Stock liquidity in forefront of anticipated announcements

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Motivation

- information asymmetry has a deteriorating impact on liquidity (Kyle 1985)
- outstanding earnings announcements lead to increased fundamental uncertainty and thus information asymmetry
- Deteriorating effect of EAs has been shown for spreads and volumes at best bid and ask quotes (Lee et al. 1993,...)
- However the main theoretical prediction is not about tightness, but depth - Kyle's λ
- This paper: focuses on the slopes of the supply and demand schedules

Approach & Contribution

- Calculate both spreads and supply and demand elasticities
- sample of 42 NYSE traded stocks in 2011

Contribution

- We find supportive evidence of the deteriorating effect of outstanding EAs
- The effect is stronger for the market depth measures compared to tightness measures

Outline

Kyle's lambda

One period case

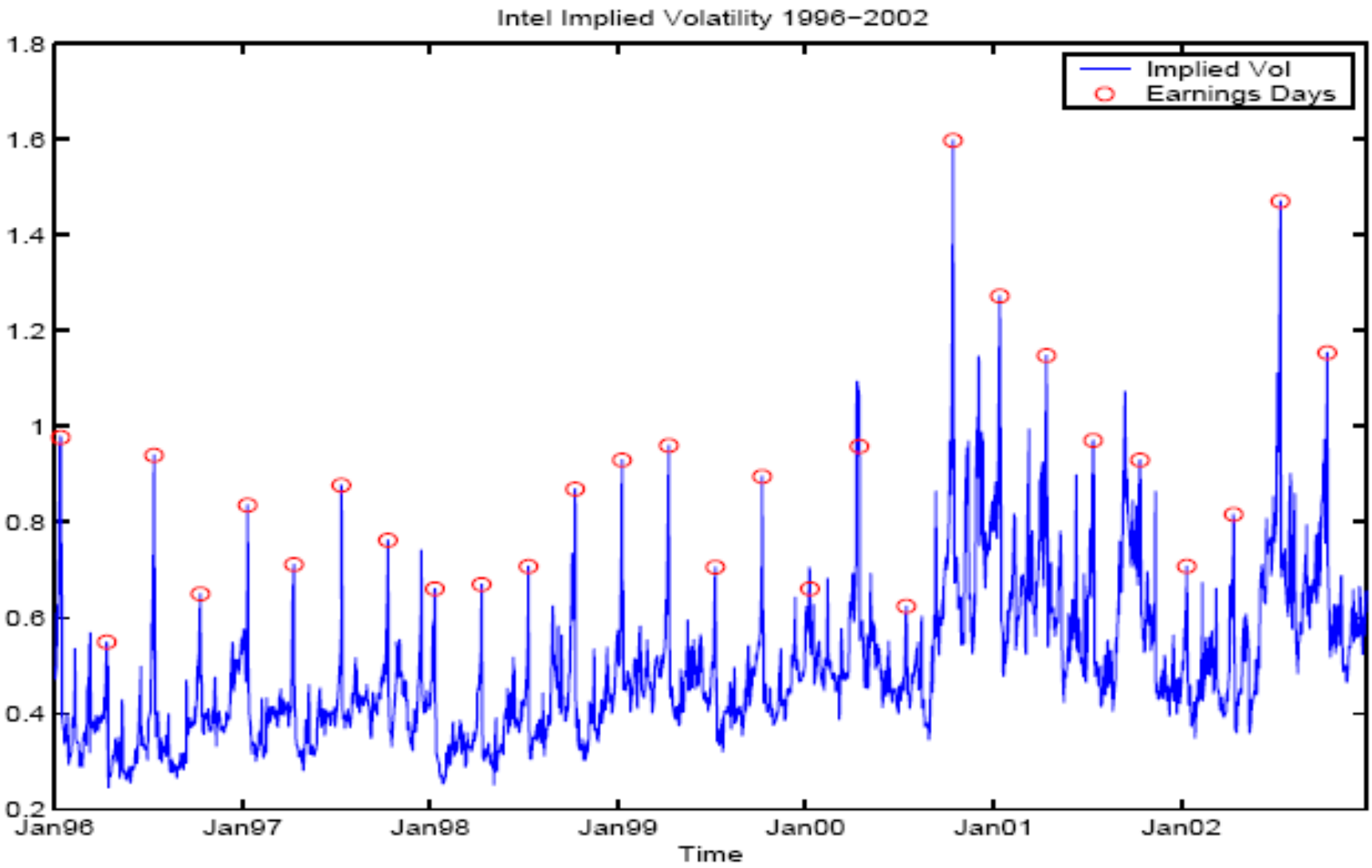
$$p_1 = p_0 + \lambda (u + y)$$

thereby λ

$$\lambda = \frac{\sigma_f}{2\sigma_u},$$

where σ_f is fundamental uncertainty (volatility of the fundamental value given p_0)

