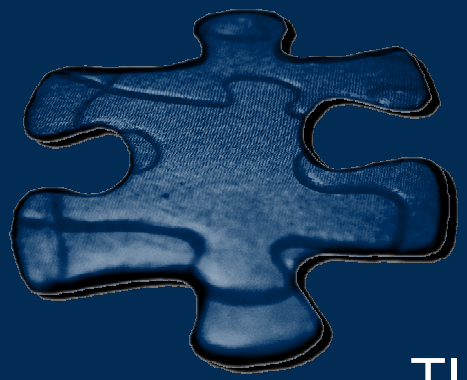
# An empirical analysis of legal insider trading in the Netherlands

Jérémie Lefebvre
Tilburg University
TILEC

Hans Degryse
Tilburg University
TILEC

Frank de Jong
Tilburg University



# Introduction – Legal insider trading in the Netherlands

- Insider trading is regulated
  - It is forbidden to trade upon private and price-sensitive information;
  - Corporate insiders have to report their trades to a public registry.
- Definition of insider in this paper:
  - Corporate insiders of listed companies who are required by law to notify their trades in their own company's stock.
- Research questions:
  1. What is the information content/stock price effect of insider trading?
  2. What types of trades are information driven?
  3. Market Abuse Directive: What is the effect of the implementation of EU directives on market abuse?

# Aim of the paper

- What we do:
  - Empirical analysis of the stock price effect around insider trading days;
  - Methodology: event study analysis => “Cumulative Abnormal Returns” (CAR)
- Contribution:
  - Recent data from the Netherlands: From 1999 to 2007;
  - We study individual trades (de-aggregated) in a cross-sectional regression framework;
  - Differentiate trades of shares and trades relative to the exercise of employee stock options;
  - Study of regulatory change, by keeping other factors constant.

# Hypotheses and main findings

Hierarchy hypothesis Fidrmuc, Goergen & Renneboog 2006 JF – Betzer & Theissen 2007 EFM – Lakonishok & Lee 2001 RFS.

- Top executives are more informed than Other insiders

Purchases *versus* sales

- Purchases by Top executives: up to 3.2% abnormal returns 30 days following the trade
- Sales: less significant abnormal returns

Firms size and value effects Jeng, Metrick & Zeckhauser 2003 RES – Lakonishok & Lee 2001 RFS.

- Purchases in small firms by Top executives: 8% abnormal returns
- Purchases in value firms (high book-to-market value) by Top executives: 5.3% AR

Insider/trade specific characteristics Aktas, de Bodt & Van Oppens 2007 JBF – Fidrmuc, Goergen & Renneboog 2006 JF – Betzer & Theissen 2007 EFM – Bajo & Petracci 2006 SEF.

