



# Investment Manager Skill in Small-Cap Equities

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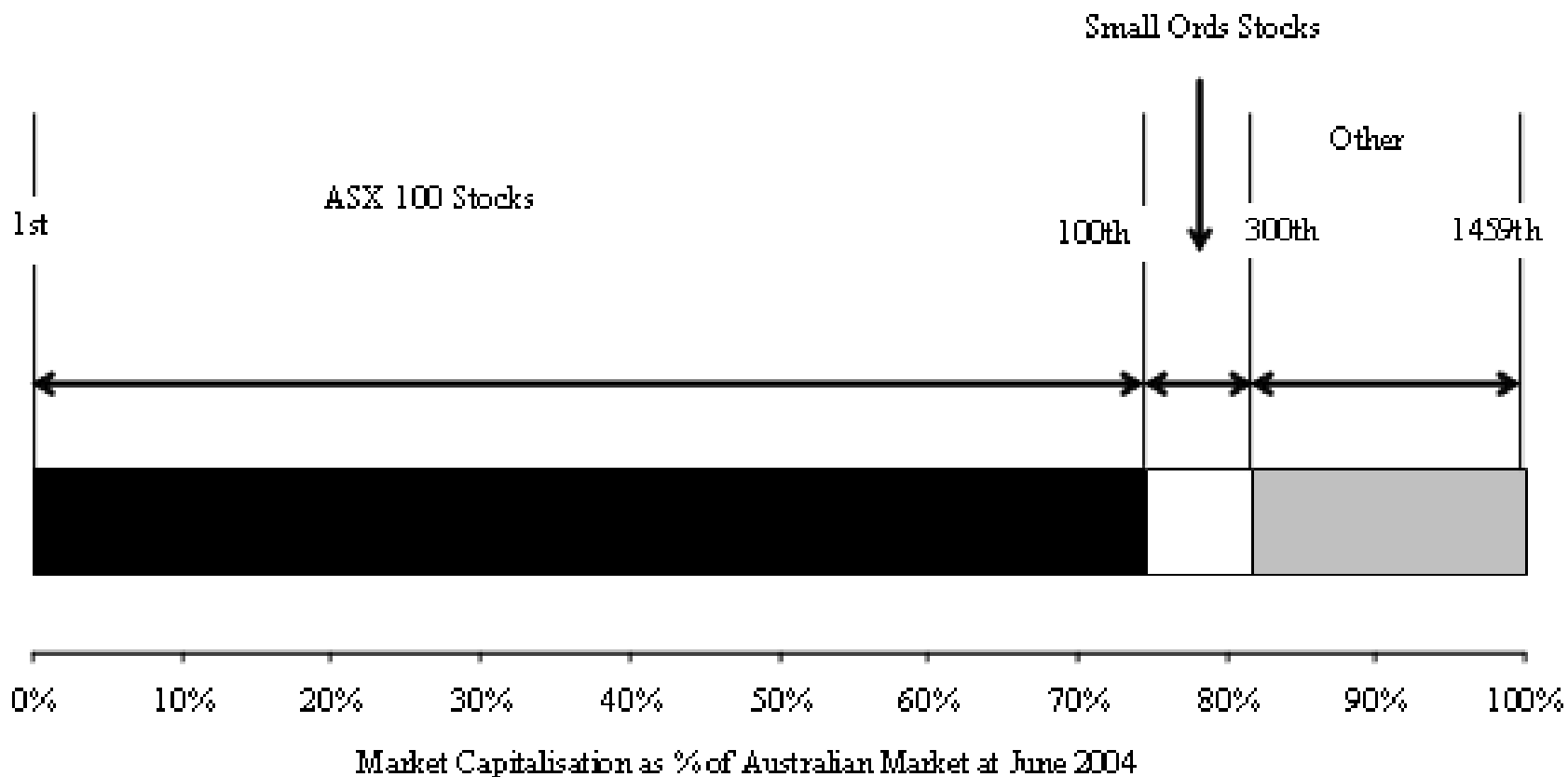


# Overview

- Background
- Research Context
- Research Questions and Motivation
- Literature
- Data and Research Design
- Empirical Results
  - Performance
  - Transaction Costs
- Conclusion & Future Research



# ASX Market Capitalisation





# Background

- S&P/ASX defines small cap index as:
  - Stocks outside ASX100, but constituents of the ASX300
  - Accounts for 6% of the total ASX market-cap
- Small-caps are relatively liquid securities
  - Large institutions are active participants
  - Stale prices is not an issue for this segment of the market
  - (See **Table 3**)



