Liquidity and Asset Pricing. Evidence on the role of Investor Holding Period.

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Holding period

This paper: *Holding periods* of individual investors.
Relate to:

- Asset pricing.
- Liquidity/Market microstructure.

Asset pricing

Asset pricing:
Prices align to make investors indifferent between trading / not trading.
Does the mechanism for moving prices involve trading?
(The microstructure view)
Whose trades are then important?

- Those that buy/sell?
- Those that do *not* buy/sell?
  - (The silent majority)

Microstructure

Recent evidence – liquidity matters for asset returns, e.g.

- Pastor and Stambaugh [2003]
- Acharya and Pedersen [2005]
- Korajczyk and Sadka [2007]

Many different liquidity proxies,

- Spread
- Turnover
- Lesmond et al. [1999]
- Amihud [2002]
- ...

What aspect of liquidity is it that generates return effects?
Disputed

Amihud and Mendelson [1986] model

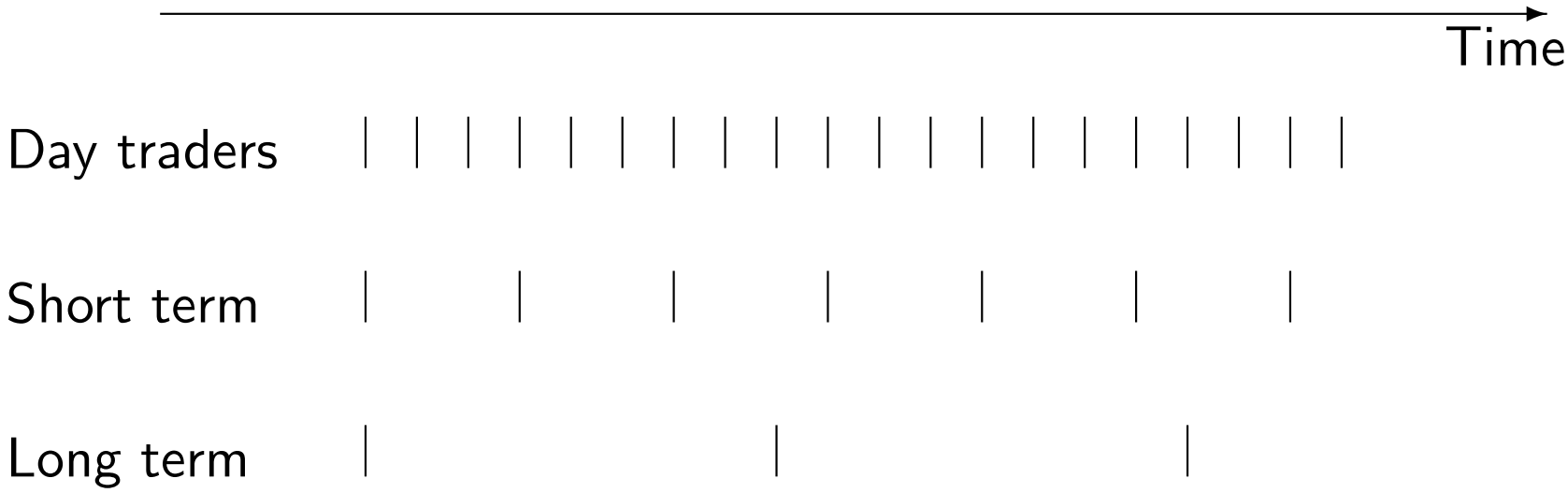
Often cited link asset pricing - microstructure:
The Amihud and Mendelson [1986] model.
Investors choose assets depending on the spread.
Expect to hold the stocks for a long period
– Willing to buy high spread stocks.
(Higher cost distributed over longer time)
Result:
Link between

- Expected return and spread
- Expected return and turnover
  (reflecting holding period differences)