- Large holdings and small trade size explain abnormal returns for purchases

Market Abuse Directive in 2005: should lower information content

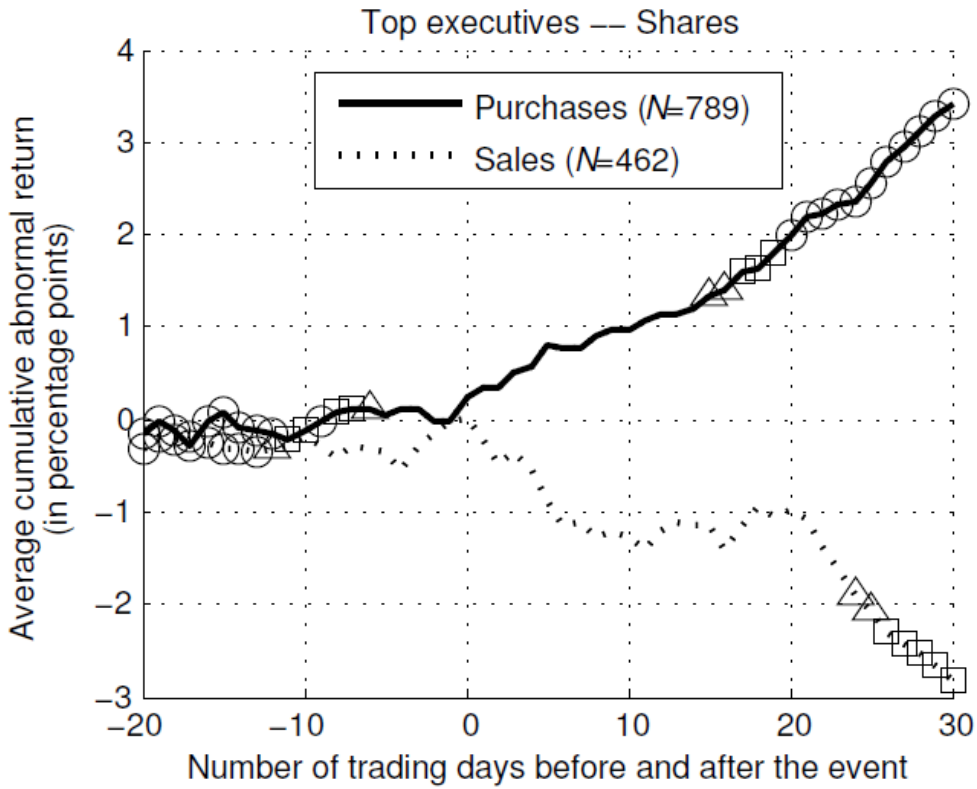
- Only sales by Top Executives are less informative

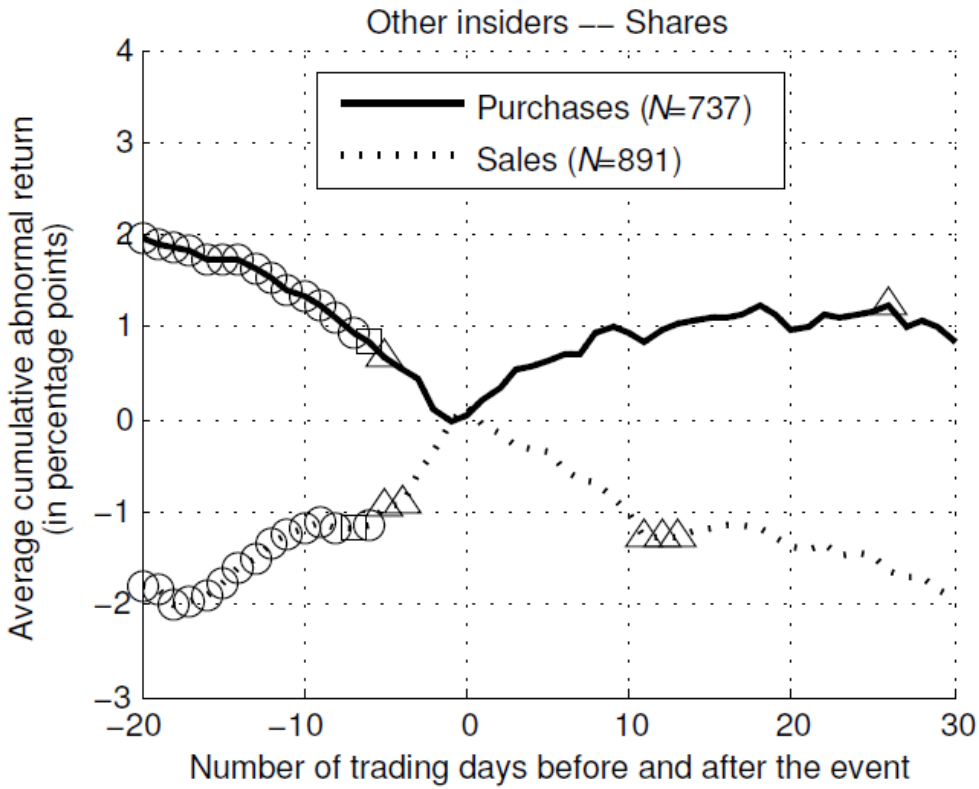
# Regulation and data

Overview of regulation and notification:

- April 1999: All insiders had to notify their trades
  - Delay: 10 days after the end of the month of the trade (i.e. max 40 calendar days).
- September 2002: Distinction between *Top executives* and *Other insiders*
  - *Top executives* have a notification delay of 1 day.
- October 2005: Implementation of Market Abuse Directive in the Dutch law
  - Raise penalty to illegal insider trading;
  - Notification delay for *Other insiders* is reduced to 1 week.