# Background – Table 3

Daily Average Trading Activities for a Typical Stock in the Respective Sectors

Panel A: Last 4 Years

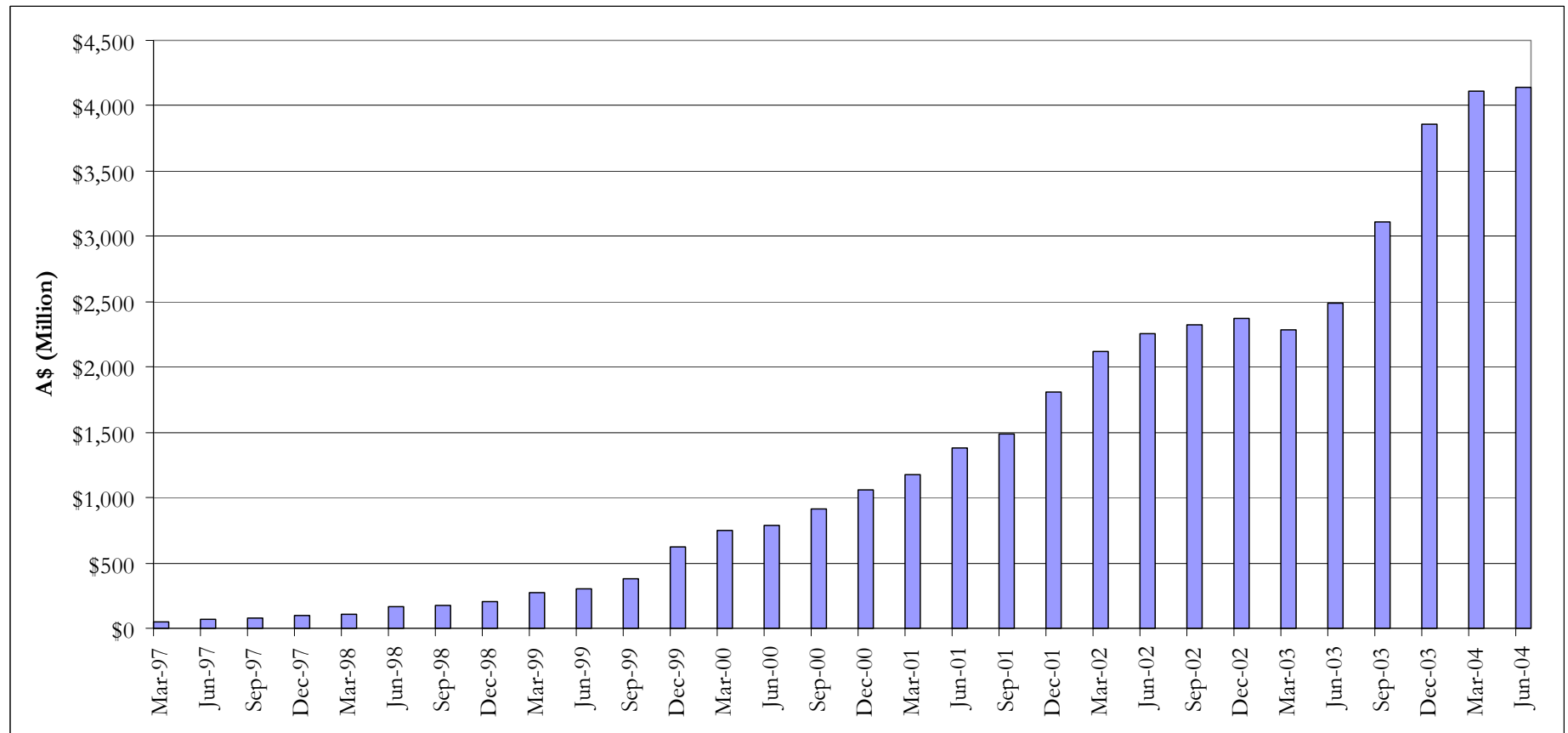
Indices	Avg. Daily Value	Avg. Daily Trade Volume	Avg. Daily Trade Frequency	Off-Market Volume
ASX 100	13,104,576	2,110,604	353	763,445
Small Ordinaries	543,784	470,263	58	161,513
Micro-Cap	181,111	259,298	16	38,144
Small Ordinaries/ASX100 (%)	4.14	22.28	16.43	21.16
Micro-Caps/ASX100 (%)	1.38	12.29	4.53	5.00

Panel B: Last 12 Months

ASX 100	15,967,542	2,671,994	402	924,851
Small Ordinaries	803,995	690,594	70	214,260
Micro-Cap	264,405	461,919	22	66,913
Small Ordinaries/ASX100 (%)	5.04	25.85	17.41	23.17
Micro-Caps/ASX100 (%)	1.66	17.29	5.47	7.23

# Background

- Institutional assets in Small-cap equities in Australia





# Research Context

- Recent US and European studies show investment manager skill in the small-cap space (Keim, 1999, Christopherson Ding and Greenwood, 2002, Gorman, 2003, Dahlquist, Engstrom and Soderlind, 2002, Otten and Bams, 2002, Engstrom, 2004)
- Outperformance ranges between 1.65% and 3.20% p.a.
- Our paper examines small-cap equity manager performance in Australia
  - Do active small-cap managers outperform the market?
  - Consideration of a market segment which exhibits lower analyst following, and potentially is inefficient.
  - Consideration of whether higher transaction costs in small-cap equities erodes performance.



