

Do non-executive employees have information? Evidence from employee stock purchase plans

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Motivation

- ▶ Lots of academic and commercial interest on trades by corporate insiders
 - ▶ Seyhun (1986), Lakonishok and Lee (2001), Ravina and Sapienza (2009), Aboody et al (2008)
 - ▶ Wall Street Journal, CDA/Investnet, Barrons, Bloomberg, Yahoo
- ▶ Focus on trades by *Section 16 Insiders*
 - ▶ Top management, directors, 10% owners
 - ▶ Required to disclose trades to the SEC
 - ▶ Likely to have information but may not act on it

Motivation

- ▶ **Research question:** Do other employees, beyond top management, have non-public information about future performance?
- ▶ **Purchase decisions by non-executives may be more informative than those by executives**
 - ▶ *Aggregate signal:* Individual purchases are noisy, but firms have thousands of employees
 - ▶ *Trades are not publicly disclosed:* No public scrutiny, insider trading laws largely do not apply
 - ▶ *Allowed to make-short swing profits:* Executives have to forfeit profits on round-trip transactions made within 6 months
 - ▶ *No signaling motives:* Executives may purchase stock to look good or for voting power concerns
 - ▶ *No minimum stock holding requirements for employees*

Preview: What We Find

- ▶ **Higher stock purchases through ESPPs forecast positive abnormal stock returns**
 - ▶ Information is not efficiently incorporated into prices, 6-9% abnormal returns per year
 - ▶ Stronger predictability than with insider trades
- ▶ **ESPP purchases predict future corporate events**
 - ▶ Break in a series of consecutive earnings increases, earnings restatements, being the target of an acquisition
- ▶ **Implications**
 - ▶ Hidden compensation, Own stock puzzle, Disclosure Policy, Market Efficiency
- ▶ **Low participation rates**
 - ▶ A well-paid employee forfeits up to \$8,000 per year

Employee Stock Purchase Plan

- ▶ Company-run program for employees to voluntarily purchase shares at a discount
 - ▶ **Explicit discount:** Most often 15 percent
 - ▶ **Lookback feature:** Discount taken from the lower price at the beginning or the end of the offering period
- ▶ The majority (83%) of plans are **tax-qualified** (Section 423 plans)
 - ▶ Give a tax-advantage to employees if shares are held for at least one year after purchase and two years after start of the offering period
 - ▶ Open to all employees (excludes part-time, temporary employees and highly-compensated individuals)
- ▶ **Restrictions on immediate resale:** explicit (26%) and implicit

Data

- ▶ ESPP dataset: collected through a manual search of 10-K forms filed with the SEC
 - ▶ 2002 to 2007 (S&P 500, S&P 400 Midcap, NASDAQ 100)
 - ▶ Augmented using contract data from previous 10-K, 10-Q, 8-K, S-8 forms and proxy statements
 - ▶ Plan features, number of shares issued, dollar amounts contributed and more
 - ▶ 411 unique firms with ESPP (46% of firms): 2,255 firm-years
- ▶ Supplemented with a survey of 392 firms in 2009 (by NCEO)
- ▶ Data on stock option grants and exercises is from RiskMetrics
- ▶ Data on average employee wages is from Glassdoor.com

Summary Statistics

	Obs.	Mean	SD	10%	50%	90%
Contributions (\$M)	1,793	22.06	57.44	0.90	5.76	48.09
Contributions/employee (\$)	1,750	1,711	2,138	207	791	4,819
Participation (%)	1,750	7.23	9.16	0.55	3.44	20.11
Wage-adjusted particip. (%)	1,707	15.58	17.66	0.97	8.67	43.15
Shares issued/outstand. (%)	1,717	0.307	0.374	0.038	0.190	0.674
Percent of comp. (%)	1,678	17.36	20.47	10	10	20
Discount (%)	2,109	14.65	6.53	10	15	15
Sale restrictions	1,443	0.263	0.441	0	0	1
Min holding period (m)	1,443	4.31	8.86	0	0	24
Lookback	2,079	0.693	0.461	0	1	1
Offering period (m)	1,843	6.83	5.57	3	6	12
Annual dollar limit (\$)	1,783	24,343	8,806	21,250	25,000	25,000
Survey wage (\$)	1,977	72,794	20,931	42,805	74,000	98,615