# *Top executives versus Other insiders*
## Shares




- Large post-event *CAR* for purchases (information)
- Small pre-event *CAR*s

- Large pre-event *CAR*s (timing)
- Insignificant post-event *CAR*s

# Shares – The effect of firm size

| Firm size | Top executives | | Other insiders | |
|---|---|---|---|---|
| | Purchases | Sales | Purchases | Sales |
| Small caps | 8.02% | 0.75% | 0.99% | -5.12% |
| | (4.22) *** | (0.15) | (0.50) | (-0.37) |
| | 178 | 161 | 175 | 176 |
| Mid caps | 0.37% | -3.03% | 1.63% | -3.72% |
| | (-0.23) | (-2.43) ** | (-0.09) | (-3.29) *** |
| | 231 | 139 | 235 | 405 |
| Large caps | 0.30% | -1.43% | 0.29% | 1.53% |
| | (1.24) | (0.09) | (1.58) | (1.83) * |
| | 399 | 136 | 366 | 326 |
| All | 1.97% | -1.16% | 0.83% | -2.04% |
| | (2.73) *** | (-1.23) | (1.28) | (-1.27) |
| | 808 | 436 | 776 | 907 |

- The high positive *CAR* for purchases by Top executives is driven by trades in small cap firms.

# Shares – The effect of book-to-market ratio

| Book-to-market ratio | Top executives | | Other insiders | |
|---|---|---|---|---|
| | Purchases | Sales | Purchases | Sales |
| Value firms | 5.33% | 4.33% | 2.39% | 1.61% |
| | (5.12) *** | (1.35) | (1.20) | (0.49) |
| | 149 | 60 | 182 | 107 |
| Medium | 1.69% | -3.44% | 1.79% | -0.13% |
| | (0.64) | (-2.68) *** | (0.62) | (0.55) |
| | 319 | 159 | 287 | 310 |
| Growth firms | 0.77% | -0.85% | -1.36% | -4.27% |
| | (0.20) | (-0.16) | (0.51) | (-2.38) ** |
| | 340 | 217 | 307 | 490 |
| All | 1.97% | -1.16% | 0.83% | -2.04% |
| | (2.73) *** | (-1.23) | (1.28) | (-1.27) |
| | 808 | 436 | 776 | 907 |

- The large *CAR* after purchases by Top executives is driven by trades in value firms.

# Cross-sectional regression analysis

- Dependent variable:
  - *CAR*(0,20) for Top executives
  - *CAR*(0,30) for Other insiders
- Explanatory variables:
  - Liquidity of the market
  - Size of trade
  - Holdings prior to the trade (Top executives only)
  - Clustered trades by same insider (dummy)
- Control variables (dummies):
  - Firm size
  - Book-to-market ratio
  - Industry
  - Regulatory regimes
  - Notification delay