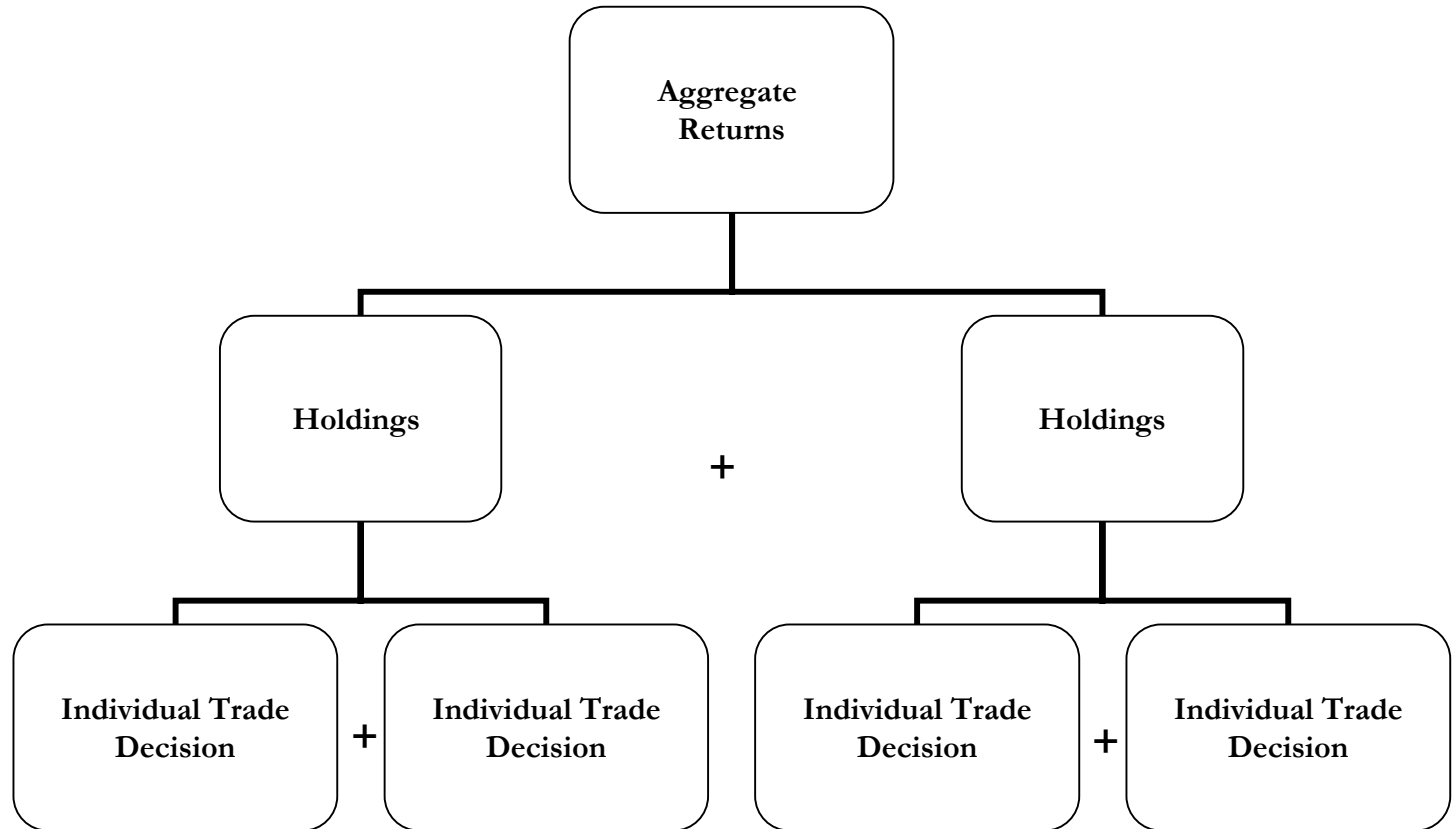
# Research Questions

- Are investment managers able to provide risk-adjusted performance?
  - In a perfect capital market?
  - With costly information?
- How should we measure investment performance?
  - Aggregate performance (total fund returns)
  - Holdings (i.e., stock positions)
  - Trades (i.e., dynamic trading)





Lower Granularity  
Data

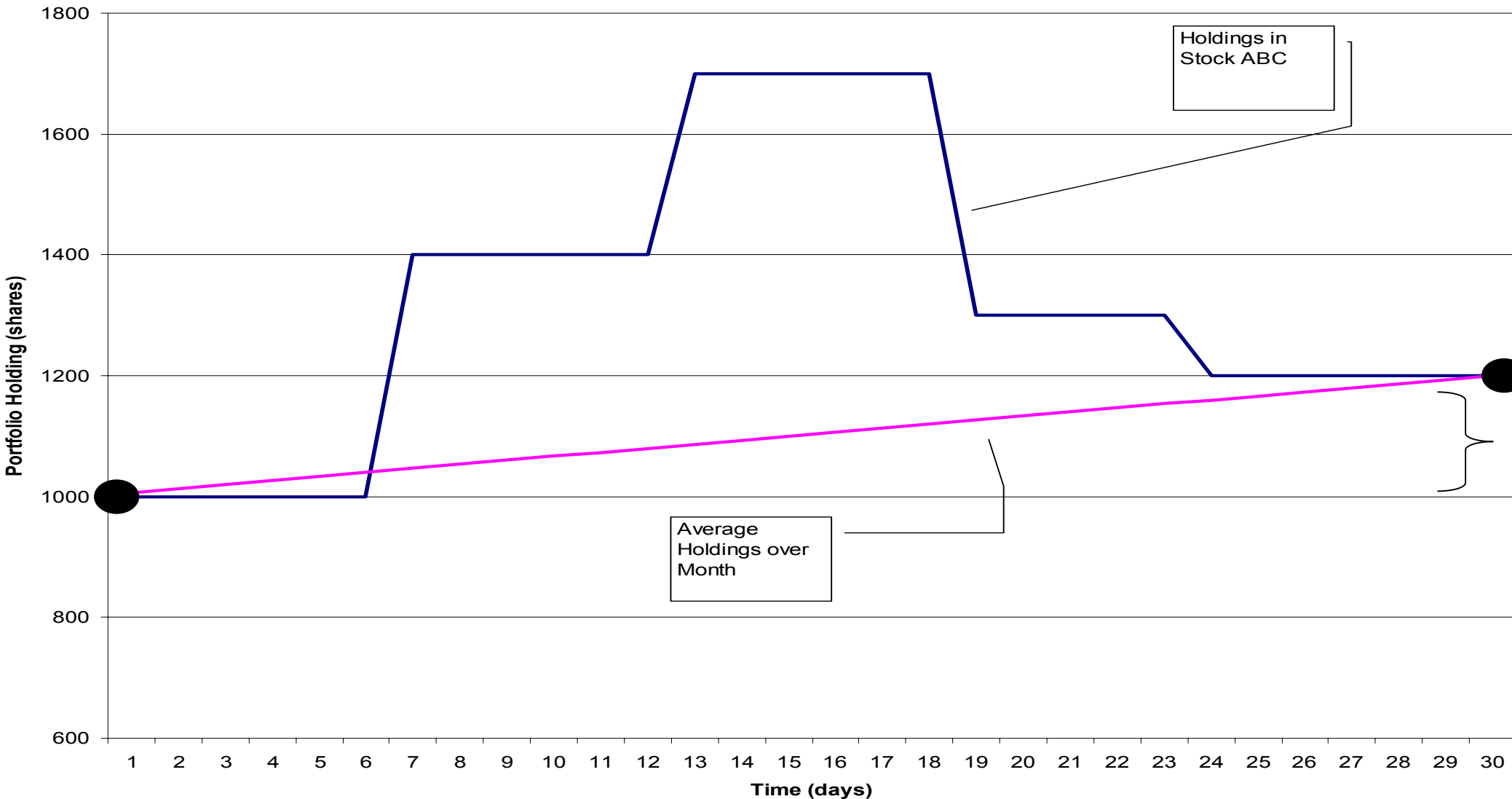


High Granularity  
Data



# Motivation

- Evaluate manager performance using daily trade data
  - Daily trading data is more granular
  - Detection of the sources of manager ability
  - Aggregation errors may arise when inferring trades from periodic holdings
    - Net trading between periods may not capture the total level of trading
  - Improved estimates concerning the information content of institutional trades in small-cap equities





# Literature

- With perfect capital markets, there should be no superior performance
- Majority of the evidence points to no superior performance (e.g. Jensen (1968), Malkiel (1995), Gruber (1996))
- Relaxing assumptions (particularly info search costs) leads to a Grossman and Stiglitz (1980) equilibrium
- Recent studies find superior performance e.g. Grinblatt and Titman (1989b), Daniel *et al.* (1997), and Wermers (2000), Pinnuck (2003)



# Literature

- Small-cap Literature suggests:
  - Small firms outperform large stocks (e.g. Banz 1981)
  - But is the small firm anomaly exploitable?
    - Market Impact Costs
    - Measurement and Statistical errors – e.g. non synchronicity
    - Transaction Cost Considerations
    - Keim (1999) shows that a passive small-cap equity fund outperforms:
      - flexible tracking error policies
      - acting as a liquidity provider in the market



