54]	[-0.59]	[0.93]	[1.60]	[3.05]

Table A4: **Cross sectional regressions, revisions of earnings forecasts**

Panel A reports Fama-MacBeth regressions of individual stock return. The dependent variable is the monthly stock return. The explanatory variables are the lagged customer return (CRET) and analysts' revision (CREV), the stock's own lagged revision (REV), lagged revisions of the corresponding industry portfolio (INDREV), and lagged revisions of the corresponding customer industry portfolio (CINDREV). Revisions are defined as REV = (UP-DOWN) / EST where EST is the number of estimates in month t of the firm's earnings for the current fiscal year (FY1) and UP (DOWN) is the number of upward (downward) revisions. Panel B reports Fama-MacBeth regressions of earnings revisions. The dependent variable is the monthly revision REV. Cross sectional regressions are run every calendar month and the estimates are weighted by the cross sectional statistical precision, defined as the inverse of the standard error of the coefficients in the cross sectional regressions. Cross sectional standard errors are adjusted for heteroskedasticity. Coefficients are in percent, t-statistics are reported below the coefficient estimates and 5% statistical significance is indicated in bold.

Panel A: The dependent variable is the monthly stock return RET							
$CREV_{t-1}$	**0.906**	**0.768**			0.469	**0.582**	**0.463**
	[3.99]	[3.43]			[1.92]	[2.40]	[1.99]
$CRET_{t-1}$		**2.224**		**2.137**	**2.040**		**2.139**
		[2.61]		[2.58]	[2.42]		[2.17]
$CINDREV_{t-1}$			**1.479**	**1.289**	0.924		
			[3.07]	[2.75]	[1.73]		
REV_{t-1}						**0.947**	**0.945**
						[5.65]	[5.64]
$INDREV_{t-1}$						**4.424**	**4.339**
						[3.99]	[3.97]
Panel B: The dependent variable is the monthly analysts' revisions REV							
$CREV_{t-1}$	**5.724**	**5.303**			**2.520**	**3.755**	**3.390**
	[10.87]	[10.14]			[4.19]	[7.64]	[6.89]
$CRET_{t-1}$		**5.214**		**5.914**	**4.800**		**5.130**
		[3.34]		[3.79]	[3.06]		[3.35]
$CINDREV_{t-1}$			**11.023**	**10.453**	**8.035**		
			[10.24]	[9.73]	[6.32]		
REV_{t-1}						**12.516**	**12.516**
						[21.48]	[21.45]
$INDREV_{t-1}$						**28.211**	**27.642**
						[13.27]	[12.93]

Figure A1: Annual returns of customer momentum strategy

This figure shows annual buy-and-hold returns on a long/short portfolio formed on customer return in month *t*. At the beginning of every calendar month, stocks are ranked in ascending order based on the return of a portfolio comprised of its major customers in the previous month. Stocks are assigned to one of five quintile portfolios. The figure also shows annual buy-and-hold returns on a long/short portfolio formed on customer industry return in month *t*. At the beginning of every calendar month we assign stocks to 48 industries based on the available SIC code. Industry definitions are from Ken French's website. For each industry we form a portfolio of related industries. Industries are weighted using the last available total dollar flow of goods from the customer-supplier sales. Stocks are ranked in ascending order on the basis of the return at the end of the previous month of the portfolio of linked industries. Stocks are assigned to one of five quintile portfolios. Portfolios are rebalanced monthly to maintain value weights. The figure shows annual returns of a zero cost portfolio that holds the top 20% high customer return stocks and sells short the bottom 20% low customer returns stocks.

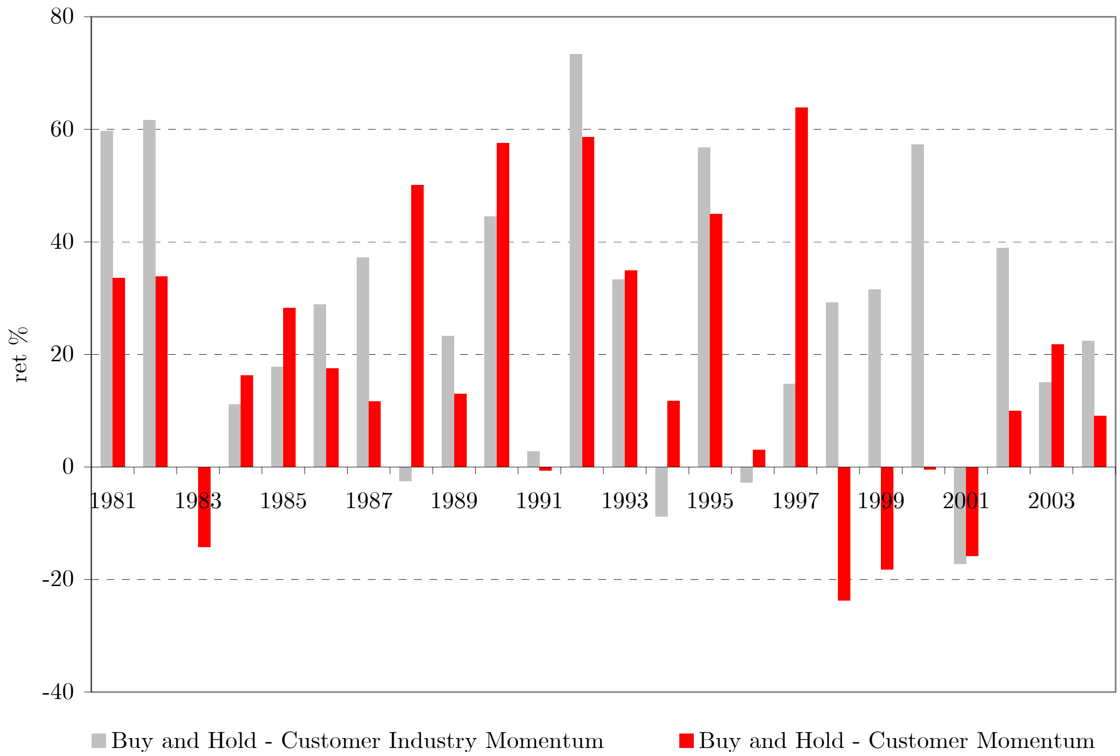

Figure A2: Customer momentum, event-time CAR and analyst revisions

This figure shows the average cumulative return and cumulative analyst revisions in month *t+k* on a long/short portfolio formed on the firm's customer return in month *t*. At the beginning of every calendar month, stocks are ranked in ascending order based on the return of a portfolio of its major customers at the end of the previous month. Stocks are assigned to one of five quintile portfolios. The figure shows average cumulative returns (in %) over time of a zero cost portfolio that holds the top 20% high customer return stocks and sells short the bottom 20% low customer returns stocks. The figure also shows the cumulative changes in recommendation on the long/short customer momentum portfolio over time (average revisions for the top 20% customer return portfolio minus the average revision for the bottom 20% customer return portfolio). Monthly analysts' revisions are defined as $REV_t = (\#ESTUP_t - \#ESTDOWN_t) / \#ESTIMATES_t$ where $\#ESTIMATES_t$ is the number of estimates in month *t* of the firm's earnings for the current fiscal year (FY1) and $\#ESTUP_t$ ($\#ESTDOWN_t$) is the number of upward (downward) revisions in month *t*.