Fundamental uncertainty prior to EA day



Empirical literature: Effects of EAs on liquidity

- Spreads increase prior to EA, order volumes at best quotes decrease (Lee et al. 1993)
- Liquidity deteriorates proportionally to ex-post surprise (Lee et al. 1993)
- Liquidity (price-impact of a trade) enhances after EA (Furfane 2014)

Data

- Order book data from NYSE TAQ Openbook History (42 stocks)
- Earnings announcement dates: Bloomberg, partially handcollected.

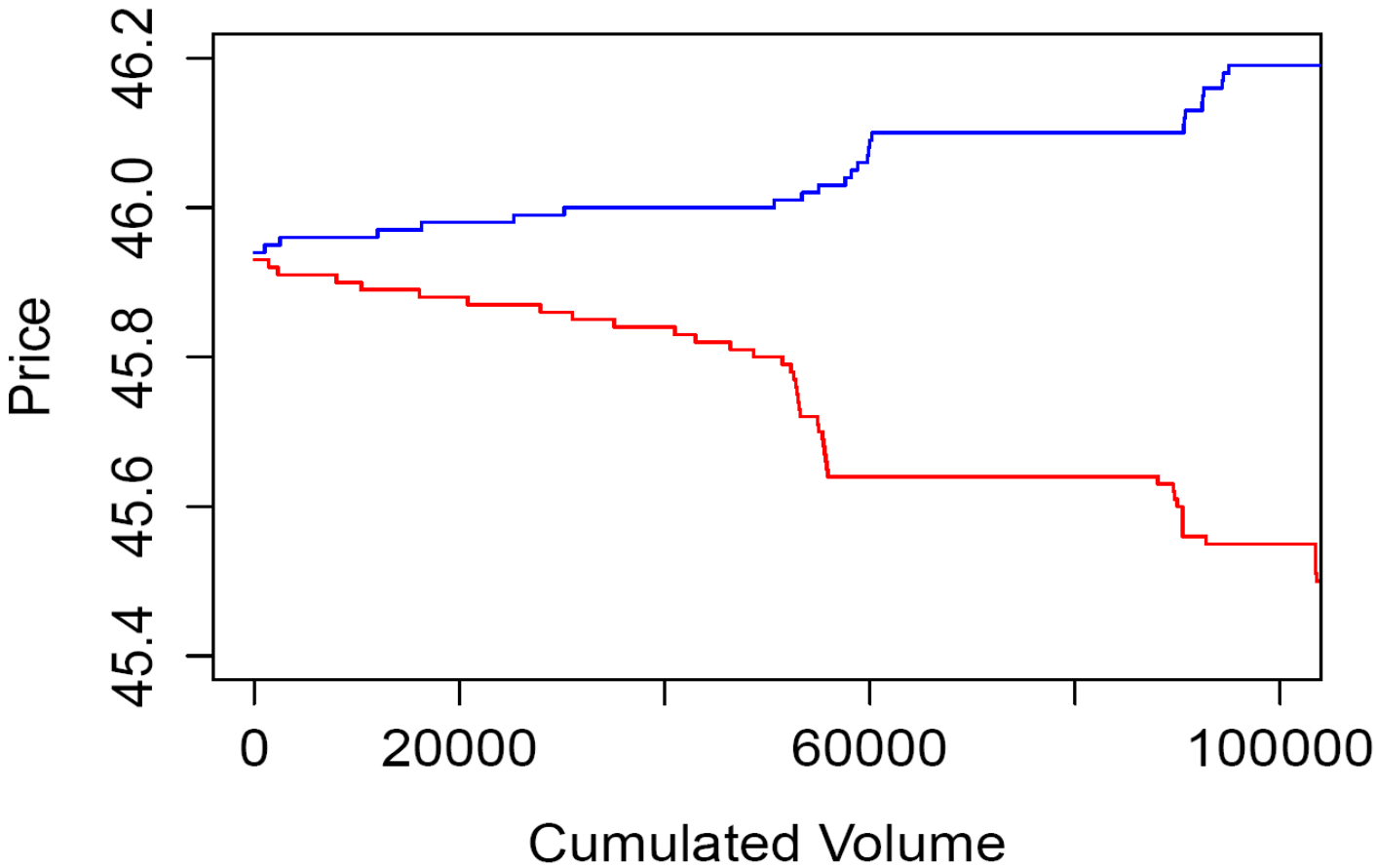
ABT	HUM	PEP
AET	JCP	PG
ANF	JNJ	PPL
APA	JPM	PX
APC	JWN	RTN
ATI	KEY	SHW
AVY	NOC	SO
BAX	NSC	STJ
BBY	ODP	STT
BCR	OI	SYY
BHI	OKE	TER
BLL	OMC	TSN
BMS	PBI	TSS
HSY	PCG	TXT

