

Short Selling Bans around the World: Evidence from the 2007-09 Crisis

Alessandro Beber

Cass Business School and CEPR

Marco Pagano

University of Naples Federico II, CSEF, EIEF and CEPR

February, 2011

Short selling bans and liquidity

- 19 Sept. 2008: “The emergency order temporarily banning short selling of financial stocks will restore **equilibrium to markets**”
- 31 Dec. 2008: “Knowing what we know now, I believe on balance the commission would not do it again. The **costs** (of the short selling ban on financials) appear to outweigh the benefits.”



Christopher Cox
SEC Chairman

World-scale experiment

- **Short sales restrictions in most countries. But not in some.**
- **Different ban introduction dates:**
 - most European countries acted after the U.S.
- **Different ban lift dates:**
 - U.S. and Canada were the first to remove the ban.
- **Different group of stocks subject to ban:**
 - Financials only (e.g., Germany) versus all stocks (e.g., Japan).
- **Variation in stringency of short sales restrictions:**
 - uncovered short sales only, covered sales as well, mere disclosure.

Our paper:

- **We will use panel data and matching techniques to test if the ban restrictions are associated with changes in**
 - market liquidity
 - speed of price discovery
 - “overpricing”

Liquidity: theoretical predictions

- The effect of a ban on liquidity is ambiguous in the Glosten-Milgrom adverse selection model (Diamond and Verrecchia, 1987):
 - **Raises** liquidity: if it affects mainly informed sellers (likely) but
 - **Lowers** liquidity: if it equally affects informed and uninformed, as it slows the resolution of uncertainty.
- Unambiguous if market makers are risk-averse:
 - **Lowers** liquidity: the ban increases the market makers' cost of supplying liquidity and reduces competition from other liquidity suppliers. Moreover, by delaying price discovery it increases market-making risk.

Liquidity: empirical evidence

- **Jones and Lamont (JFE, 2002)**: during the Great Depression in the U.S., results **vary** with type of restriction.
- **Charoenrook and Daouk (2005)**: short-sale restrictions reduce liquidity in a cross-country, **market-wide** study where **trading volume** is a proxy for liquidity.

Crisis-related papers:

- **Boehmer, Jones and Zhang (2010)**: recent U.S. short selling ban on financials reduced liquidity (using several measures of liquidity).

Price Discovery

- **Theory:**
 - in Glosten and Milgrom' adverse selection model, Diamond and Verrecchia (1987) show that a ban slows down price discovery.
- **Evidence: consistent negative effect.**
 - Bris, Goetzmann and Zhu (2005): cross-country (not panel) evidence for 46 equity markets.
 - Saffi and Sigurdson (2007) and Boehmer and Wu (2008): ease to short sell increases informational efficiency.
 - Reed (2007): bans induce asymmetry in price response to earnings announcements.

“Overpricing”

- **Theory:**

- Miller’s (1977) model with heterogeneous beliefs: the ban prevents full revelation of negative opinions.
- Rational expectations with risk neutrality (Diamond and Verrecchia again): no effect, as the ban is discounted.
- Rational expectations with risk aversion (Bai, Chang & Wang, 2006):
 - delaying price discovery increases risk \Rightarrow lowers prices;
 - preventing short-sales to hedge other risks (e.g., endowment risk) raises demand for the stock \Rightarrow raises prices.

- **Evidence:**

- Jones & Lamont (2002), Chang, Cheng & Hu (2007) : higher prices.
- Diether, Lee & Werner (2009), Boehmer et al. (2008): no effect.
- Boehmer et al. (2009), Harris et al (2009): overpricing (*endogenous?*)

Preview of the Results

- **Liquidity:**
 - Short-selling bans were **detrimental** for liquidity.
 - Cross-sectional evidence: different effects with respect to size, volatility, country, *optionable* stocks, dual-listing.
- **Price Discovery:**
 - Short-selling bans **reduced the speed** of price discovery, especially for negative information.
- **Overpricing:**
 - Short-selling bans did not seem to support prices, with the potential *spurious* exception of the U.S.