NCEO 2009 Survey Data

	Obs.	Mean	SD	10%	50%	90%
Participation hourly (%)	193	23.75	25.60	2.50	10.00	60.00
Participation salaried (%)	221	34.51	26.97	2.50	22.50	77.50
Participation managers (%)	219	37.55	28.74	2.50	22.50	77.50
Participation executives (%)	193	37.64	37.01	2.50	22.50	97.50
Retention hourly (%)	170	39.44	31.85	2.50	40.00	90.00
Retention salaried (%)	192	47.44	28.28	10.00	40.00	90.00
Retention managers (%)	193	58.30	28.20	22.50	60.00	97.50
Retention executives (%)	170	74.12	31.35	10.00	90.00	97.50
ESPP Satisfaction (0 to 3)	235	1.96	0.93	1	2	3

Return Predictability: Methodology

- ▶ Every end of June, from 2003 to 2008, we look at all 10-Ks filed in the last 12 months
- ▶ Sort firms in quartiles based on:
 - ▶ Dollar contributions to ESPP per employee
 - ▶ Shares issued under ESPP/ shares outstanding
- ▶ Form equally-weighted portfolios of firms in each quartile for each month from July to next June
- ▶ Regress monthly portfolio returns on Fama-French factors

Calendar Time Results

- ▶ Sorting variable: ESPP shares issued/shares outstanding

	0-25 % bottom quartile	25-50 %	50-75 %	75-100 % top quartile	Top - bottom quartile
Alpha	-0.05 (-0.38)	0.46** (2.51)	0.18 (0.88)	0.70*** (2.58)	0.75** (2.34)
RMRF	1.03 (0.75)	0.91 (-1.22)	1.03 (0.00)	1.24*** (3.31)	0.20** (2.35)
SMB	0.16** (2.45)	0.46*** (5.33)	0.65*** (6.68)	0.86*** (6.86)	0.70*** (4.67)
HML	0.36*** (4.74)	-0.14 (-1.47)	0.07 (0.61)	-0.40*** (-2.85)	-0.76*** (-4.53)

Alpha = 75 bps per month = 9.0% annually

Own Company Stock Puzzle

- ▶ U.S. employees hold a large fraction of their portfolio in their own company's stock
 - ▶ Against standard portfolio theory. In addition, their human capital positively covaries with the stock payoff
 - ▶ Poterba (2003), Huberman and Sengmueller (2004), Benartzi (2007)
- ▶ Possible explanations
 - ▶ Loyalty: Cohen (2009)
 - ▶ Familiarity: Huberman (2001), Hong et al (2008)
 - ▶ Ambiguity aversion: Boyle, Uppal, and Wang (2003), Ang, Bekaert, and Liu (2005)
 - ▶ Information advantage: theoretical argument by Nieweburgh and Vieldkamp (2010)
- ▶ Our results provide support to the information advantage

Other Relevant Literature

- ▶ Do employees have price-relevant information?
 - ▶ Huddart and Lang (2003): option exercises on 7 companies: YES!
 - ▶ Aboody et al (2008) and Cicero (2009): option exercises are noisy since many people don't sell the stock
 - ▶ Benartzi (2001) and Cohen (2009): 401K contributions: NO!
 - ▶ Principal differences between 401K and ESPP: size of the discount and "retirement savings"
 - ▶ Benartzi: Single cross-section of 142 firms with raw returns
- ▶ Literature on ESPP
 - ▶ Englehardt and Madrian (2004): one firm
 - ▶ Bhagat, Brickley, and Lease (1985): market reaction to authorization announcements of 130 ESPPs

Information Hypothesis vs Alternatives

▶ **Information hypothesis**

- ▶ Higher predictability with holding restrictions and inability to hedge the exposure
- ▶ Higher predictability for less transparent firms (lower analyst coverage, smaller firms, high dispersion of forecasts)

▶ **Alternative hypotheses**

- ▶ Predictability due to management participation in a plan
 - ▶ Management changes ESPP terms to make it more or less attractive at the right times
 - ▶ Higher returns are *caused* by higher effort/motivation
 - ▶ Higher returns are *caused* by relaxation of financing constraints
- ▶ Tested in a regression framework with annual BHAR (July to June) as the dependent variable