Empirical approach

1. Accumulate orders at the end of each minute (drop observations before 9:35 and after 15:55) to obtain 381 order book snapshots per day for each stock
2. Calculate liquidity measures for each snapshot
3. Take daily averages of liquidity measures for each stock and day
4. Run SUR with controls on dummies for pre-announcement days

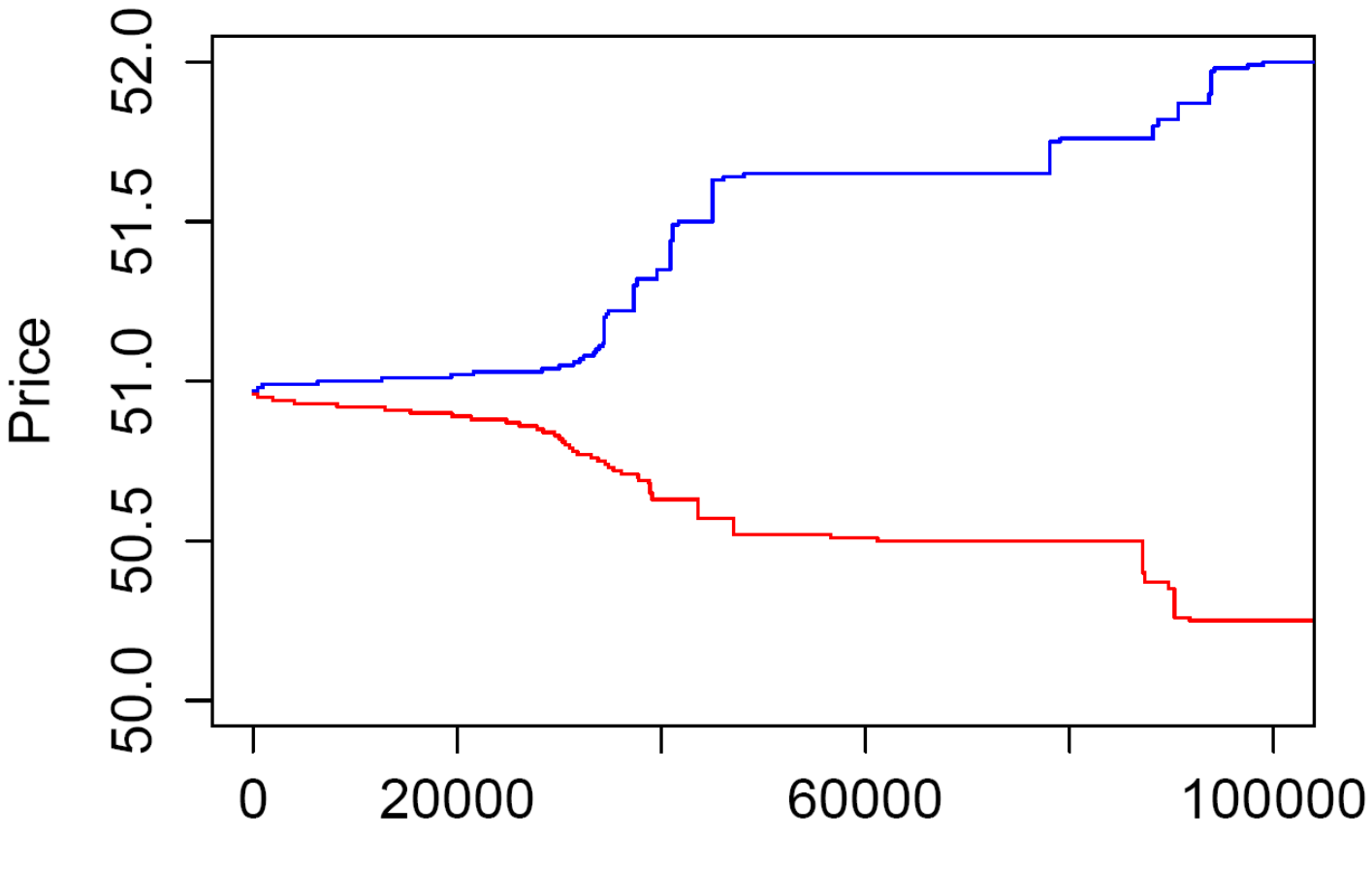
Example: order book snapshot, non pre-EAD