Outline

1. Data

2. Liquidity Results:

- Descriptive Evidence
- Regression Analysis
- Cross-Sectional Evidence

3. Price Discovery Results

4. Overpricing Results

5. Conclusions

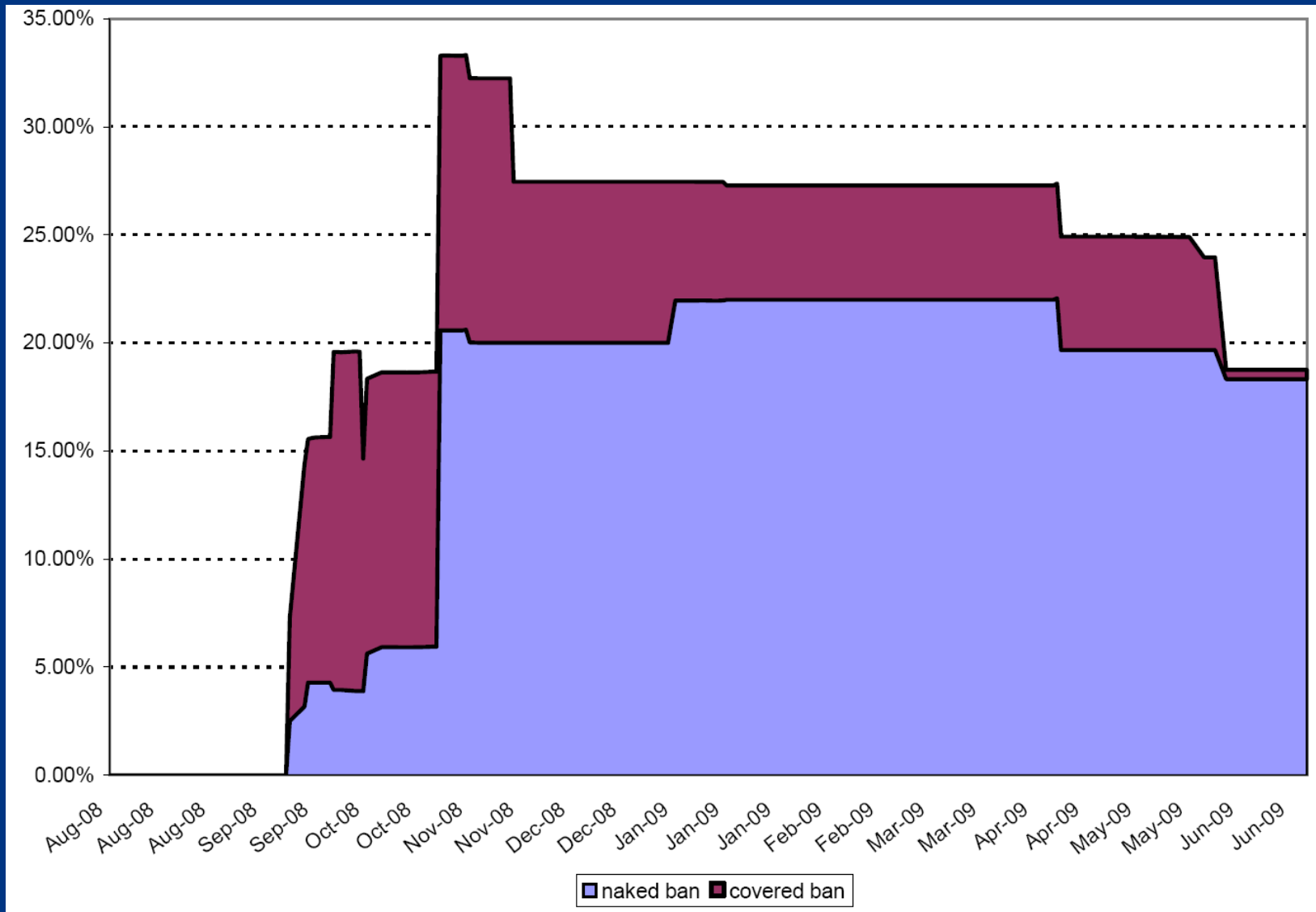
Data

- **All stocks** in Datastream for 30 countries (European markets and developed non-European): sample of 17,040 stocks, 5,992,679 obs.
- Sample period: January 2008 – June 2009.
- Daily bid-ask prices, volume, number of shares from Datastream.
- Characteristics of short-selling bans: drawn from reports by regulatory bodies and CESR (Committee of European Security Regulators).
- Ban applies to 12.4% of observations, 31.5% of stocks (as of 1 October 2008).