# Cross-sectional regression: Top executives

| | Purchases | | | | Sales | | | |
|---|---|---|---|---|---|---|---|---|
| **Model** | **(1)** | | **(2)** | | **(1)** | | **(2)** | |
| | Coef | (t-stat) | Coef | (t-stat) | Coef | (t-stat) | Coef | (t-stat) |
| Intercept | -0.0018 | (-0.17) | -0.0024 | (-0.22) | -0.0166 | (-1.03) | -0.0166 | (-1.05) |
| Cluster | 0.0111 | (0.94) | 0.0118 | (0.99) | 0.0044 | (0.25) | 0.0046 | (0.27) |
| Holdings | 0.0672 | (3.04) *** | 0.0677 | (2.79) *** | 0.0448 | (0.98) | 0.0477 | (1.09) |
| *ILLIQ* | 0.0076 | (1.90) * | 0.0082 | (2.02) ** | 0.0182 | (2.18) ** | 0.0186 | (2.21) ** |
| Volume | -0.1757 | (-3.33) *** | – | – | 0.0165 | (0.14) | – | – |
| Turnover | – | – | -0.0000 | (-1.48) | – | – | -0.0000 | (-0.08) |
| $N$ | 1355 | | 1336 | | 492 | | 436 | |
| Adj. $R^2$ | 0.0956 | | 0.0895 | | 0.0445 | | 0.0955 | |

Trade size (Volume): significant for purchases.

Holdings: important factor for purchases.

Adj. $R^2$: higher for purchases than for sales.

# Cross-sectional regression: Other insiders

| | Purchases | | | | Sales | | | |
|---|---|---|---|---|---|---|---|---|
| **Model** | **(1)** | | **(2)** | | **(1)** | | **(2)** | |
| | Coef | (t-stat) | Coef | (t-stat) | Coef | (t-stat) | Coef | (t-stat) |
| Intercept | -0.0025 | (-0.19) | -0.0011 | (-0.08) | -0.0146 | (-1.61) | -0.0158 | (-1.72) * |
| Cluster | 0.0191 | (1.12) | 0.0199 | (1.15) | 0.0056 | (0.54) | 0.0072 | (0.68) |
| *ILLIQ* | -0.0108 | (-0.96) | -0.0082 | (-0.71) | 0.0052 | (1.19) | 0.0051 | (1.17) |
| Volume | -0.4550 | (-3.70) *** | – | – | -0.2036 | (-1.78) * | – | – |
| Turnover | – | – | -0.0000 | (-2.15) ** | – | – | 0.0000 | (0.48) |
| $N$ | 1170 | | 1155 | | 1001 | | 1001 | |
| Adj. $R^2$ | 0.0865 | | 0.0643 | | 0.0795 | | 0.0762 | |

Volume: still important factor

# Regulatory regimes

| | Purchases | | | Sales | | |
|---|---|---|---|---|---|---|
| Sept. 2, 2002 – Oct. 1, 2005 | 0.0026 | (0.71) | .61 | -0.0111 | (-2.26) ** | .61 |
| Oct. 1, 2005 – Nov. 1, 2006 | -0.0050 | (-0.70) | .19 | 0.0069 | (0.68) | .19 |
| After Nov. 1, 2006 | -0.0031 | (-0.36) | .19 | 0.0276 | (2.37) ** | .20 |

Top executives: Effect visible since November 2006:

- Sales by Top Executives are less informed
- No effect of Market Abuse Directive for purchases

# Notification delay

| | Purchases | | | Sales | | |
|---|---|---|---|---|---|---|
| Notification in time | -0.0004 | (-0.11) | .57 | 0.0114 | (2.34) ** | .61 |
| Late notification | 0.0005 | (0.11) | .43 | -0.0178 | (-2.34) ** | .39 |
| Other insiders | 0.0011 | (1.01) | .96 | 0.0013 | (2.08) ** | .96 |
| | -0.0286 | (-1.01) | .04 | -0.0327 | (-2.08) ** | .04 |

A large proportion is outside the legal delay.

Purchases: no significant effect.

Sales:

- Late notifications have large negative effect

  → Informed trades that are not made public.

# Summary of findings

1. Information content
   - Abnormal returns are higher than in the U.S. and the U.K., but similar than in other European countries.
2. Asymmetric effect of insider trading on stock prices
   - Top executives *versus* Other insiders
   - Purchases *versus* Sales
3. Informed trades are likely to be:
   - Purchases in small firms and value firms
4. Market condition (liquidity) affects the size of the abnormal returns.
5. Policy issues
   - When accounting for other factors, the increase in penalty for illegal insider trading did not affect informativeness of purchases.
   - A late reporting delay seems to hide informative trades to the public.