# Literature

- Finer data improves the precision of detecting manager skill
  - Performance comes from holdings, which is the sum of trades
  - Holdings data provides a higher granularity compared to total fund return data (e.g. see Grinblatt and Titman (1989), Wermers (1999), Chen, Jegadeesh and Wermers (2000), etc.)
  - Inferred trades from changes in portfolio holdings, see Chen, Jegadeesh and Wermers (2000) and Pinnuck (2003)
  - Daily transactions data provides more valuable information concerning a manager's information set (Gallagher & Looi, 2003)



# Data

- *Stage 1: Mercer Investment Consulting*
  - Universe of Institutional Small-cap Equity Managers in Australia
  - 34 funds examined over the period Jan 1991-Mar 2004
- *Stage 2: Portfolio Analytics Database*
  - 13 fund managers (sub-set of above sample)
  - Period of analysis: Jan 1998-Mar 2004
  - Representative of overall sample (e.g. performance)
  - Survivorship bias is not a problem in this study
  - See **Table 1**



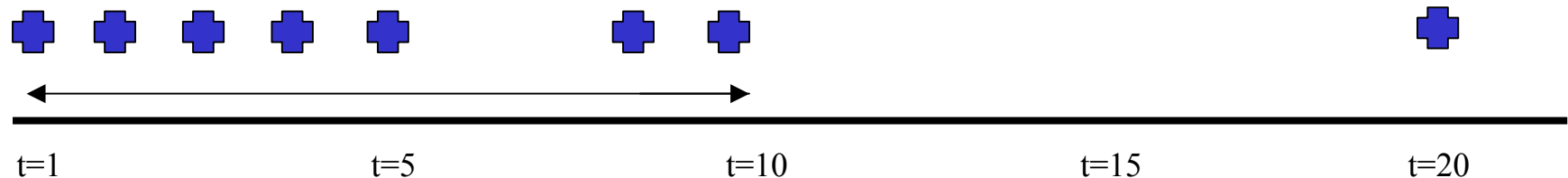
# Holdings, Trades & Market Data

- Stockholdings are recorded monthly
- Trades are recorded by date, stock code, trade quantity, weighted average traded price
- ASX stock price data obtained from SEATS provided by SIRCA
- Accounting information provided by the ASPECT database
- Conditional variables sourced from the Reserve Bank of Australia



# Trade Data

- Absent trade intention, we need to estimate where the information signal should be measured from
- Divide trades into trade packages following Chan and Lakonishok (1995)
- Trade package is defined by a 5 day rule
- Descriptive statistics on trade packages, portfolio turnover etc. provided in **Table 2** Panels A + B +C)





**Table 2** Panels A + B Summary:

Trading Activity Executed by Value of Trade Package

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Cumulative Total Trading	1 Day	2-3 Days	4-6 Days	7-10 Days	>11 Days
Buys	35.96	51.88	70.18	82.89	100
Sells	37.78	54.25	71.46	82.61	100

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**Table 2** (Panel C): Descriptive Statistics

Panel C: Summary Statistics							
	1998	1999	2000	2001	2002	2003	Years 1998-2003
Total Dollar Value of Buy Packs (A\$,000)	15,146	35,147	132,152	497,467	748,795	1,068,031	2,496,738
Total Dollar Value of Sell Packs (A\$,000)	4,044	12,173	83,874	349,811	643,553	853,429	1,946,884
Average Value of Buy Packs (A\$,000)	72	106	210	362	317	342	235
Average Value of Sell Packs (A\$,000)	81	112	319	459	391	324	281
Std. Dev of the Value of Buy Packs (A\$,000)	353	163	486	631	500	588	454
Std. Dev of the Value of Sell Packs (A\$,000)	328	120	442	951	568	572	497
No. of Buy Packs	209	333	629	1375	2365	3120	8031
No. of Sell Packs	50	109	263	762	1644	2630	5458
No. of Buy Trades	271	478	1062	2995	5786	8470	19062
No. of Sell Trades	59	156	490	1584	4623	8101	15013
Turnover (%) p.a. = $(\sum \text{buys} + \text{sell}) / \text{average fund size}$	136.51	102.03	126.02	164.41	172.25	237.04	156.38

# Research Design – Factor Models

- Unconditional CAPM Model

$$r_{i,t} = \alpha_i + \beta_{iSO}(r_{m,t}) + \varepsilon_{i,t}$$

- Four-Factor Model

$$r_{i,t} = \alpha_i + \beta_{iSO} r_{m,t} + \beta_{iSML} SML_t + \beta_{iGMV} GMV_t + \beta_{iPR1YR} RP1YR_t + \varepsilon_{it}$$

- Five-Factor Model (Market-Liquidity)

$$r_{i,t} = \alpha_i + \beta_{iSO} r_{m,t} + \beta_{iSML} SML_t + \beta_{iGMV} GMV_t + \beta_{iPR1YR} RP1YR_t + \beta_{iIML} IML_t + \varepsilon_{it}$$

- Market-Timing Model

$$r_{i,t} = \alpha_i + \beta_{iSO}(r_{m,t}) + \gamma_i(r_{m,t})^2 + \varepsilon_{i,t}$$



# Research Design – Conditional Model

- Following Ferson and Schadt (1996) we also test a conditional model.
- Our conditioning variables are 30 day T-bill rate (TB), the dividend yield (DY), the term structure of interest rates (TS) and a January dummy (Jan).