Cross-Sectional Regressions (Information)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Participation	0.29***	0.32	0.32	0.789***	1.98***	1.94***	0.17
	(2.87)	(0.89)	(0.89)	(3.60)	(2.68)	(3.78)	(1.57)
	2.66%	2.93%	2.93%	8.81%	18.13%	17.79%	1.56%
Participation* holdup		0.63**	-1.02				
		(2.11)	(-1.55)				
Participation* vol.*holdup			2.49**				
			(2.11)				
Participation* traded option				-0.72**			
				(-2.39)			
Participation* firm size					-0.21**		
					(-2.42)		
Participation* analysts						-0.58**	
						(-3.38)	
Participation* std analysts							60.44**
							(2.49)
Observations	1,351	977	977	1,351	1,351	1,351	1,317

Alternative I: Management Information

- ▶ Plan 423 is open to all employees, other plans are mostly offered to top management

	(1)	(2)	(3)
Participation	-0.11 (-0.61) -1.0%	0.29*** (2.93) 2.66%	0.31** (2.34) 2.84%
Plan 423	-4.01 (-1.49)		
Participation* plan 423	0.49** (2.06)		
Insider purchases		51.7* (1.85)	
Discount			-54.40* (-1.70)
Lookback			2.24 (0.98)
Percent of comp.			-0.02 (-0.35)
Offering period			-0.30* (-1.71)
Holdup			2.40 (1.00)
Observations	1,215	1,351	853

Alternative II: Participation Causes High Returns

- ▶ Data on stock option grants and exercises is from the RiskMetrics database.

	(4)	(5)
Participation		0.33*** (2.89) 3.02%
Expected participation	0.08 (0.54)	
Unexpected participation	0.36** (2.22)	
Option exercises/emp		-0.23** (-2.16) -2.22%
Option grants/emp		0.08 (1.40)
Observations	831	1,333

Alternative III:

- ▶ Employees talk with the management.
- ▶ NCEO surveys indicate that whenever companies adopt ESPPs they also organize periodic meetings with top management

Is There Time-Series Variation in Participation Rates?

- ▶ Firm-fixed effects explain approximately 80% of variation, $MSE=4\%$ when average is 7%

Year	Adobe Systems	Mentor Graphics	Applied Materials	JetBlue Airways	Puget Energy
2002	27	14	25	3.7	0.3
2003	47	8	75	6.8	0.6
2004	75	0.8	46	8.2	0.9
2005	26	1.3	40	7.3	0.7
2006	47	2	32	6.4	2.4
2007	55	0.6	38	6.1	2.1

Variation in Participation Rates

- ▶ A potential concern is that we pick some cross-sectional firm characteristics correlated with returns
- ▶ Participation should have stronger predictability in companies with more variation in participation rates

$$CV \text{ Participation} = STD / Mean$$

	CV Participation >	CV Participation <
	Median	Median
Intercept	5.337 (1.43)	4.792 (0.75)
Participation	0.303** (2.69)	0.144 (1.18)
Observations	663	675

Likelihood of Earnings Break and Earnings Restatement

▶ **What exactly might employees know?**

- ▶ Future Earnings Estimates
 - ▶ Ke, Huddart, and Petroni (2003): large negative market reaction to a break in a string of consecutive earnings increases
 - ▶ Executives are able to predict earnings breaks
- ▶ Inaccurate reports of accounting data (often employees are whistle-blowers)
 - ▶ Tenet HealthCare in 2005: former employee alleged that inappropriate managed care reserves have been taken at three hospitals and triggered restatement
 - ▶ Dechow, Hutton, and Sloan (1996), Palmrose, Richardson, and Schotz (2004): large negative market reactions to restatements, particularly if restate because of incorrect revenue recognition or cost items

Logit Model: Earnings Restatements and Earnings Breaks

- ▶ Restatements: U.S. GAO Jul 02-Jun 06 (46 restatements)
- ▶ Break=1 if earnings decline after a string of increases