Figure: Abbott Labs, Feb 14, 2011, 12:30:00



Example: order book snapshot, pre-EAD

Figure: Abbott Labs, April 19, 2011, 12:30:00



Liquidity measures for each snapshot

- Supply curve elasticity (following Naes and Skjeltrop (2006)):

$$SE_{it}^{s} = \frac{1}{N}\sum_{\pi=1}^{N}\frac{\left(V_{\pi+1}^{A}-V_{\pi}^{A}\right)\Big/V_{\pi}^{A}}{\left(P_{\pi+1}^{A}-P_{\pi}^{A}\right)\Big/P_{\pi}^{A}}$$

- Demand curve elasticity

$$DE_{it}^{s} = \frac{1}{N}\sum_{\pi=1}^{N}\frac{\left(V_{\pi+1}^{B}-V_{\pi}^{B}\right)\Big/V_{\pi}^{B}}{\left(P_{\pi+1}^{B}-P_{\pi}^{B}\right)\Big/P_{\pi}^{B}}$$

- Average book elasticity

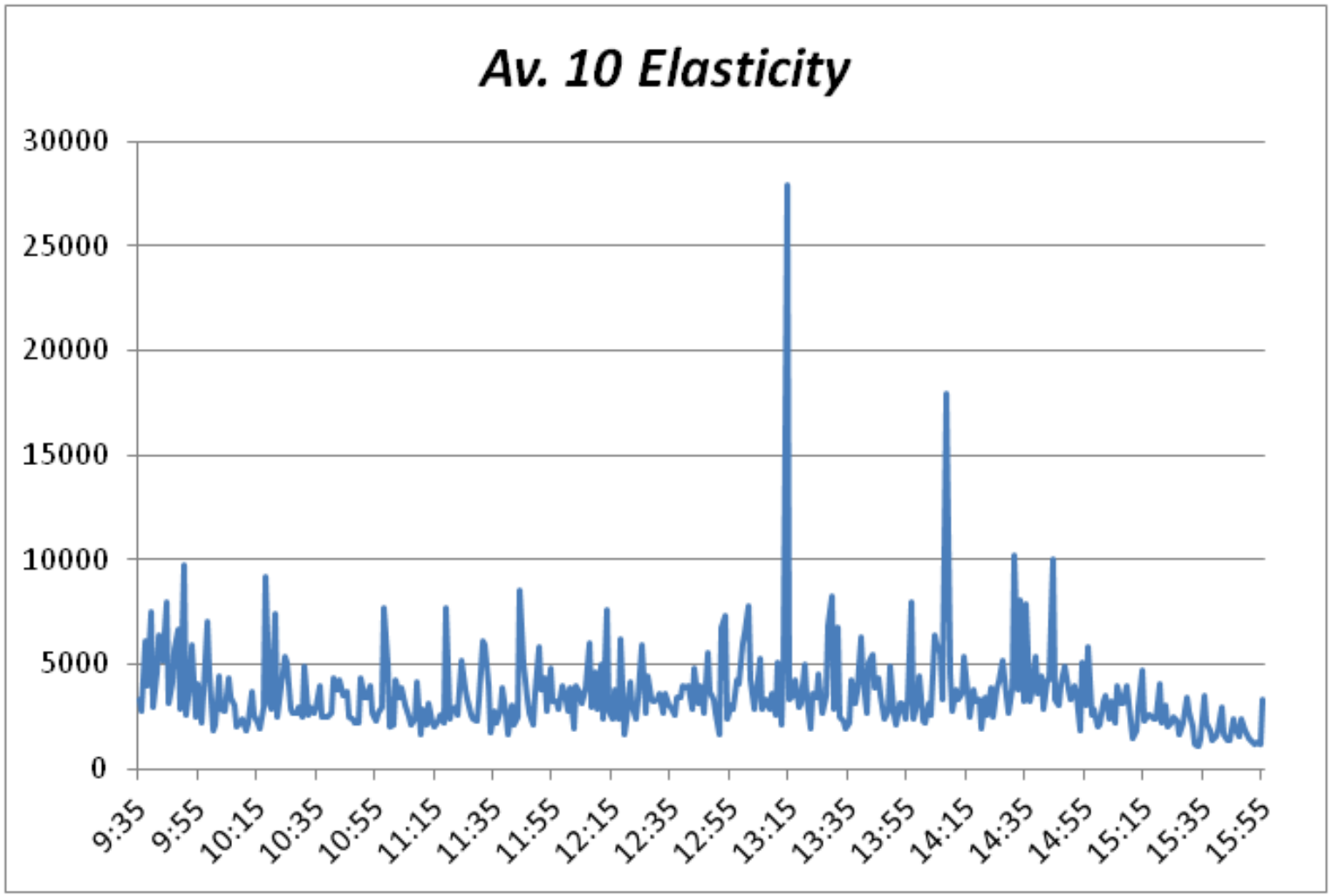
$$AE_{it}^{s} = \frac{SE_{it}^{s}+\left|DE_{it}^{s}\right|}{2}$$

