Turnover: Liquidity or Uncertainty?

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Two Views of Turnover

- Asset-pricing literature: turnover is liquidity
  - But: turnover volatility is negatively related to returns (Chordia et al., 2001)
- Microstructure literature: turnover is uncertainty
  - Several anomalies (e.g., momentum) are stronger if turnover is high
  - But: high turnover means lower future returns

Empirical fact: turnover is weakly related to other liquidity measures (size, price, bid-ask spread, etc.)

Contribution

- I show that turnover measures firm-level uncertainty, and uncertainty lowers the exposure of real options to aggregate volatility risk
  - Turnover impacts future returns more for high leverage firms and high market-to-book firms
  - High turnover means lower aggregate volatility risk, especially for high market-to-book firms and highly levered firms
- Application: new issues and the turnover factor (Eckbo and Norli, 2005)
  - Small growth firms and small new issues load more negatively on the turnover factor
  - Consistent with the turnover factor picking up aggregate volatility risk, inconsistent the liquidity story

Aggregate Volatility Risk

- Volatility increase means worse future investment opportunities (Campbell, 1993)
- Volatility increase means the need to increase precautionary savings (Chen, 2002)
- Firms with most positive return sensitivity to aggregate volatility changes have lower expected returns (Ang et al, 2006)

Main Mechanism: Cross-Section

$$\beta_P = E(P,S) \cdot \beta_S, \qquad \frac{\partial E(P,S)}{\partial \sigma_I} < 0$$

- As uncertainty goes up
  - The beta of the asset behind the real option stays constant
  - The real option elasticity wrt the underlying asset value declines (option delta decreases in volatility)
- Therefore, the real options beta declines in uncertainty

Main Mechanism: Time-Series

- Both uncertainty and aggregate volatility are high in recessions
- All else constant, higher uncertainty has two effects, both stronger for volatile firms with valuable real options:
  - Risk exposure of real options decreases
  - Value of real options increases
- Therefore, high uncertainty (high turnover) firms beat CAPM when aggregate volatility increases
- The more valuable are the real options, the greater is the "hedging" ability

Empirical Predictions

- Turnover is negatively related to expected returns
- Turnover is negatively related to aggregate volatility risk
- The negative relation between turnover and expected returns strengthens with leverage and market-to-book
- This last regularity is also explained by aggregate volatility risk
- Can restate everything for turnover variability

FVIX Factor

- FVIX mimics daily changes in VIX
- The correlation between FVIX and the change in VIX is 0.53
- Negative FVIX beta is volatility risk (losing money when volatility increases)
- FVIX factor loses 1% per month, t-statistic -4.35 - FVIX hedges against volatility risk and has negative market beta
- CAPM alpha of FVIX is -56 bp per month, t-statistic -3.0

Table 3A: Turnover and Aggregate Volatility Risk

	Low	Turn2	Turn3	Turn4	High	L-H
α_{CAPM}	0.255	0.216	-0.006	-0.037	-0.328	0.584
t-stat	*2.15*	*1.70*	*-0.06*	*-0.41*	*-1.86*	*2.15*
α_{ICAPM}	-0.028	-0.119	-0.155	-0.055	0.121	-0.149
t-stat	*-0.32*	*-1.11*	*-1.49*	*-0.70*	*0.79*	*-0.73*
β_{FVIX}	-0.502	-0.594	-0.264	-0.033	0.797	-1.299
t-stat	*-7.20*	*-7.27*	*-2.82*	*-0.51*	*8.82*	*-11.5*

Table 3B: Turnover, Market-to-Book, and Aggregate Volatility Risk

	Value	MB2	MB3	MB4	Growth	G-V
α_{CAPM}	0.494	0.507	0.563	0.449	0.648	0.154
t-stat	*1.82*	*1.89*	*2.18*	*1.33*	*1.81*	*0.41*
α_{ICAPM}	0.420	-0.006	0.395	-0.213	-0.322	-0.742
t-stat	*1.50*	*-0.02*	*1.29*	*-0.74*	*-1.14*	*-2.30*
β_{FVIX}	-0.132	-0.909	-0.298	-1.173	-1.718	-1.587
t-stat	*-1.09*	*-5.34*	*-1.45*	*-9.92*	*-10.5*	*-7.62*