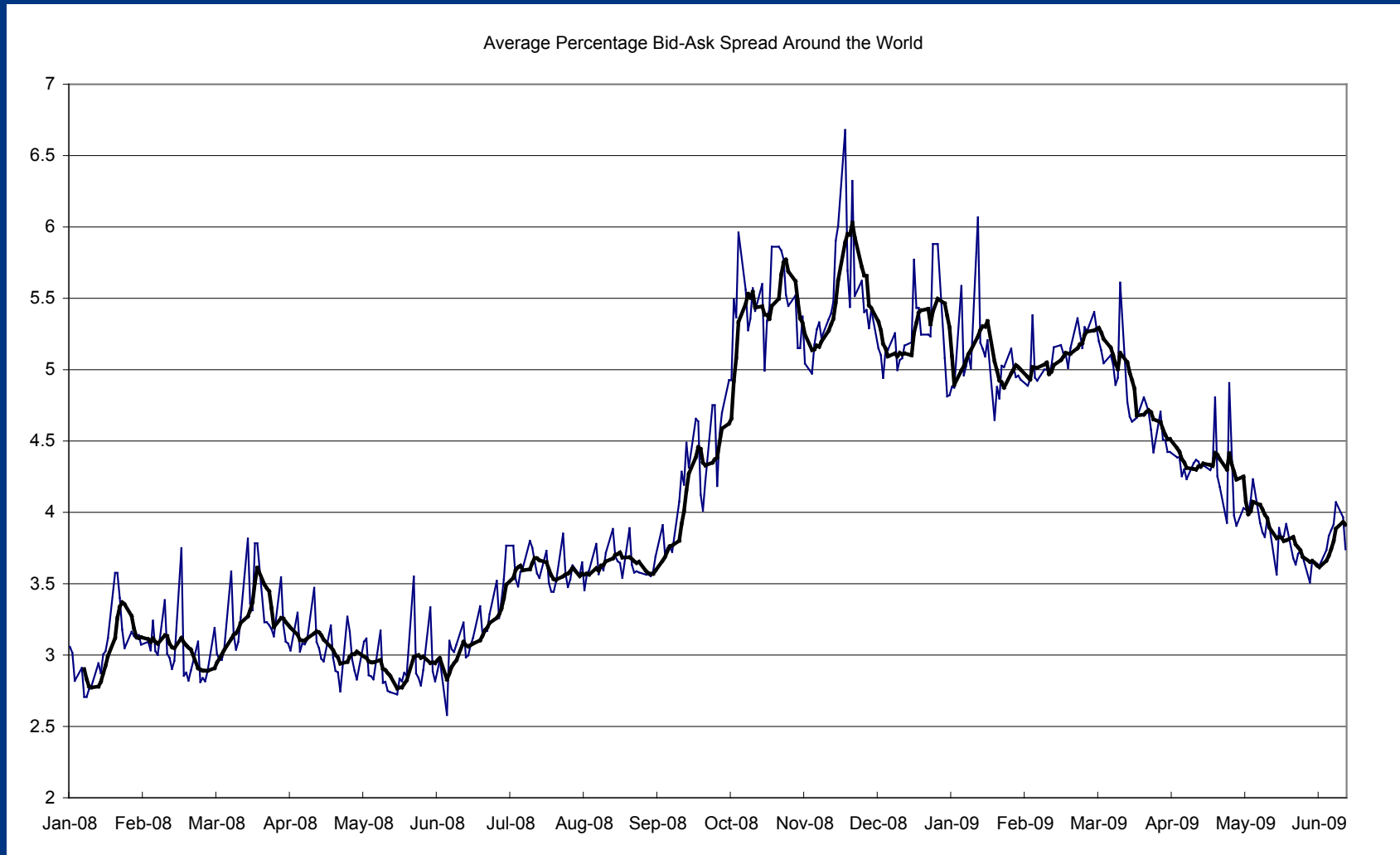
Ban time-series and cross-sectional variation