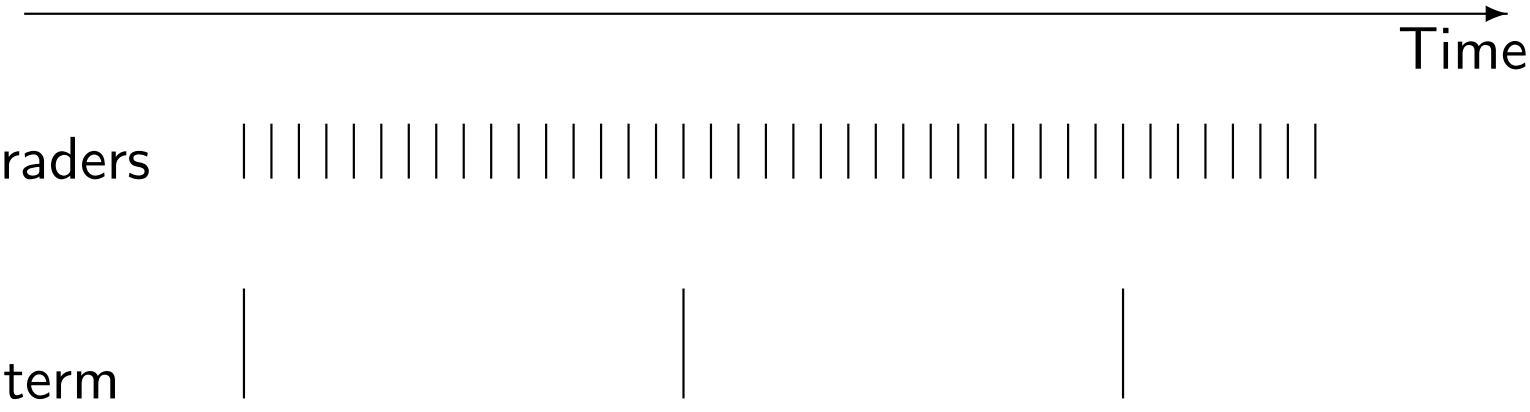
Bottom line

The whole distribution of how long owners hang on to their stocks likely to be important for asset pricing.

A possible distribution of equity owners



Another possible distribution of equity owners



This paper

Source of contribution of this paper:
Data on holding periods of

- All owners in a stock market
- Over a long time period (13 years).

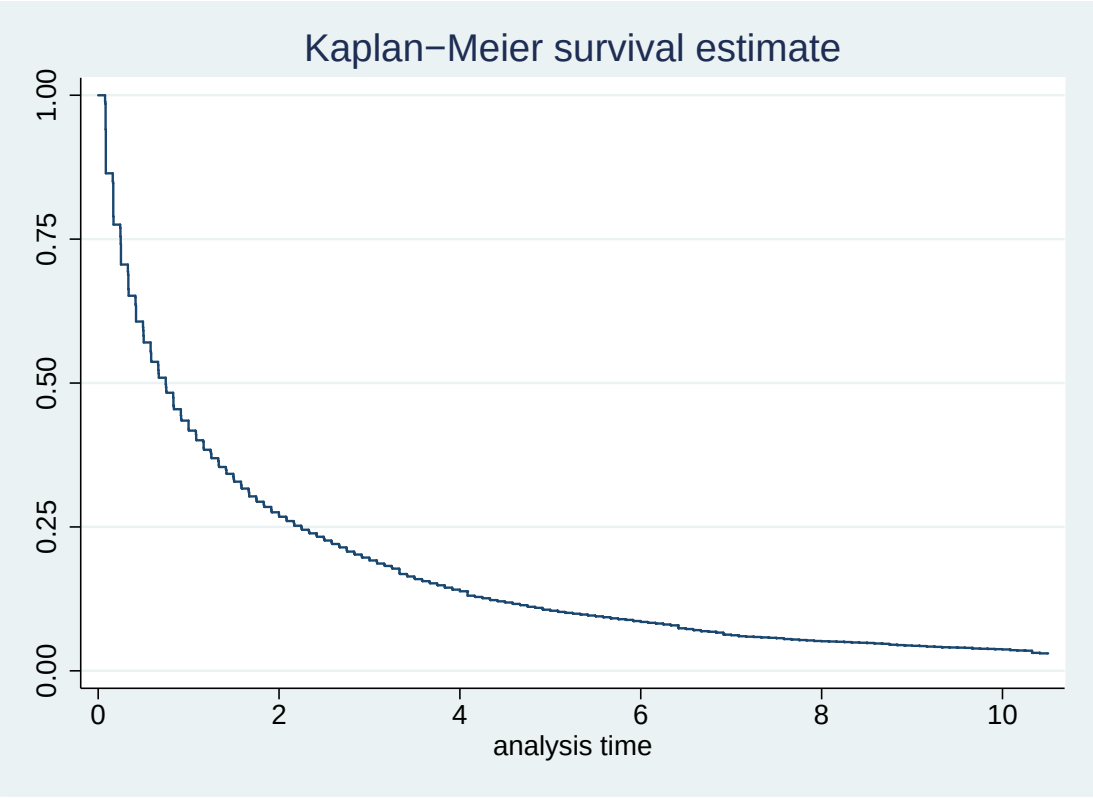
What do we do?
Exploratory:

1) Describe holding period distribution for individual investors.
2) Relate actual holding periods to existing proxies for holding period.
3) Look at the link between holding periods and liquidity measures.
4) Ask whether holding period measures explain asset prices better than liquidity measures.

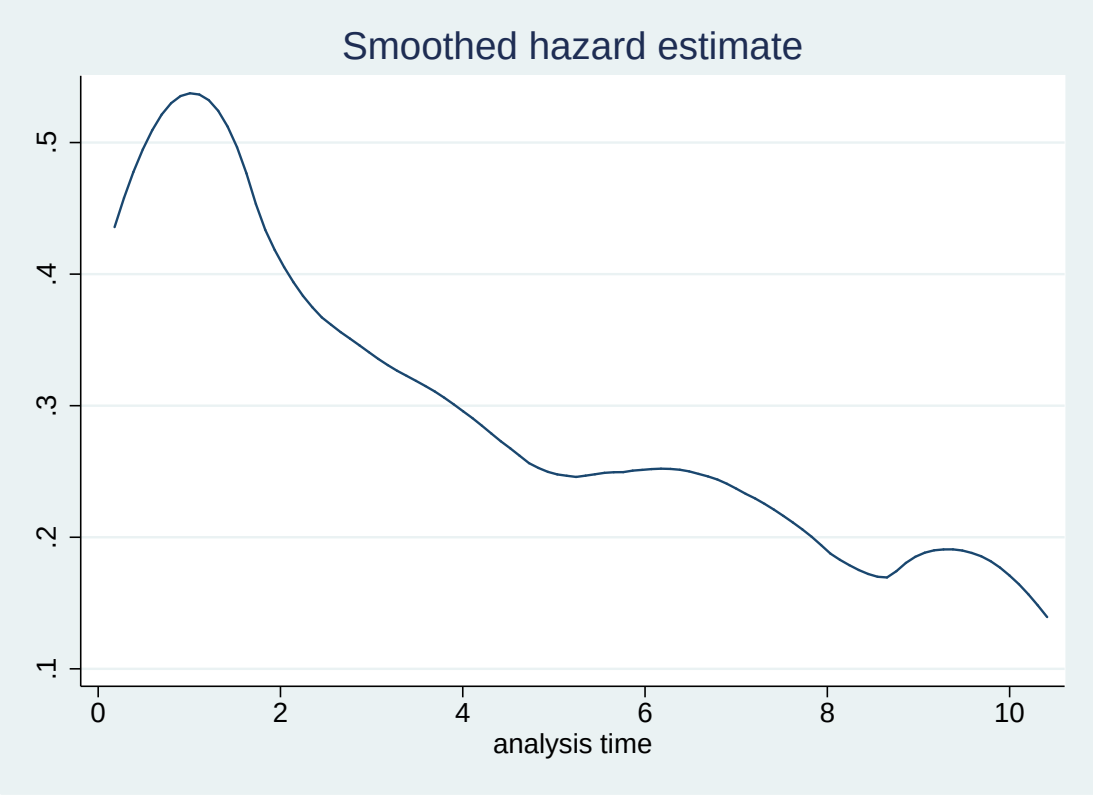
1) Describing holding periods for individual investors