	Earnings restatement = 1		Earnings break = 1	
Intercept	-2.479** (-12.68)	-3.631*** (-2.57)	0.124** (2.11)	0.727* (1.70)
ESPP participation	-0.076** (-2.45)	-0.041* (-1.70)	-0.009** (-2.23)	-0.009* (-1.76)
Dividend payer	-4.27%	-2.31%	-2.67%	-2.65%
RD/assets		-0.515 (-1.45)		0.001 (0.01)
Firm size		-4.864 (-1.07)		2.173 (1.60)
Tobin's q		0.110 (0.74)		-0.011 (-0.25)
Insider purchases		-0.405** (-2.29)		-0.099** (-2.29)
Year, industry effects		3.294 (0.67)		-3.053 (-1.52)
Observations	No, No	Yes, Yes	No, No	Yes, Yes
	879	876	1,730	1,722

Likelihood of Being the Target of an Acquisition

- ▶ Becoming the target is associated with large positive returns (e.g., Barger et al (2008))
- ▶ The unconditional probability of being a target is low in our sample (2%) since we have large firms

	Aquisition target=1	
Intercept	-4.190*** (-8.10)	-3.246** (-2.45)
ESPP participation	0.023** (1.97)	0.038*** (3.01)
	0.63%	1.05%
Dividend payer		0.031 (1.25)
RD/assets		0.211 (0.51)
Firm size		-0.093 (-0.65)
Tobin's q		-0.613*** (-2.84)
Insider purchases		3.026 (0.44)
Observations	1,730	1,672

Low Participation Puzzle

- ▶ Employees can invest up to \$25,000, earn 15% through discount, 10% through lookback feature, and 7.5% through information advantage, a total of \$8,000.
- ▶ But the participation rates are around 15-30%. Resonates with general well-documented low stock market participation of households.
- ▶ Proposed explanations in the literature for stock market:
 - ▶ *fixed costs* (Vissing-Jorgensen, 2002): reduced considerably in case of ESPP
 - ▶ *awareness and lack of trust* (Luigi, Sapienza, and Zingales (2008); Hong, Kubik, and Stein (2004)): ESPP is a social setting, employees trust their companies
 - ▶ *asymmetric aversion to gains and losses* (Ang, Bekaert, and Liu (2005)): shares are given at discount, but also can sell immediately, cannot lose much

Company's Goal in Structuring ESPP

- ▶ **Question:** Why do companies have such plans? Do they want/recognize employees having informational advantage?
- ▶ **Possible explanation:** Hidden compensation (Hall and Murphy (2003), Bebchuk and Fried (2004))
 - ▶ On accounting statements compensation cost is underestimated (does not include informational advantage)
 - ▶ Keeps both (misinformed) shareholders and employees happy
 - ▶ For average firm in our sample, the cost is underestimated by \$4 million per year, would be \$20 million if all employees participated
- ▶ **Alternative:** promote employee ownership, greater incentives, team work, etc.

Company's Satisfaction with ESPP

- ▶ Look at survey data, gives company's satisfaction with the plan
- ▶ Hidden compensation
 - ▶ Satisfaction should increase with participation (broad-based)
 - ▶ Should not depend on retention
- ▶ Employee ownership/incentives
 - ▶ Satisfaction should increase with share retention & participation

ESPP Satisfaction

	(1)	(2)	(3)
Intercept	1.486*** (5.05)	1.320*** (3.78)	1.436*** (3.79)
Plan 423	-0.172 (-0.92)	0.006 (0.03)	0.084 (0.41)
Num of employees	-0.026 (-0.48)	-0.022 (-0.40)	-0.027 (-0.47)
Participation hourly	-0.441 (-1.21)		
Participation salaried	1.304*** (2.75)	1.544*** (5.47)	
Participation managers	1.384*** (3.04)		1.246*** (4.96)
Participation executives	-0.667*** (-2.69)		
Retention salaried		0.281 (1.26)	
Retention managers			0.068 (0.29)
% of comp contrib salaried		0.427 (0.19)	
% of comp contrib managers			0.278 (0.14)
Observations	160	181	180

Conclusion

- ▶ Higher stock purchases through ESPP's forecast positive abnormal stock returns
 - ▶ Stronger effect for broad-based plans, small firms, and plans with holding period restrictions
 - ▶ Might partially explain own company's stock puzzle
 - ▶ Implications for market efficiency/trading strategies, disclosure, compensation cost
- ▶ Employees might have some information about
 - ▶ Future earnings, future restatements of accounting data, acquisitions
- ▶ There is a puzzle of low participation levels