Percentage of stocks affected by the ban

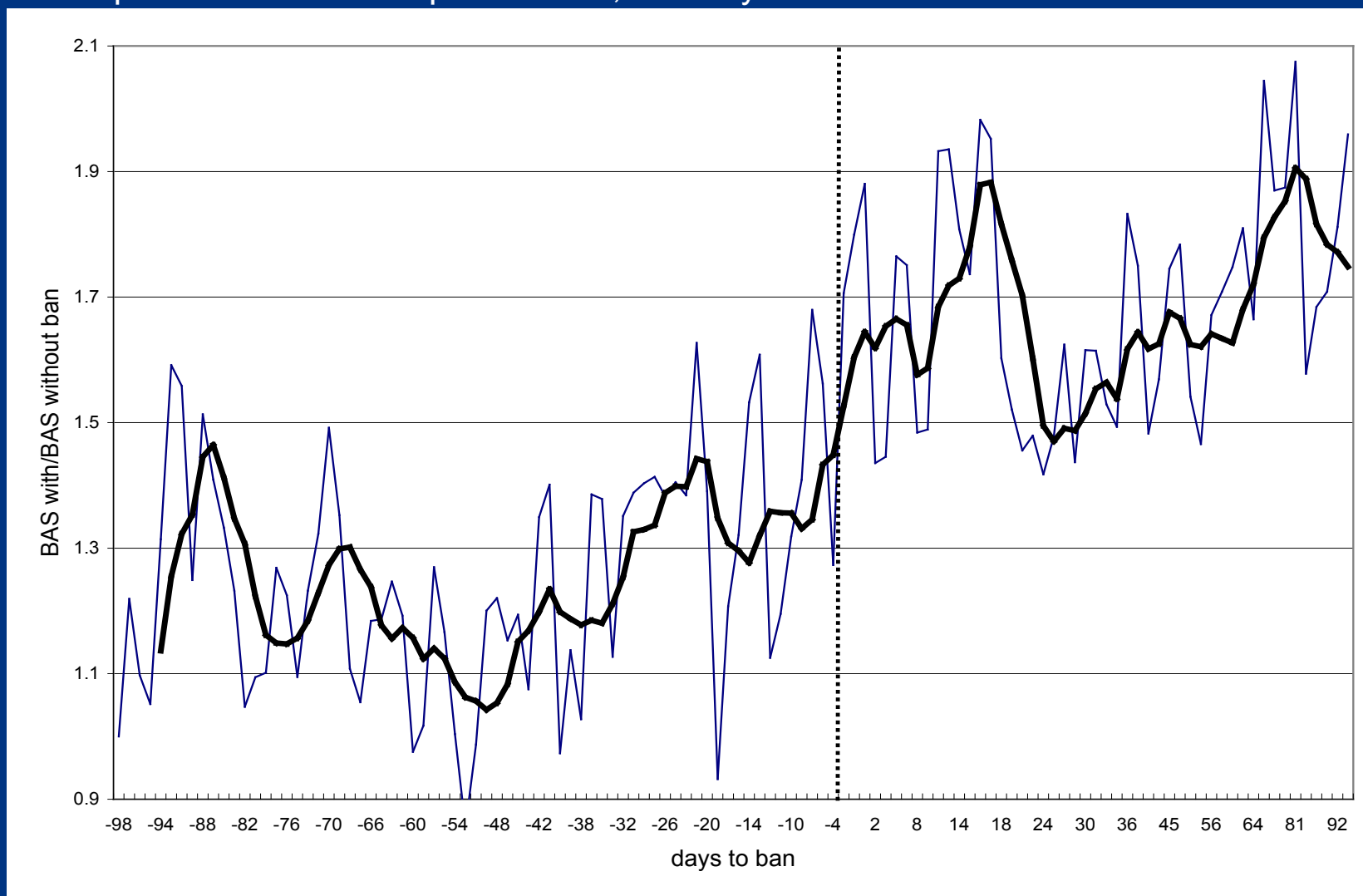


Average bid-ask spread around the world



Ratio of average bid-ask spread of stocks with ban to stocks without ban

European countries with partial bans, 100 days before/after the ban was introduced



Preliminaries: countries with ban on *all* stocks

Country	Median percentage bid-ask spread for stocks with ban			Median ratio of bid-ask spread for stocks with ban	
	before	during	after	during/before	during/after
Australia	3.3333	5.2632*** (55.0)	4.7244	1.58	1.11
Japan	0.6006	0.6976*** (50.9)		1.16	
South Korea	0.4494	0.5249*** (27.4)		1.17	
Spain	0.5840	0.9611*** (36.6)		1.65	
Italy	0.5721	2.7682*** (168.1)		4.84	

Preliminaries: countries with ban on *financials*

	during/before	during/after	during/before	during/after	
Austria	1.63		1.02		financials
Belgium	1.88		1.59		
Canada	3.33	1.70	1.98	0.85	Non-financials
Denmark	1.97		1.37		
France	2.04		1.42		
Germany	2.36		1.38		
Ireland	3.36		1.71		
Netherlands	2.32	1.56	1.18	0.86	
Norway	1.71		1.56		
Portugal	2.09		1.54		
Switzerland	1.12	1.20	1.43	1.18	
U.K.	3.23	1.58	1.73	1.00	
U.S.	3.43	1.86	1.54	1.04	
Averages	2.27	1.50	1.49	0.99	

Methodology I: panel

- Regress measures of liquidity (percentage quoted bid-ask spread and Amihud illiquidity measure) on three ban dummy variables:
 - **Naked ban, covered ban, disclosure requirements.**
- Stock characteristics (e.g., number of market makers, analyst coverage, capitalization,) correlate with liquidity:
 - **Control for unobserved heterogeneity at stock and country level via stock-level fixed effects.**
- Liquidity auto-correlated \Rightarrow SE clustered at stock level, AR(1) errors
- Risk is a potential determinant of bid-ask spreads:
 - **Control for the volatility of returns of individual stocks**
 - **Control for changes in aggregate risk (proxies, calendar dummies, time trend, etc.)**

Ban associated with higher bid-ask spreads

Stocks	All	All	Financials	All
Constant	3.93***	4.97***	3.76***	4.90***
Naked Ban	1.28***	0.89***	0.86***	0.90***
Covered Ban	1.98***	1.63***	2.14***	1.63***
Disclosure	-0.65***	-0.37***	-0.27**	-0.37***
Volatility				0.99***
Stock-Level Fixed Effects	Yes	Yes	Yes	Yes
AR(1) disturbances	No	Yes	No	Yes
Number of observations	5,143,173	5,126,682	878,279	5,124,349
Number of stocks	16,491	16,456	2,718	16,452

Note: qualitatively similar results with Amihud Illiquidity ratio

Countries with partial bans

Constant	4.18 ^{***} (1112.91)	4.20 ^{***} (997.52)	0.0005 ^{***} (3.71)
Naked Ban	2.44 ^{***} (20.18)	2.43 ^{***} (20.06)	0.23 ^{***} (3.99)
Covered Ban	2.76 ^{***} (24.90)	2.75 ^{***} (24.75)	0.46 ^{***} (2.39)
Disclosure	-1.79 ^{***} (-15.14)	-1.79 ^{***} (-15.10)	-0.50 ^{***} (-2.25)
Volatility		-0.36 ^{***} (-14.65)	
TED Spread			
VIX			
Day Fixed Effects	No	No	Yes
Stock-Level Fixed Effects	Yes	Yes	Yes
Number of observations	3,188,903	3,188,903	3,188,903
Number of stocks	10,253	10,253	10,253