Econometrics:
Analyzing decision to terminate a relationship
Duration analysis.
Main focus of estimation in duration analysis:
Hazard function
– conditional probability of leaving
(selling the stock)
conditional on having survived so far.
Unconditional probility: Survival function

Unconditional Probability Distribution



Conditional Probability Distribution



Determinants of the Hazard Function

- Hazard $= f$(observables at entry)
- Variables
  - spread (test of the AM-model)
  - firm characteristics (size, volatility)
  - investor types (financial, foreign, ..)
  - size of investment

Determinants of the Hazard Function (2)

Variable	Hazard ratio	pvalue	Prob of exit
Spread	0.0034	(0.00)	$\downarrow$
Ln(Firm size)	1.0097	(0.00)	$\uparrow$
Ln(Volatility)	1.4317	(0.00)	$\uparrow$
Financial	1.1916	(0.00)	$\uparrow$
Foreign	0.9932	(0.61)	
Non-financial	1.1157	(0.00)	$\uparrow$
Individual	0.7551	(0.00)	$\downarrow$
Ln(Investment)	0.9829	(0.00)	$\downarrow$
n	1038170		

Contribution to the hazard function:

- coefficient $= 1$, no contribution
- coefficient > 1, higher conditional probability
- coefficient < 1, lower conditional probability

2) Existing proxies for holding period

How does the estimates from actual individual owners compare to existing estimates.
Atkins and Dyl [1997]: Estimating Holding Period Using Turnover.

$$\text{Average holding period} = \frac{1}{\text{Turnover}}$$

Compare:

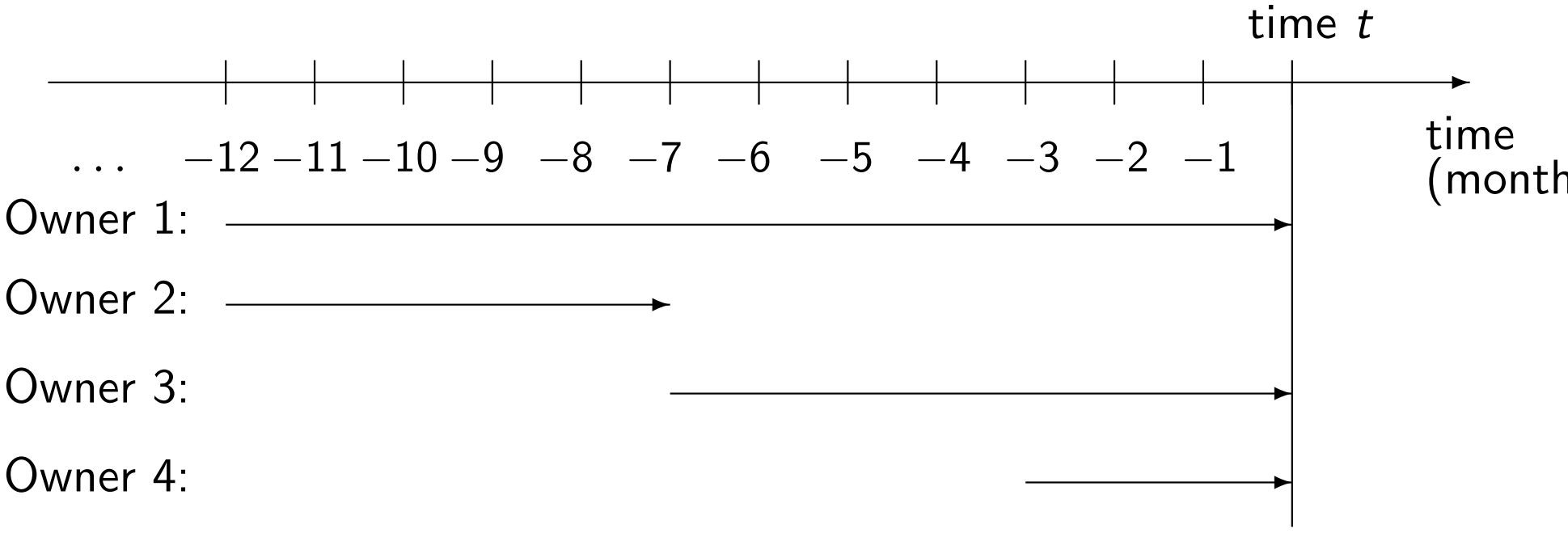
	NYSE 1975-1989	Nasdaq 1983-1991	OSE 1992-2003
Average	6.99	4.01	3.33
Median	3.38	2.43	1.96