- we use $N = 10$ and $N = \max\left[\pi\right] - 1$; Ask 10 Elasticity, Bid 10 Elasticity, Av. 10 Elasticity, Ask Total Elasticity, Bid Total Elasticity, Av. Total Elasticity
- Quoted spread

$$QS_{it}^{s} = \frac{P_1^A - P_1^B}{0.5\cdot\left(P_1^A+P_1^B\right)}$$

Intraday dynamics of a liquidity measure

Figure: Abbott Labs, February 14, 2011



Daily liquidity measures

Averaging over 1-minute snapshots

- Supply curve elasticity

$$SE_{it} = \frac{1}{381} \sum_{s=1}^{381} SE_{it}^{s}$$

- Demand curve elasticity

$$DE_{it} = \frac{1}{381} \sum_{s=1}^{381} DE_{it}^{s}$$

- Average elasticity

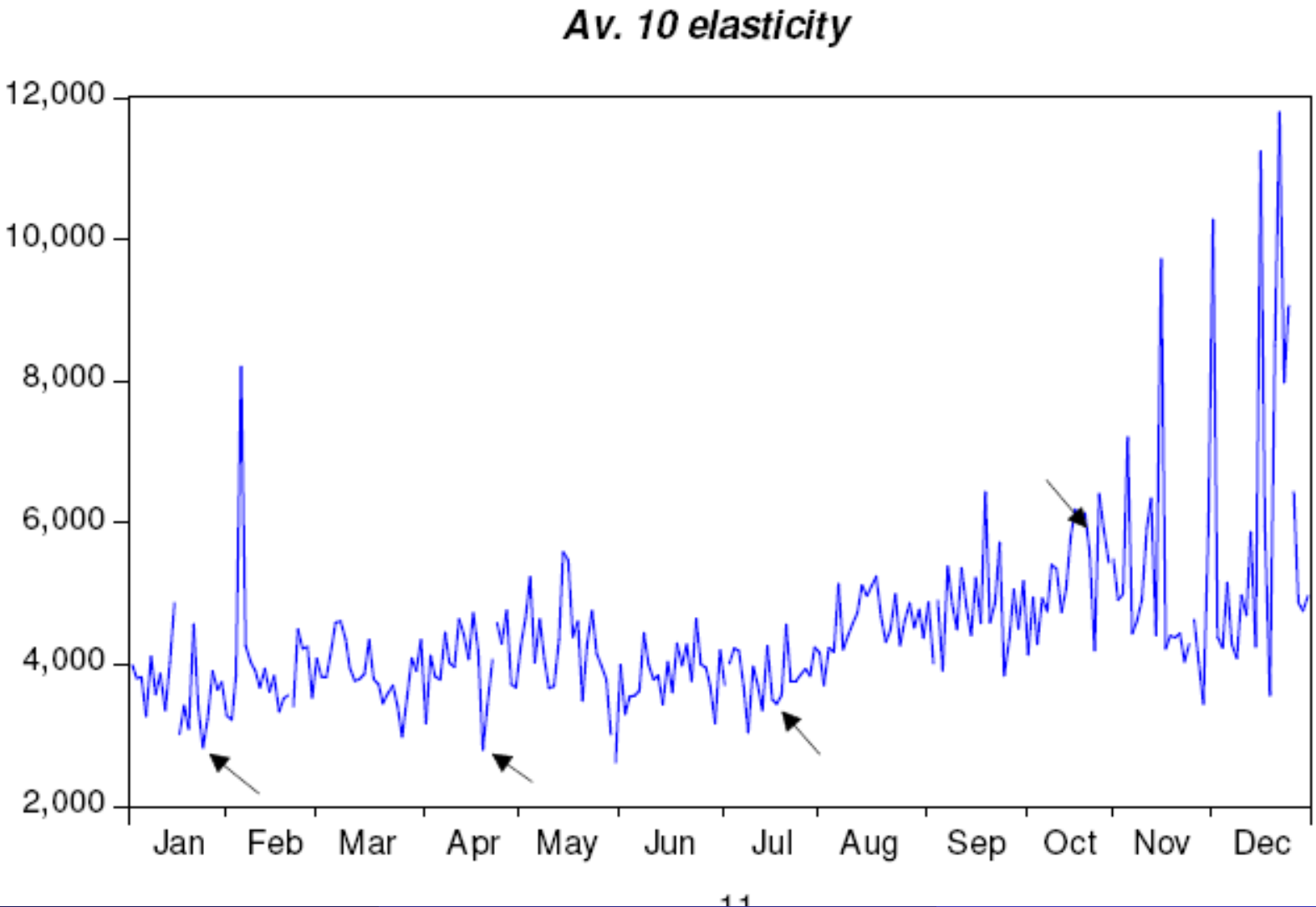
$$AE_{it} = \frac{1}{381} \sum_{s=1}^{381} AE_{it}^{s}$$