Methodology II: matching

- Restrict sample period: window of 50 days around ban inception.
- Match each banned stock with a non-banned stock, traded in the same **country**, same **option listing** status, and smallest distance in market capitalization and stock price.
- Regress liquidity differential between the banned and its matching stock on three ban dummy variables:
 - Naked ban, covered ban, disclosure requirements.
- Control for unobserved heterogeneity at stock and country level via stock-level **fixed effects**

Ban associated with higher bid-ask spreads

	Panel Methodology	Matching Methodology
Constant	4.90***	0.71***
Naked Ban	0.90***	0.56***
Covered Ban	1.63***	1.19***
Disclosure	-0.37***	-0.54*
Volatility	0.99***	
Stock-Level Fixed Effects	Yes	Yes
AR(1) disturbances	Yes	No

Note: qualitatively similar results with Amihud Illiquidity ratio

Size: stronger liquidity effect on small-cap stocks

- Stocks in top/bottom quartile of own country size distribution:

	Large-Cap Stocks	Small-Cap Stocks
Constant	4.19 ^{***} (580.10)	6.66 ^{***} (700.13)
Ban	1.16 ^{***} (18.03)	1.50 ^{***} (18.52)
Stock-Level Fixed Effects	Yes	Yes

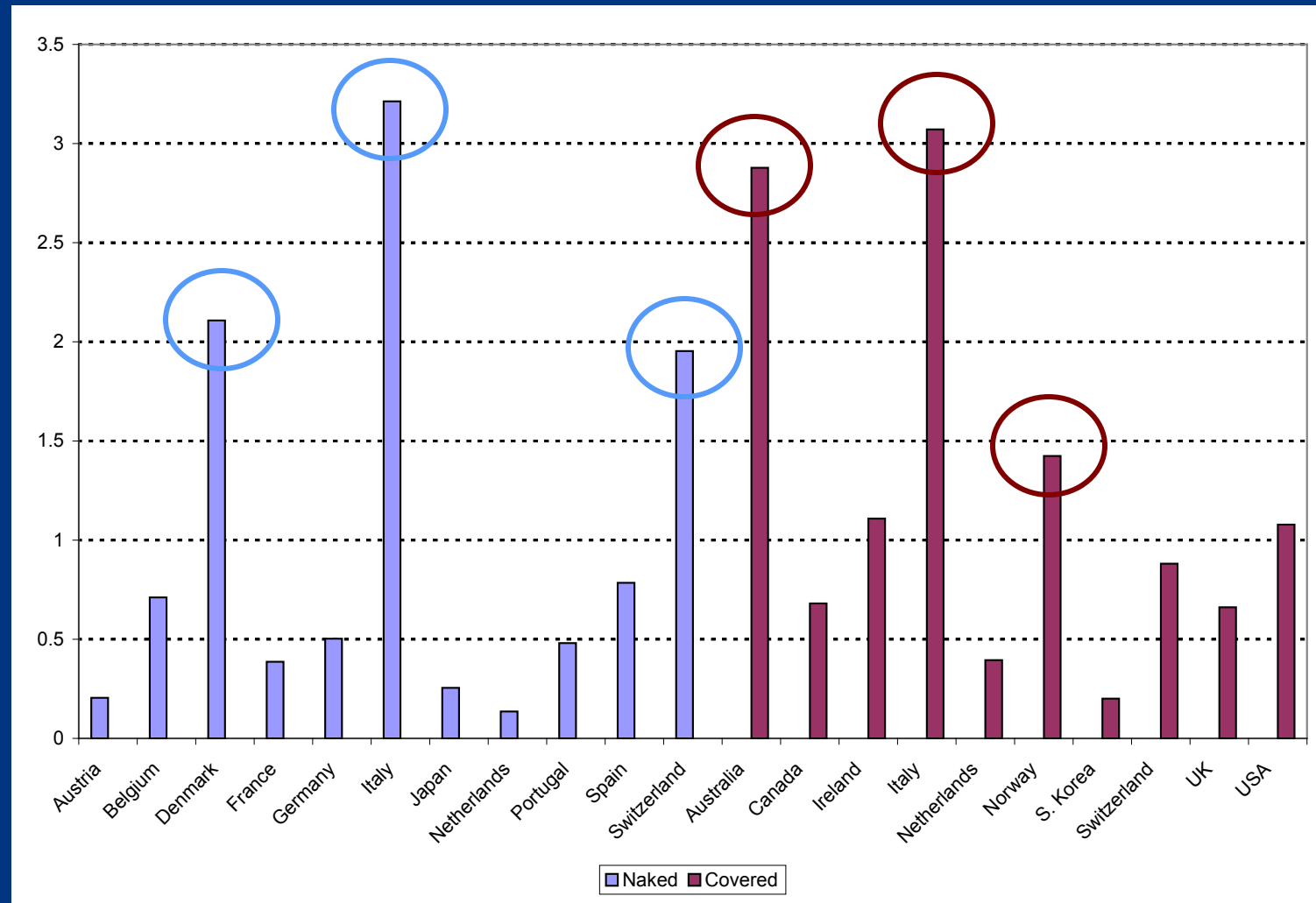
Volatility: Stronger liquidity effect on high-volatility stocks