# Holdings-Based Performance Approach

- Holdings

$$AR_{jt} = \sum_{i=1}^N w_{i,t-1} (R_{i,t} - R_t^{DGTW(i),t-1})$$

- Inferred-Trades

$$IT_{ijt} = w_{ijt} - w_{ijt-1}$$

# Transaction-Based Performance Approach

- Abnormal Return

$$\overline{AR}_t = \frac{\sum_{j=1}^L \sum_{t=1}^{D_j} (r_{ij,t} - r_t^{DGTW^{(ij),t-1}})}{N}$$

- Cumulative Abnormal Return

$$CAR_T = \sum_{t=1}^T \overline{AR}_t$$



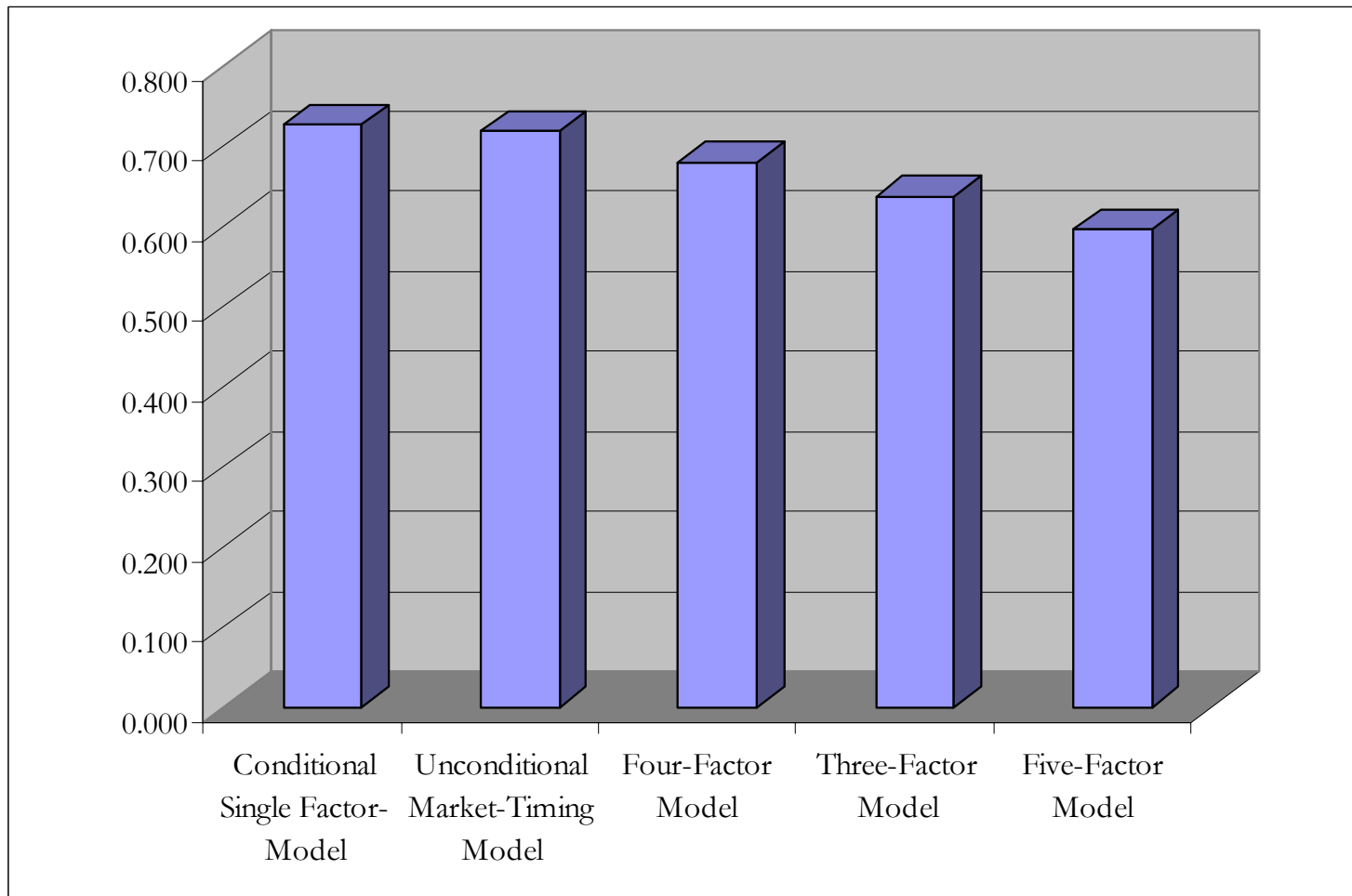
# Summary Empirical Results

- Small-cap Managers outperform the market
  - See **Tables 4, 5, 6, 7, 8, 9, 10, 11, and 12**
  - Robust statistically and economically
  - Consistent across performance approaches
  - Managers perform best when they are purchasing rather than selling
  - Trade packages defined as ‘small’ and ‘medium’ in size are more profitable than ‘large’ packages