- Quoted Spread

$$QS_{it} = \frac{1}{381} \sum_{s=1}^{381} QS_{it}^{s}$$

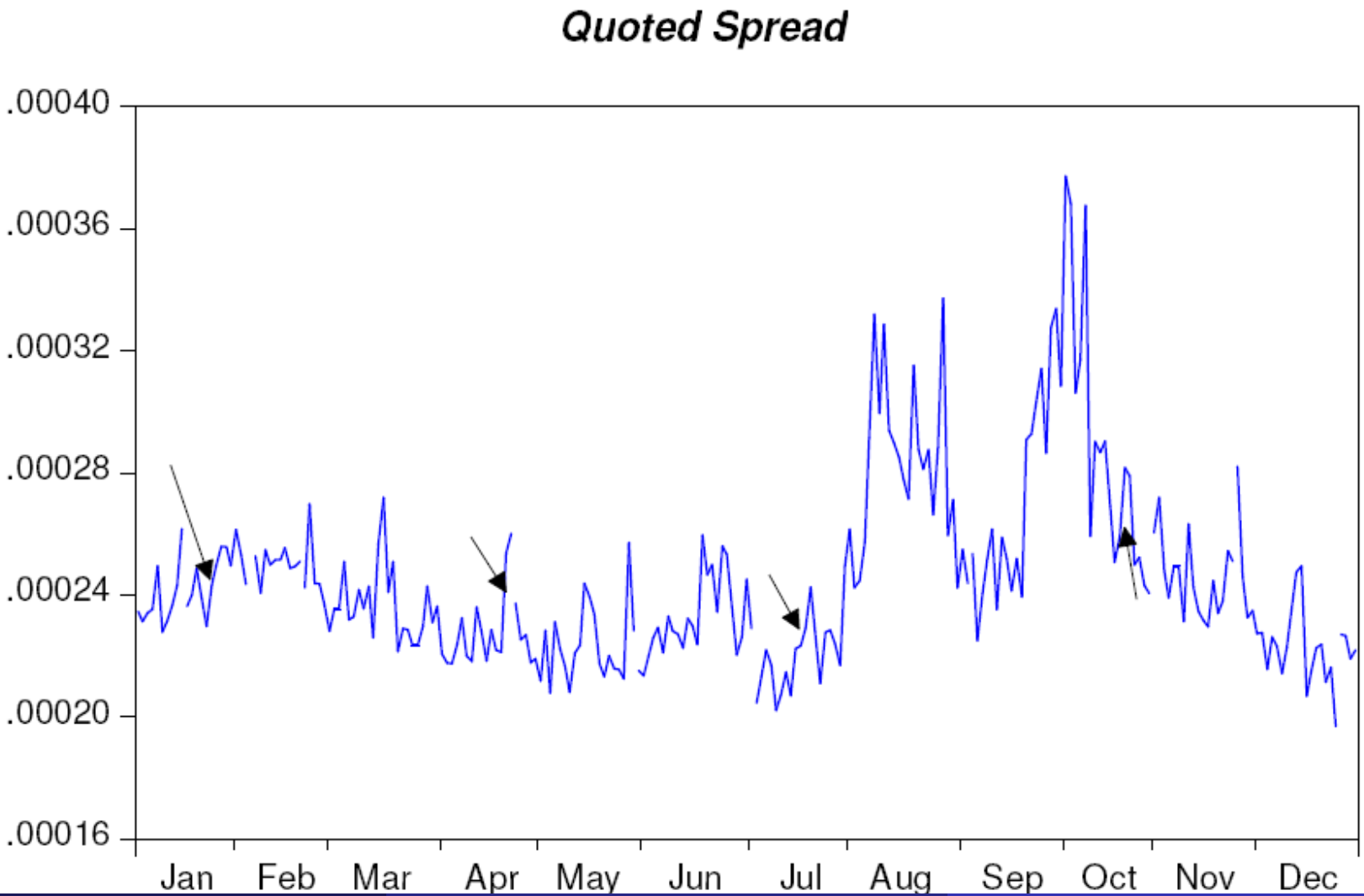
Dynamics of elasticity

Figure: Abbott Laboratories, 2011



Dynamics of a tightness measure

Figure: Abbott Laboratories, 2011



Descriptive Statistics

	Quoted spread	Av. Total elasticity	Av. 10 elasticity	Bid total elasticity	Ask total elasticity	Bid 10 elasticity	Ask 10 elasticity
Mean	5.83	487.04	3253.75	-406.75	567.00	-2993.38	3489.21
Median	4.64	487.19	3324.39	-416.08	547.37	-3086.57	3517.14
Maximum	57.64	1769.26	22740.60	-15.42	3004.56	-51.06	39600.39
Minimum	0.37	15.16	50.56	-1289.42	14.89	-9583.70	50.06
Std. Dev.	5.14	242.55	1515.99	212.86	297.48	1272.16	1803.60
Observations	10366	10405	10419	10423	10403	10414	10403

Correlations

	Quoted spread	Av. Total elasticity	Av. 10 elasticity	Bid total elasticity	Ask total elasticity	Bid 10 elasticity	Ask 10 elasticity
Quoted spread	1.00	-0.18	-0.43	0.12	-0.21	0.45	-0.39
Av. Total elasticity	-0.18	1.00	0.55	-0.93	0.97	-0.53	0.52
Av. 10 elasticity	-0.43	0.55	1.00	-0.37	0.62	-0.95	0.97
Bid total elasticity	0.12	-0.93	-0.37	1.00	-0.80	0.42	-0.32
Ask total elasticity	-0.21	0.97	0.62	-0.80	1.00	-0.57	0.62
Bid 10 elasticity	0.45	-0.53	-0.95	0.42	-0.57	1.00	-0.85
Ask 10 elasticity	-0.39	0.52	0.97	-0.32	0.62	-0.85	1.00