# Methodology

- Benchmark model and abnormal returns

$$r_{it} = \alpha_i + \beta_i r_t^m + \varepsilon_{it}$$

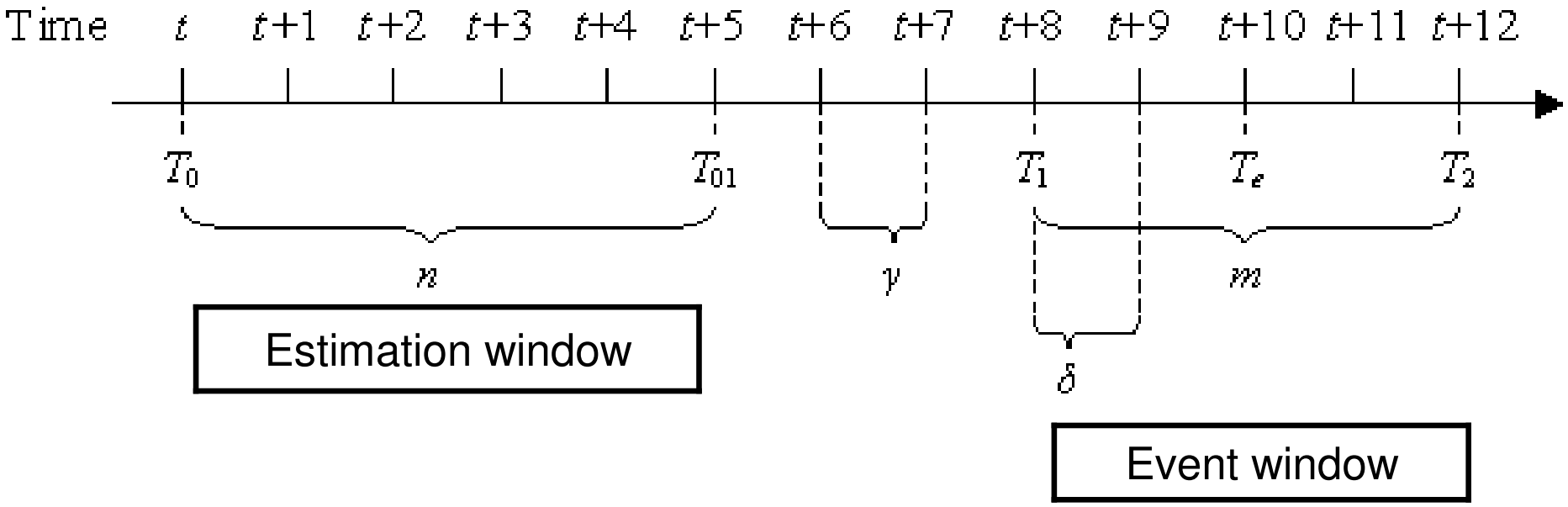
$$AR_{i\tau} = r_{i\tau} - E\left(r_{i\tau} \middle| r_\tau^m\right) = r_{i\tau} - \hat{\alpha}_i - \hat{\beta}_i r_\tau^m$$