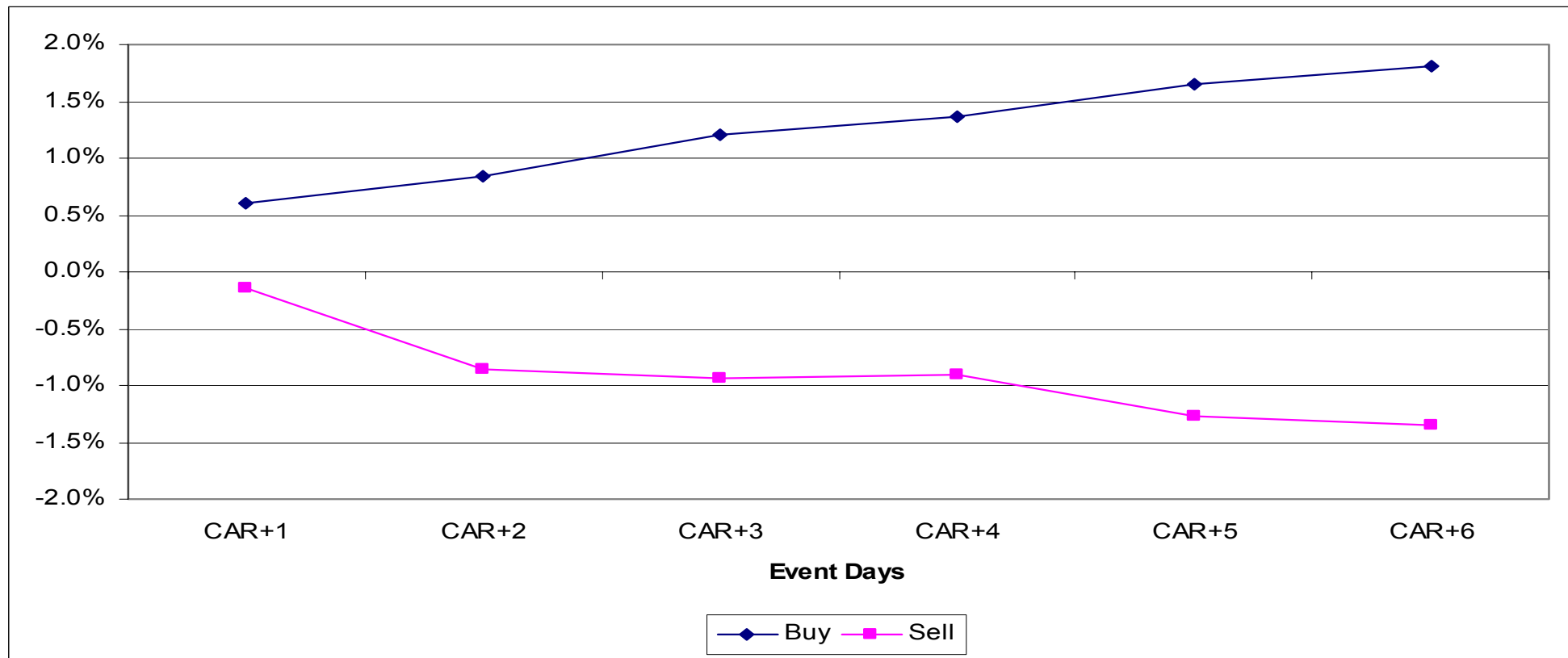


# Monthly Alphas across Factor Models (bps per month)



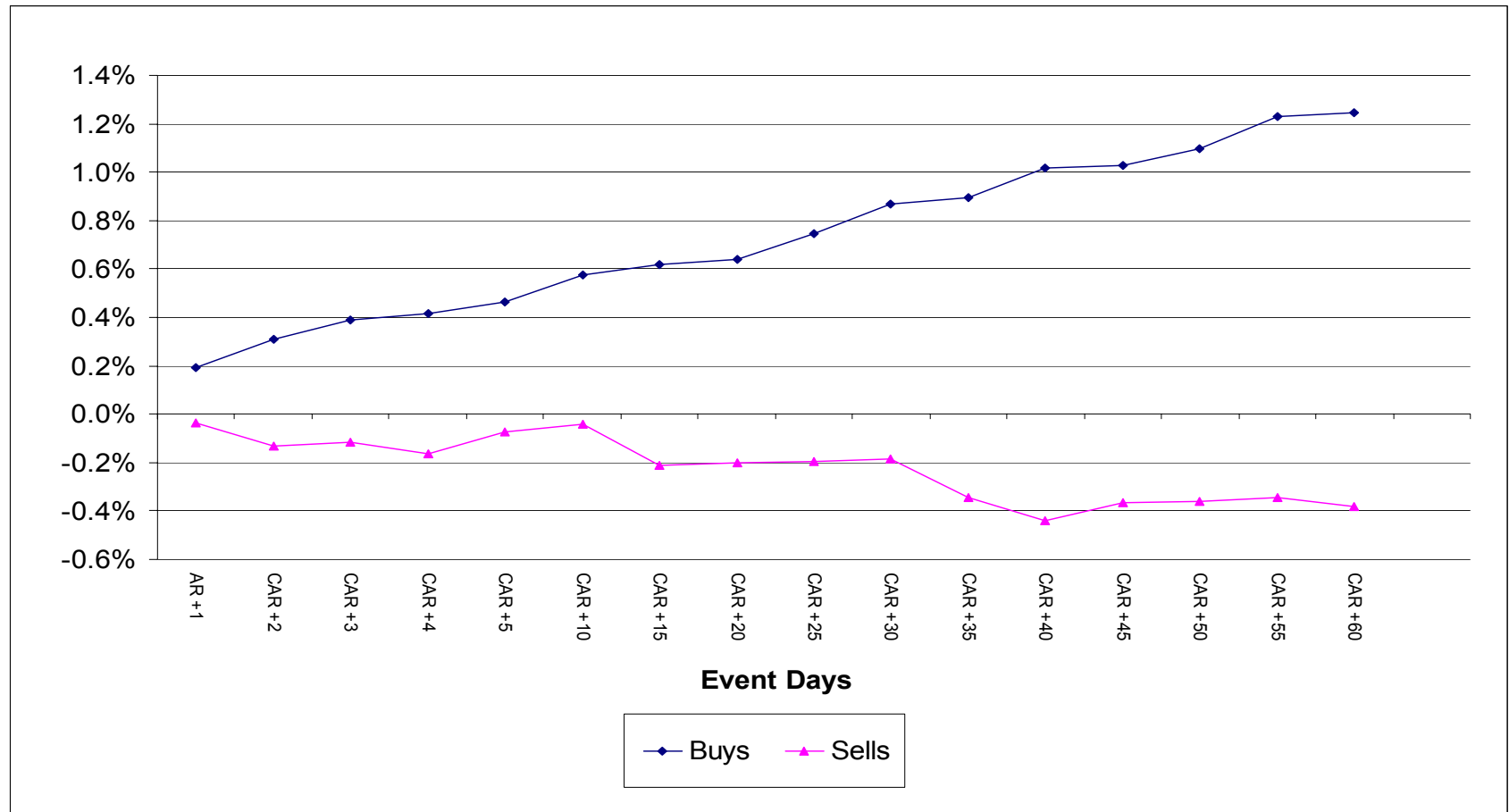
# Holdings-Based Results

Cumulative Abnormal Return Over Six-Month Event Window

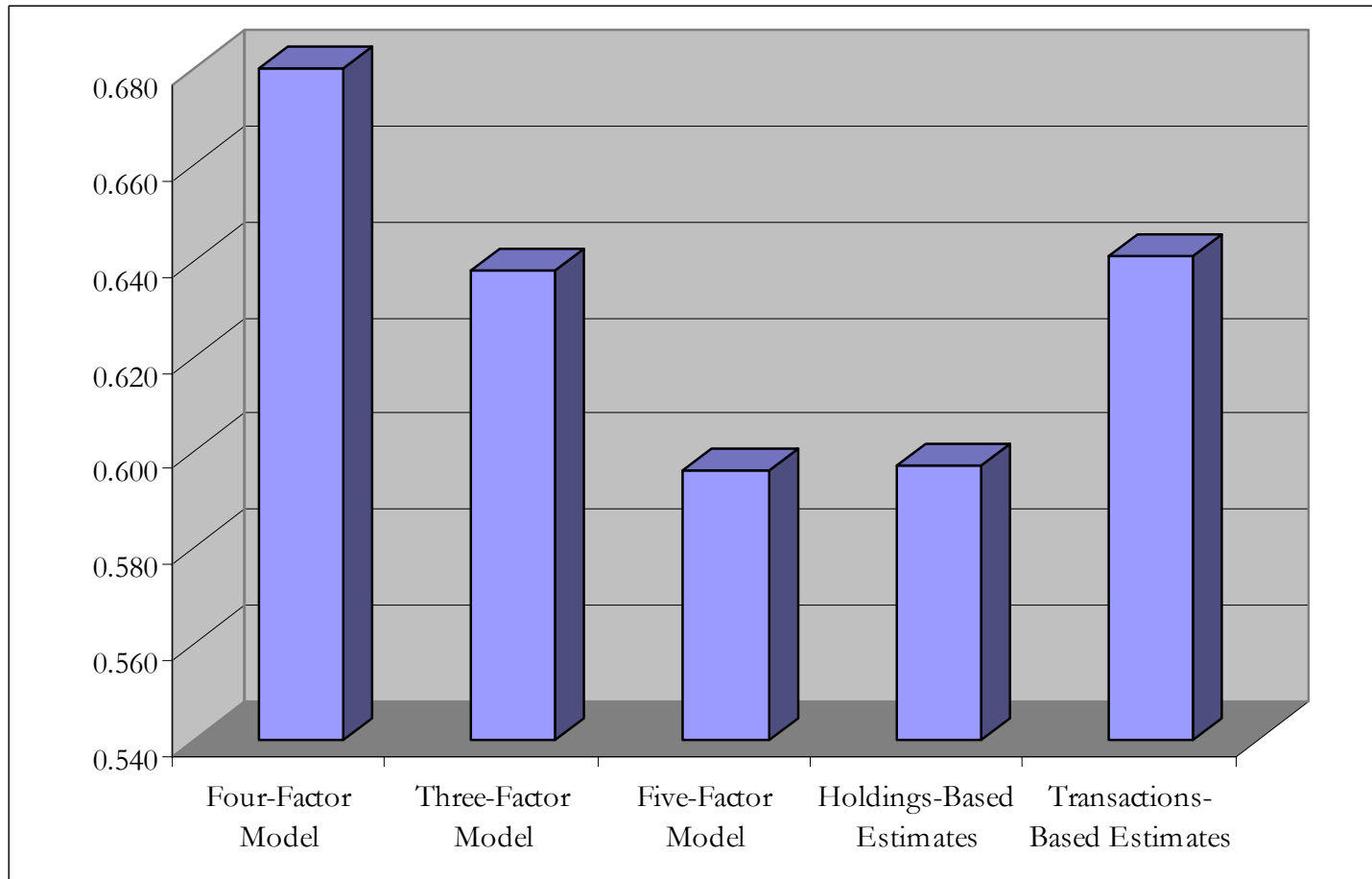


# Transaction-Based Estimation

Cumulative Abnormal Return Over Event Window (0;+60)



# Comparable Abnormal Returns (Factor models, Holdings & Trades) (bps per month)





## Performance Leakages (Explicit costs)

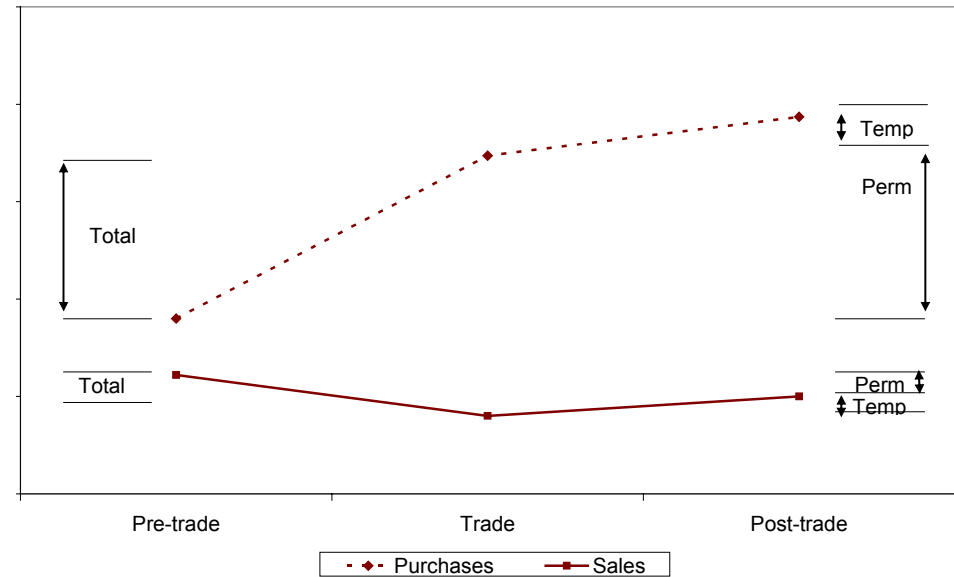
