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

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This paper

Topic of this paper: *Holding Periods* of *individual investors*.
Context: Market microstructure.
Liquidity — ability to

- trade quickly
- low price impact

Holding periods – opposite

- Never trade – long holding period
- Trade often – short holding periods

Who is important for asset prices?

- Those that trade?
- Those that do *not* trade?

Why is this an interesting question?

Empirical evidence – liquidity/microstructure matters for asset prices in the crossection.
However – unclear *what* aspect of liquidity causes the observed empirical effects.
One suggestion – Amihud and Mendelson [1986] model:
Investors choose assets depending on the spread:
Those that expect to hold the stocks for a long period are willing to buy high spread stocks. (Higher cost distributed over longer time.)
AM model

- Link expected return and spread
- Link expected return and turnover
  (reflecting holding period differences)

Problem:

- Not an equilibrium: Spread is exogenous
  – what causes spread differences in the first place?

Hence: Interesting to ask whether holding periods matter.

What do we do?

Test (correctly) a premise of the Amihud and Mendelson [1986] model

- Liquidity (spread) affects holding period decisions for individual investors.

Characterize holding periods for individual investors.

- Model conditional probability distribution – duration analysis.
- Show complex dynamics in holding period distribution.

To what extent are individual owners' holding period decisions reflected in measured stock liquidity?

- Is e.g. turnover a sufficient statistic?

Is it holding period that is causing crossectional effects in asset returns?

- or is it something else about liquidity?

This paper

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

- All owners in a stock market
- Over a long time period (10 years).

Data for all firms listed at the Oslo Stock Exchange (OSE) in the period 1992-2003
Most important

- Norwegian Securities Registry (VPS)
  - equity holdings of the complete stock market (remove "trivial" holdings < 500 shares)
  - can distinguish between investor types

Additionally: "Usual data"

- Stock prices, returns, accounting data from the stock exchange
- Interest rates from central bank

Describing holding period distribution for individual investors

Tool

- Duration (survival) analysis

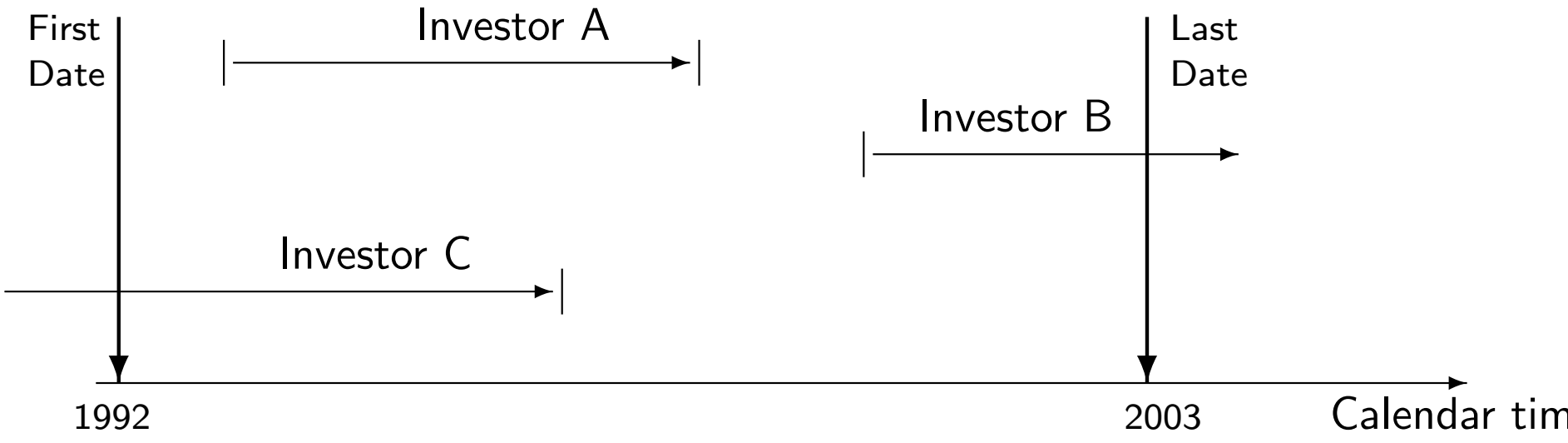
Why necessary?

