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

Table 2A: Turnover and Uncertainty

	1	2	3	4	5	6
IVol	0.606					1.189
t-stat	*8.42*					*18.1*
Disp		0.252				0.152
t-stat		*7.01*				*4.69*
ErrQtr			0.345			0.193
t-stat			*10.7*			*7.77*
VarEarn				0.352		0.424
t-stat				*8.50*		*15.0*
VarCF					0.212	0.206
t-stat					*5.66*	*6.49*
Controls	YES	YES	YES	YES	YES	YES

Table 2B: Turnover and Liquidity

	1	2	3	4	5	6
Illiq	-2.401					-4.322
t-stat	*-7.15*					*-8.40*
γ_{PS}		0.011				-0.006
t-stat		*2.62*				*-1.20*
β_{PS}			0.001			-0.013
t-stat			*0.08*			*-0.57*
β_{Sadka}				-0.028		0.050
t-stat				*-1.80*		*3.04*
β_{Amihud}					0.034	0.048
t-stat					*3.32*	*2.10*
Controls	YES	YES	YES	YES	YES	YES

Table 2: Conclusions

- Turnover is strongly related to uncertainty
- Difference in turnover between low and high uncertainty is 20-60% of market cap per month
- Turnover is largely unrelated to liquidity/liquidity risk
- Difference in turnover between low and high liquidity/liquidity risk firms is either
  - 1-5% of market cap per month (negligible)
  - 240%-430% of market cap (incredible)

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 4: 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 5A: Turnover, Market-to-Book, and Aggregate Volatility Risk

	Value	MB2	MB3	MB4	Growth	G-V
α_{CAPM}	0.808	1.121	0.842	0.879	1.614	0.806
t-stat	*2.89*	*4.36*	*3.34*	*3.68*	*5.44*	*2.92*
α_{ICAPM}	0.579	0.743	0.304	0.365	0.878	0.299
t-stat	*2.01*	*2.67*	*1.31*	*1.63*	*3.75*	*1.24*
β_{FVIX}	-0.405	-0.669	-0.953	-0.910	-1.304	-0.899
t-stat	*-3.64*	*-3.55*	*-7.30*	*-6.32*	*-11.8*	*-9.85*

Table 5B: Turnover, Leverage, and Aggregate Volatility Risk

	Low	Lev2	Lev3	Lev4	High	H-L
α_{FF}	-0.298	-0.621	0.370	0.447	0.634	0.932
t-stat	*-0.95*	*-2.10*	*0.97*	*1.20*	*1.62*	*1.94*
α_{FF4}	-0.284	-0.807	0.070	0.247	0.399	0.683
t-stat	*-0.83*	*-2.68*	*0.19*	*0.62*	*0.98*	*1.26*
β_{FVIX}	0.107	-1.446	-2.326	-1.558	-1.826	-1.933
t-stat	*0.10*	*-2.71*	*-3.49*	*-1.81*	*-2.60*	*-1.70*

Table 5C: Turnover, Credit Rating, and Aggregate Volatility Risk

	Best	Cred2	Cred3	Cred4	Worst	W-B
α_{CAPM}	-0.192	0.087	0.563	0.738	0.711	0.903
t-stat	*-0.84*	*0.39*	*2.02*	*2.83*	*2.02*	*2.22*
α_{ICAPM}	-0.203	0.131	0.342	0.683	0.184	0.387
t-stat	*-0.87*	*0.55*	*1.22*	*2.55*	*0.59*	*1.05*
β_{FVIX}	-0.020	0.076	-0.391	-0.097	-0.933	-0.914
t-stat	*-0.16*	*0.51*	*-3.80*	*-0.83*	*-5.69*	*-7.23*

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
- Turnover effect is stronger for growth firms and distressed firms (abundant real options)
- Difference in aggregate volatility risk between low and high turnover firms increases with market-to-book, leverage, credit rating

Table 7: Turnover Effect and Liquidity Factors

	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_{PS}	0.316	0.294	0.038	-0.021	-0.381	0.697
t-stat	*2.78*	*2.65*	*0.44*	*-0.22*	*-2.11*	*2.61*
β_{PS}	-0.136	-0.177	-0.090	-0.009	0.105	-0.242
t-stat	*-2.70*	*-3.24*	*-2.08*	*-0.42*	*1.32*	*-1.89*

Table 7: Turnover Effect and Liquidity Factors

	Low	Turn2	Turn3	Turn4	High	L-H
α_{Amihud}	0.259	0.252	0.061	-0.006	-0.203	0.462
t-stat	*1.93*	*1.85*	*0.68*	*-0.06*	*-1.08*	*1.55*
β_{Amihud}	-0.014	-0.129	-0.237	-0.112	-0.449	0.435
t-stat	*-0.08*	*-0.63*	*-2.26*	*-2.14*	*-1.37*	*0.88*
α_{Sadka}	0.192	0.149	0.035	0.041	-0.171	0.363
t-stat	*1.59*	*1.21*	*0.40*	*0.49*	*-0.93*	*1.30*
β_{Sadka}	0.134	0.140	-0.064	-0.139	-0.348	0.482
t-stat	*2.58*	*1.93*	*-1.44*	*-2.88*	*-3.66*	*3.88*

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

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
- Turnover effect is unexplained by other liquidity risk factors
- The liquidity story for the new issues puzzle (Eckbo and Norli, 2005) picks up aggregate volatility risk, not liquidity risk