$$CAR_i(0,20) = \sum_{\tau=0}^{20} AR_{i\tau}$$

$$\overline{CAR}(0,20) = \frac{1}{N}\sum_{i=1}^{N} CAR_i(0,20)$$

# Methodology

- Time line of an event study



# Methodology

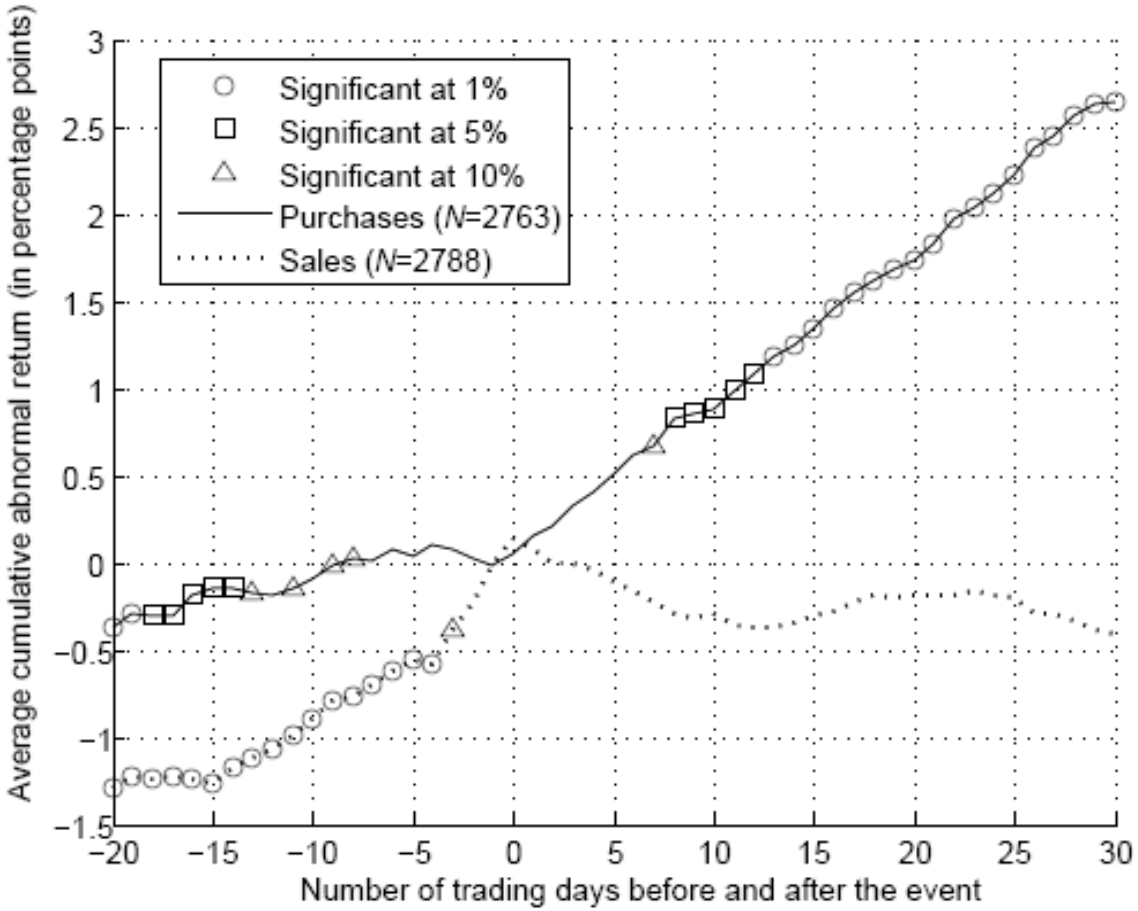
- Test: we want to test whether the average $CAR$ is statistically different from zero. ($N$ is the number of firms, $n$ is the length of the estimation window)

$$SCAR_i = \frac{CAR_i}{sd(CAR_i)} \sim \text{Student} - \text{t}(n-2)$$

$$\frac{1}{N}\sum_{i=1}^{N} SCAR_i \overset{N\to\infty}{\sim} \text{N}\left[0, \tfrac{1}{N}\left(\tfrac{n-2}{n-4}\right)\right] \text{under the null hypothesis}$$

$$J = \frac{\frac{1}{N}\sum_{i=1}^{N} SCAR_i}{\sqrt{\frac{1}{N}\left(\frac{n-2}{n-4}\right)}} = \frac{\sum_{i=1}^{N} SCAR_i}{\sqrt{N\left(\frac{n-2}{n-4}\right)}} \overset{N\to\infty}{\sim} \text{N}(0,1)$$

# Results:
# Cumulative abnormal returns
# All buys and all sells (incl. options)




- Large post-event *CAR* for purchases
- Significant pre-event *CAR* for sales