Table 3C: Turnover, Leverage, and Aggregate Volatility Risk

	Low	Lev2	Lev3	Lev4	High	H-L
α_{FF}	-0.122	0.096	0.393	0.591	0.554	0.677
t-stat	*-0.46*	*0.31*	*1.51*	*2.01*	*1.55*	*1.68*
α_{FF4}	-0.316	-0.021	0.228	0.471	0.497	0.813
t-stat	*-1.19*	*-0.06*	*0.92*	*1.47*	*1.35*	*2.03*
β_{FVIX}	-0.150	-0.558	-0.579	-0.578	-0.876	-0.726
t-stat	*-1.33*	*-4.07*	*-4.49*	*-3.74*	*-7.15*	*-5.67*

Table 3: Conclusions

- Higher turnover means lower aggregate volatility risk (higher FVIX beta)
- This explains why higher turnover implies lower future returns - high turnover firms beat the CAPM when aggregate volatility increases
- Difference in aggregate volatility risk between low and high turnover firms increases with market-to-book and leverage

Liquidity Factor vs. FVIX Factor

- Eckbo and Norli (2005) show that a turnover-based liquidity factor explains IPO underperformance
- Conditional on the market factor, the liquidity factor and FVIX have large negative correlation
  - Strange, because small firms load positively on FVIX and should load positively on liquidity risk
  - If turnover picks up uncertainty, the liquidity factor can be a proxy for FVIX
- In two-factor models, FVIX explains returns to the liquidity factor, but not vice versa

Table 4: Horse Race

	S1G1	S2G1	IPO	SEO	CumIss
α_{CAPM}	-0.912	-0.524	-0.578	-0.436	-0.639
t-stat	*-2.71*	*-2.36*	*-2.01*	*-2.25*	*-2.66*
α_{FVIX}	-0.023	0.129	0.091	-0.084	-0.061
t-stat	*-0.06*	*0.54*	*0.28*	*-0.36*	*-0.25*
β_{FVIX}	1.574	1.158	1.185	0.624	1.024
t-stat	*5.40*	*5.20*	*9.84*	*7.38*	*9.29*
α_{LMH}	0.063	0.178	0.371	0.168	0.114
t-stat	*0.17*	*0.87*	*1.23*	*0.82*	*0.54*
β_{LMH}	-1.097	-0.790	-1.068	-0.680	-0.847
t-stat	*-6.02*	*-6.39*	*-10.3*	*-12.7*	*-10.9*

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Table 5A: FVIX Factor and Cross-Section of IPO Puzzle

	Size1	**Size2**	**Size3**	**3-1**
α_{CAPM}	-0.639	-0.505	0.270	0.909
t-stat	*-2.02*	*-1.69*	*0.95*	*2.37*
α_{ICAPM}	0.084	0.152	0.333	0.249
t-stat	*0.24*	*0.50*	*1.16*	*0.68*
β_{FVIX}	1.281	1.164	0.111	-1.170
t-stat	*10.28*	*6.96*	*0.71*	*-5.32*

Table 5B: FVIX Factor and Cross-Section of SEO Puzzle

	Size1	Size2	Size3	3-1
α_{CAPM}	-0.495	-0.376	-0.215	0.280
t-stat	*-2.04*	*-1.94*	*-1.52*	*1.14*
α_{ICAPM}	-0.059	-0.027	-0.276	-0.218
t-stat	*-0.20*	*-0.12*	*-1.92*	*-0.81*
β_{FVIX}	0.773	0.618	-0.109	-0.882
t-stat	*7.33*	*5.27*	*-1.13*	*-5.89*