- Censoring problems
- Dynamics of conditional distribution

Get

- Characterization of probability distribution
  - Survival function
  - Hazard function
- Allow time variation in conditional distribution
- Can test for what factors influence holding period decision

The structure of the data



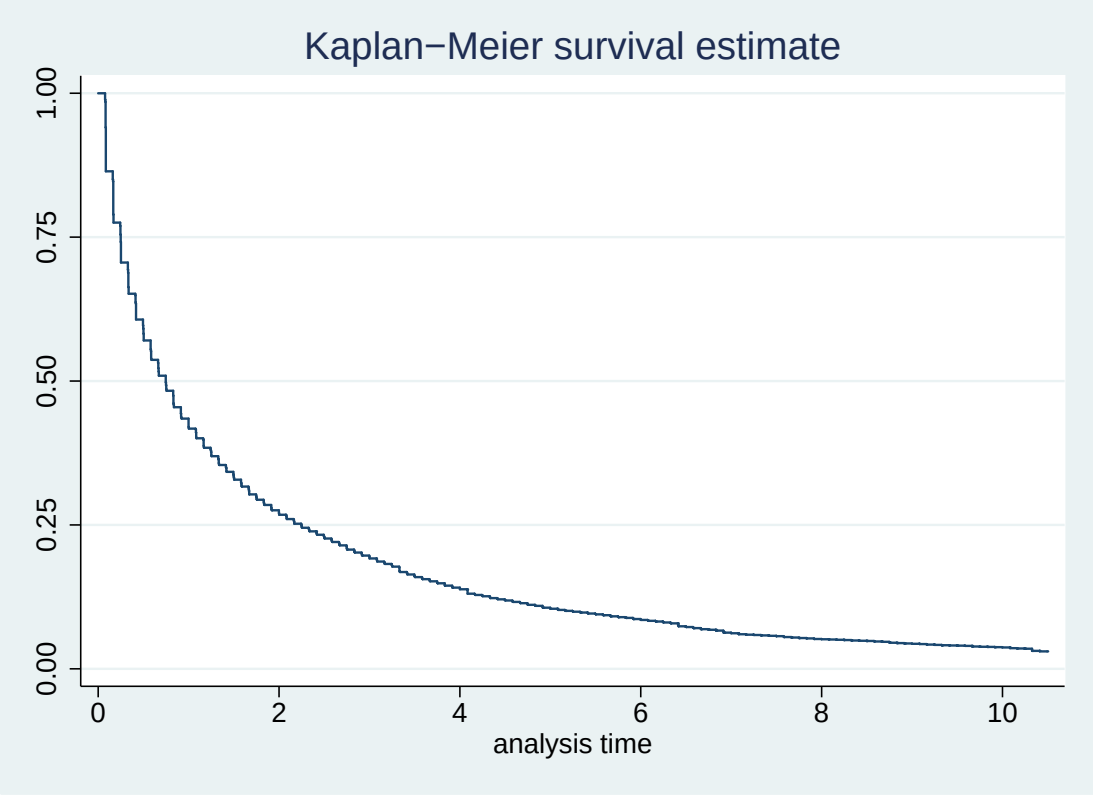
- Investor A: correctly estimated
- Investor B: right censored
- Investor C: left censored