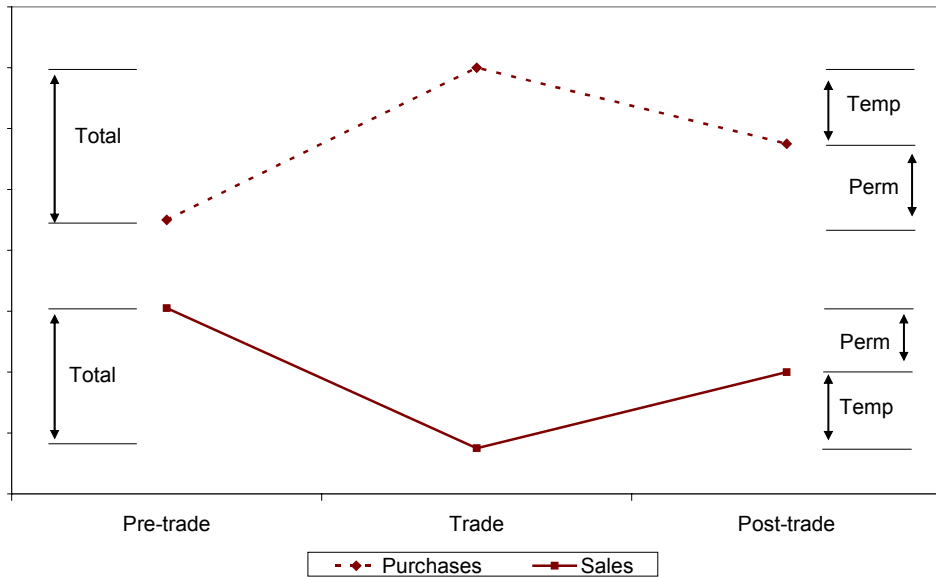
- Management fees is estimated to be 8.4 basis points per-month
- Average monthly alpha ranges between 59.6 - 76.1 basis points
- CARs accumulated over a one-month period is estimated to be 59.7 basis points (holdings-based) and 64.1 basis points (transactions-based)
- Accordingly, monthly out performance ranges from 51.2 basis points to 67.7 basis points