Table 5A&B: Liquidity Factor and Cross-Section of New Issues Puzzle

	Size1	Size2	Size3	3-1
α_{IPO}	0.352	0.398	0.430	0.077
t-stat	*1.05*	*1.45*	*1.53*	*0.21*
β_{LMH}	-1.117	-1.016	-0.180	0.937
t-stat	*-9.85*	*-7.20*	*-2.06*	*5.77*
α_{SEO}	0.179	0.224	-0.082	-0.261
t-stat	*0.69*	*1.13*	*-0.49*	*-0.95*
β_{LMH}	-0.759	-0.676	-0.150	0.609
t-stat	*-13.8*	*-7.97*	*-1.62*	*5.57*

Liquidity Factor vs. FVIX: Conclusion

- Eckbo and Norli's liquidity factor picks up aggregate volatility risk, not liquidity risk
  - Liquidity factor and FVIX factor are strongly and counterintuitively negatively correlated
  - FVIX factor explains returns to the liquidity factor, but not vice versa
  - Smallest growth firms seem to be extraordinary hedges against "liquidity risk"
  - "Liquidity risk" is much lower for the smallest new issues than for the largest ones

Table 8A: Turnover Variability, Median Returns, and Aggregate Volatility Risk

	Low	CV2	CV3	CV4	High	L-H
α_{CAPM}	0.023	-0.073	-0.224	-0.363	-0.526	0.549
t-stat	*0.18*	*-0.49*	*-1.45*	*-2.26*	*-3.20*	*2.97*
α_{ICAPM}	-0.070	0.068	0.081	0.053	-0.122	0.052
t-stat	*-0.99*	*0.54*	*0.50*	*0.30*	*-0.69*	*0.30*
β_{FVIX}	-0.229	0.153	0.349	0.425	0.322	-0.551
t-stat	*-6.93*	*3.24*	*7.50*	*8.66*	*8.38*	*-12.0*

Table 8B: Turnover Variability, Median Returns, Market-to-Book, and Aggregate Volatility Risk

	Value	MB2	MB3	MB4	Growth	G-V
α_{CAPM}	0.218	0.271	0.464	0.248	0.802	0.584
t-stat	*0.89*	*1.35*	*2.04*	*0.94*	*3.38*	*1.85*
α_{ICAPM}	0.089	0.226	0.161	0.328	0.254	0.164
t-stat	*0.45*	*1.68*	*1.03*	*1.99*	*1.29*	*0.57*
β_{FVIX}	-0.224	-0.166	-0.340	-0.212	-0.618	-0.393
t-stat	*-2.29*	*-1.68*	*-3.11*	*-2.17*	*-5.67*	*-2.72*

Table 8C: Turnover Variability, Median Returns, Leverage, and Aggregate Volatility Risk

	Low	Lev2	Lev3	Lev4	High	H-L
α_{CAPM}	0.024	0.538	0.439	0.344	0.303	0.279
t-stat	*0.10*	*2.23*	*1.95*	*1.66*	*1.09*	*1.10*
α_{ICAPM}	0.165	0.445	0.207	0.062	0.452	0.287
t-stat	*1.23*	*2.68*	*1.23*	*0.42*	*2.49*	*1.34*
β_{FVIX}	0.044	-0.400	-0.284	-0.262	-0.094	-0.138
t-stat	*0.72*	*-7.32*	*-4.76*	*-4.84*	*-1.38*	*-1.75*

Table 8: Conclusions

- Higher turnover variability means lower aggregate volatility risk (higher FVIX beta)
- This can explain why higher turnover variability implies lower future returns
- Difference in median alphas and median FVIX betas between low and high turnover variability firms increases with market-to-book, but not with leverage

Conclusion

- **Turnover measures uncertainty, not liquidity**
- Higher turnover implies lower aggregate volatility risk - high turnover firms beat the CAPM when aggregate volatility increases
- Turnover impacts future returns only through real options
- All of the above is true for turnover variability
- The liquidity story for the new issues puzzle (Eckbo and Norli, 2005) picks up aggregate volatility risk, not liquidity risk