A first look at holding periods

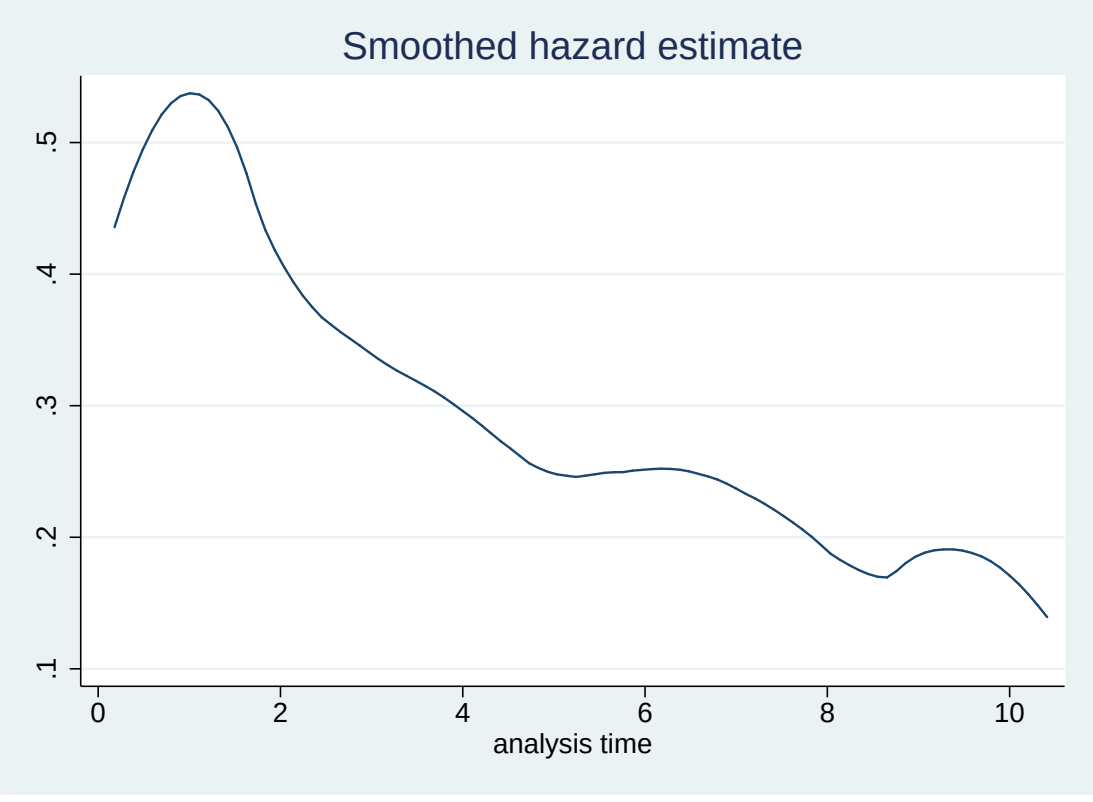
Owner type	median	mean	no obs
All	0.75	1.97	1489365
State	0.75	1.79	5860
Foreign	0.67	1.61	156561
Financial	0.50	1.29	62357
Nonfinancial	0.50	1.45	204587
Individual	0.83	2.18	1055928

(Estimate of mean corrected for censoring.)

Survival function (Unconditional)



Hazard function (Conditional Probability Distribution)



Does liquidity matter for holding periods?

How is hazard function affected by variables observed at initiation of equity position?

Use

- Spread/liquidity (test of the Amihud and Mendelson model)
- investor characteristics (type, investment size)
- stock characteristics (size, volatility)

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

Interpretation of coefficient (*not* OLS interpretation):
If coefficient $\neq 1$, variable affects hazard function.
Find: High spread $\longrightarrow$ long holding period
(assumption in the AM model)

Do we need information on individual owners?

Without information on individual owners, how would you estimate holding period?

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

Doing so:

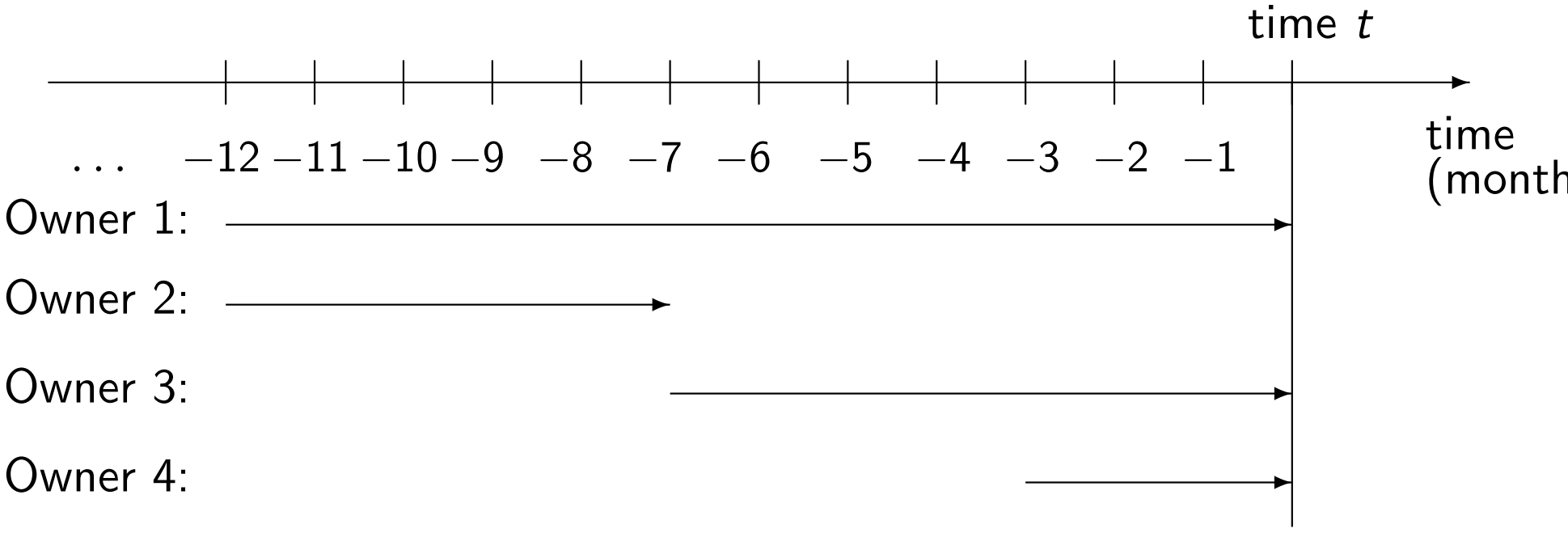
	NYSE 1975-1989	Nasdaq 1983-1991	OSE 1992-2003
Average	6.99	4.01	3.33
Median	3.38	2.43	1.96