Estimation equation

- Use SUR to estimate:

$$LM_{1,t} = \alpha_1 + \gamma_1 Aug_t + \delta_1 PED_{1,t} + \beta_{1,1} LM_{1,t-1} + \beta_{2,1} LM_{1,t-2} + \varepsilon_{1,t}$$

$$\vdots$$

$$LM_{42,t} = \alpha_{42} + \gamma_{42} Aug_t + \delta_{42} PED_{42t} + \beta_{1,42} LM_{42,t-1} + \beta_{2,42} LM_{42,t-2} + \varepsilon_4$$

where

  - $LM_{i,t}$ is a liquidity measure {Ask 10 Elasticity, Bid 10 Elasticity, Av. 10 Elasticity, Ask Total Elasticity, Bid Total Elasticity, Av. Total Elasticity, Quoted Spread};
  - Aug_t is a liquidity dummy taking value 1 starting August 1, 2011;
  - variable of interest is a dummy for pre-announcement days, $PED_{i,t}$.

- Test

$$\sum_{i=1}^{42} \delta_i = 0$$

Main result

	Quoted spread	Av. Total elasticity	Av. 10 elasticity	Bid total elasticity	Ask total elasticity	Bid 10 elasticity	Ask 10 elasticity
EA-effect	0.22	-29.2	-435.9	30.2	-37.2	430.0	-462.1
χ^2-stat	14.0***	39.5***	79.0***	79.3***	22.2***	337.0***	48.2***

First line reports an average effect of a pre-announcement day on a liquidity measure, obtained from a SUR system of equations of type eq. 6, . Liquidity measures are defined in Eq. 4-5. Second line reports Wald test-statistic for the null-hypothesis , it is χ^2-distributed with one degree of freedom.