Considerably longer average holding period than the one year suggested by our duration analysis

3) Link holding periods - liquidity

Comparing holding period and standard measures of liquidity.
Problem: Holding period is an individual owner decision.
Liquidity is measured at the level of a stock
(aggregates many individuals)
Construct a stock level measure of holding period
`hpi` – Holding period index.

Holding Period Index (hpi)



Let w_i = weight for owner i $\Rightarrow$

$$hpi = w_1 1 + w_3 \frac{7}{12} + w_4 \frac{3}{12}$$

The Link between hpi and Liquidity

	Correlation		Rank correlation	
	hpi(vw)	hpi(ew)	hpi(vw)	hpi(ew)
Annual turnover	-0.51	-0.51	-0.48	-0.43
Annual relative spread	0.17	0.32	0.15	0.23

- Correlations have expected signs
- Turnover is an imperfect measure of holding period
- Spread even less linked to holding period.

4) Asset pricing with holding period measures

If what is important for asset prices is holding period, then a measure of holding period should do better in explaining asset returns.

Horserace, Fama and MacBeth [1973] framework.

Which variable does best?

	`hpi(ew)`		`hpi(vw)`		Turnover		Spread	
Constant	-0.0016	(0.89)	-0.0110	(0.28)	**0.0088**	**(0.04)**	-0.0063	(0.25)
Stock beta	-0.0025	(0.45)	-0.0018	(0.61)	-0.0007	(0.85)	0.0023	(0.56)
`hpi(ew)`	0.0148	(0.27)						
`hpi(vw)`			**0.0249**	**(0.02)**				
Turnover					-0.0027	(0.29)		
Rel Spread							**0.2559**	**(0.00)**
n	114		114		115		115	

Fama Macbeth Analysis (2)

Adding `hpi` and liquidity measures to a three-factor specification

	`hpi(ew)`		`hpi(vw)`		Turnover		Spread	
Constant	**0.0867**	**(0.02)**	**0.0843**	**(0.01)**	**0.0861**	**(0.01)**	0.0358	(0.37
Stock beta	0.0027	(0.47)	0.0033	(0.36)	0.0025	(0.44)	0.0039	(0.29
ln(Firm size)	**-0.0045**	**(0.00)**	**-0.0047**	**(0.00)**	**-0.0041**	**(0.00)**	-0.0021	(0.25
BM ratio	0.0004	(0.93)	0.0007	(0.87)	0.0013	(0.76)	0.0012	(0.79
`hpi(ew)`	0.0083	(0.55)						
`hpi(vw)`			0.0163	(0.13)				
Turnover					-0.0004	(0.88)		
Rel Spread							**0.1630**	**(0.02**
n	114		114		115		115	

Summarizing

Explored a dataset with detailed data on individual investors holding periods.

- Individual owners tend to hold stock for less than a year.
  Holding period duration dependent.
  Liquidity affects holding period decision (Amihud and Mendelson [1986] prediction.)
- Using turnover as a proxy for holding period over-estimates holding period.
- Standard liquidity measures / turnover only imperfectly linked to holding period.
- Standard liquidity measures more related to asset prices than holding periods.

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