# Market Impact Costs – Comerton-Forde *et al.* (2005)

- USA: Chan & Lakonishok, 1993, 1995 and Keim & Madhavan, 1995, 1997)
- Papers estimate total, permanent and temporary effects using pre and post trade benchmarks
- In Australia:
  - Aitken and Frino (1996) estimate total costs of 0.27% for purchases and 0.03% for sales
  - Comerton-Forde, Fernandez, Frino and Oetomo (2005) estimate total costs of 0.34% for purchases and 0.16% for sales
- Factors influencing costs: Stock size (-); Stock liquidity (-); Explicit; Fund style; Manager identity; Market structure

# Market Impact Costs (Liquidity & Information effects)



# Market Impact Costs

- Price impact measured using standard measures:

$$PI_{total} = \ln\left(\frac{price}{open}\right)$$

$$PI_{permanent} = \ln\left(\frac{close}{open}\right)$$

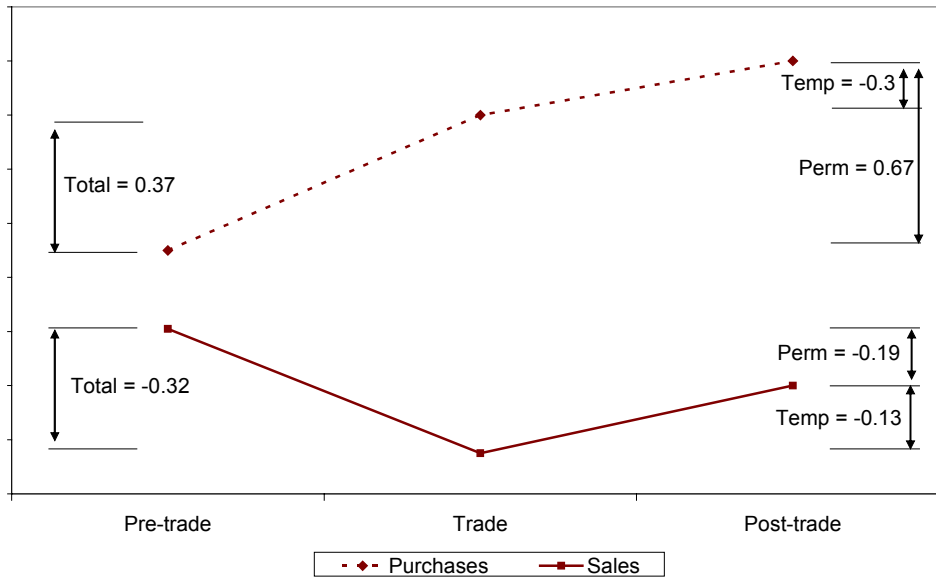
$$PI_{temporary} = \ln\left(\frac{price}{close}\right)$$

$$PI_{VWAP} = \ln\left(\frac{price}{VWAP}\right)$$

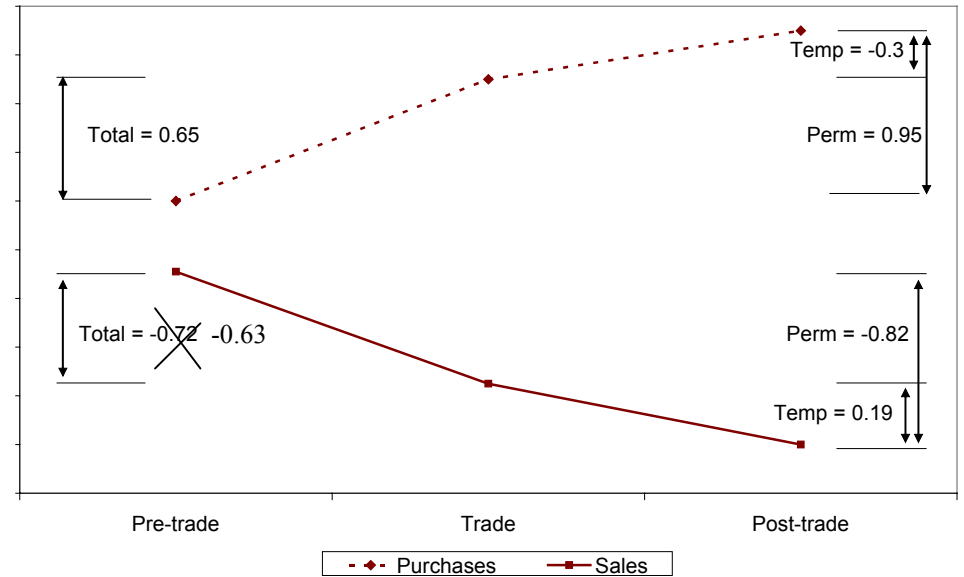


# Market Impact Costs

## All Portfolio Stocks



## Small-Cap (only) Portfolio Stocks



14,391 trade packages



# Market Impact Costs

- Larger stocks have *lower* costs
- Lower priced stocks have *higher* costs
- Greater complexity (buys) *increases* costs (i.e. ratio of package volume to average trade volume)
- Multiple brokers *increases* costs for purchases, but *reduces* costs for sales
- Increased volatility (sales) leads to *increased* costs
- Value managers have *lower* costs
- Closed funds incur *higher costs* on sales



# Summary

- Small-cap performance is statistically and economically significant
- Performance is robust to liquidity/transaction cost effects
  - Costs for small-cap managers are substantial – round trip 0.69%
  - When considering only small-cap stocks costs are even higher at round trip of 1.27%
- Both buy and sell trades derive abnormal returns, however managers are better at purchases.
- Medium and small size trades contain more information than large trades
- First study to use daily transactions (more refined data) in examining the performance of small-cap equity funds.
- Provides out of sample evidence to U.S. and European studies



# Future Research

- Why are the alphas so large?
  - What type of investor is underperforming?
  - Price inflation around quarter events
  - Concentration in the share register
- Examine trading ability around earnings and dividend announcements
- Use of brokers, information flow and analyst earnings forecasts