(Numbers for the US from Atkins and Dyl [1997])
Median estimated "holding period" from turnover (1.96)
$\approx$ mean holding period for individual investors (1.97).
This number over-estimates the holding period of the typical investor (0.75).
Do not capture complex dynamics of conditional probability of exit.

Is turnover sufficient?

While turnover do not give same estimate, and hide complexity, relative to using individual owners, may still be sufficient in crossection.
Ask: Do holding periods give same ranking in crossection as turnover/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) - Construction



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 holding period index (hpi) and Liquidity

Crossectional correlation, hpi and liquidity measures:

- Turnover.
- Relative Bid/Ask Spread.
- Amortized Spread. [Chalmers and Kadlec, 1998] (Spread normalized to one unit of time).

$$\text{Amortized Spread} \approx \text{Relative Quoted Spread} \times \text{Turnover}$$

	Correlation		Rank Correlation	
	hpi(vw)	hpi(ew)	hpi(vw)	hpi(ew)
Annual Turnover	-0.509	-0.511	-0.478	-0.430
Annual Avg Rel BA Spread	0.207	0.380	0.185	0.268
Amortized Spread	-0.079	-0.010	-0.118	-0.068

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

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.

- What is the relationship between holding period indices and returns?
- Simple portfolio sorting on excess returns
  - Excess return = Portfolio return − Risk free return

Excess Returns on Sorted Portfolios

10 portfolios sorted on hpi and liquidity measures

	hpi(ew)	hpi(vw)	Turnover	Spread	Amortized Spread
1	1.11	1.26	1.99	0.81	1.09
2	1.36	1.43	1.23	1.19	1.07
3	1.16	1.02	1.42	1.52	1.58
4	1.44	0.91	1.43	1.59	1.03
5	1.13	1.00	1.88	1.51	1.15
6	0.80	1.28	1.87	1.65	1.21
7	0.58	1.03	1.65	1.45	1.83
8	1.17	0.94	1.77	1.74	1.98
9	1.13	0.58	1.35	2.38	1.92
10	0.69	1.16	1.63	2.28	3.26

Summarizing

Explored a dataset with detailed data on individual investor holding periods.
At the level of individuals

- Individual owners tend to hold stock for less than a year.
  Holding period distribution time varying
  Holding period distribution depend on owner type:
  Least patient: Financial owners
  Liquidity affects holding period decision (Amihud and Mendelson [1986] premise.)
- Using turnover to estimate holding period over-estimates typical holding periods.

Summarizing – ctd

At the level of stocks:

- Standard liquidity measures / turnover only imperfectly linked to holding period.
- Standard liquidity measures based on trading more related to asset prices than holding periods.
  Suggest that there is more to liquidity than holding period, still have not identified what aspect of liquidity that is important,
  Actually made holding period less of a suspect.
  What instead? Information?

Yakov Amihud and Yakov Mendelson. Asset pricing and the bid/ask spread. *Journal of Financial Economics*, 17: 223–249, 1986.

Allen B Atkins and Edward A Dyl. Transactions costs and holding periods for common stocks. *Journal of Finance*, 52(1):309–325, March 1997.

John M R Chalmers and Gregory B Kadlec. An empirical examination of the amortized spread. *Journal of Financial Economics*, 48(2):159–188, May 1998.