Liquidity measures: problem of the LOT-measure

- pre-announcement day spreads rise by 4% of their standard deviation
- whereas *Av. Total Elasticity* drops by 12% of standard deviation
- *Av. 10 Elasticity* worsens by 28% of its standard deviation

$\Longrightarrow$Economic effect of EA-induced uncertainty is far stronger for the slopes than for the spread at BBO

- demand elasticity deteriorates substantially stronger than the supply elasticity: 1/3 vs. 1/4 standard deviation

Conclusion

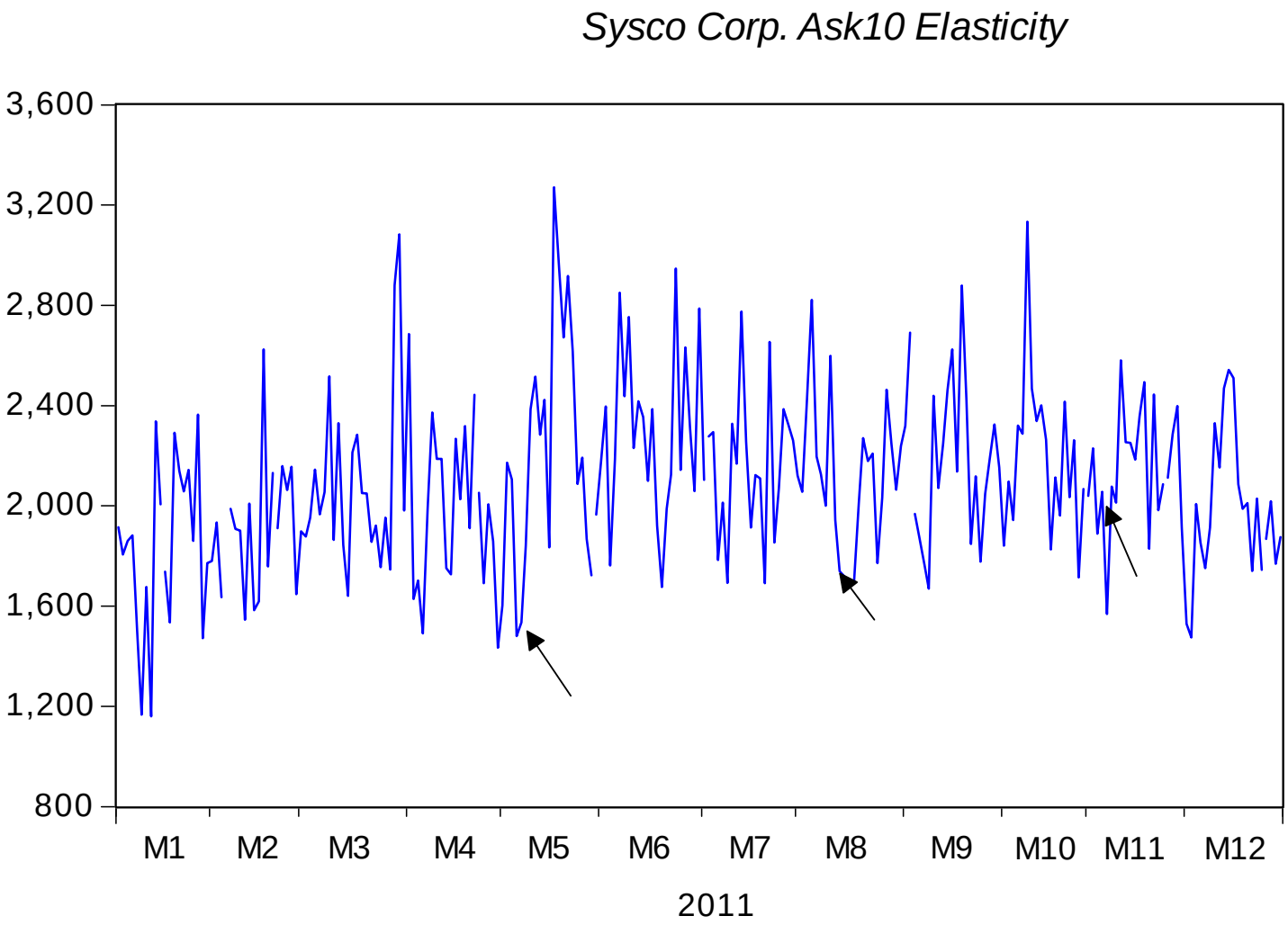
- Convincing supportive evidence of deteriorating liquidity due to the fundamental uncertainty
- Market depth is much stronger adversely affected, as best bid and ask quotes would suggest
- Demand elasticity suffers more in relative terms from unresolved firm-specific uncertainty

Further steps

- Analyze the impact of ex-ante magnitude of EA uncertainty (option-implied; analyst dispersion) on demand and suppply curve elasticity
- Expand the sample

Thank you for your attention

Example: dynamics of ASK10 Elasticity



Full order book