- Stocks in top/bottom quartile of own country volatility distribution:

	Low-Volatility Stocks	High-Volatility Stocks
Constant	2.59 ^{***} (314.26)	5.92 ^{***} (747.00)
Ban	0.94 ^{***} (16.79)	1.30 ^{***} (13.45)
Stock-Level Fixed Effects	Yes	Yes

Evidence by country

- Allowing for country-specific ban slopes in bid-ask spread regression:



Country characteristics

Dep. Variable: ban coefficient	All Countries with Ban	Countries with Covered Ban
Constant	0.99*** (5.11)	1.44*** (7.05)
Median Size	-0.11 (-0.51)	-0.44* (-1.80)
Median Volatility	0.45* (1.84)	0.49** (2.41)
Ownership Concentration	0.44* (1.80)	1.13*** (4.36)
R ²	0.26	0.79
Observations	18	10

Stocks with/without listed options

	Stocks With Listed Options	Stocks Without Listed Options
Constant	0.60 ^{***} (193.48)	4.23 ^{***} (1015.57)
Naked Ban	0.33 ^{***} (5.94)	1.40 ^{***} (12.24)
Covered Ban	0.67 ^{***} (9.66)	2.14 ^{***} (25.95)
Disclosure	-0.20 ^{***} (-3.42)	-0.72 ^{***} (-6.54)
Stock-Level Fixed Effects	Yes	Yes
Number of Observations	427,164	4,716,009
Number of Stocks	1,306	15,185

Liquidity of dually-listed stocks

	Domestic Market Liquidity	U.S. Dual Listing Liquidity
Constant	1.00 ^{***} (97.28)	0.84 ^{***} (37.93)
Ban on Domestic Market	0.17 ^{***} (3.07)	0.62 ^{***} (5.35)
Ban on U.S. Market	-0.03 (-0.78)	0.79 ^{***} (5.20)
Stock-Level Fixed Effects	Yes	Yes
Number of Observations	42,371	46,181
Number of Stocks	131	133

Bans associated with slower price discovery

- The autocorrelation of residuals in a market-model regression with weekly returns is higher for **banned** stocks and **negative** residuals:

	Median Autocorrelation of Market Model Residuals	Median Downside Cross-autocorrelation between Stock Returns and Market Returns	Median Upside Cross-autocorrelation between Stock Returns and Market Returns	Median of the Difference between Downside and Upside Cross-autocorrelation
	(1)	(2)	(3)	(4)
Ban = 0	0.0824	0.2833	0.2340	0.0358
Ban = 1	0.1011	0.3552	0.2638	0.0565
Difference	0.0187*** (0.0000)	0.0719*** (0.0000)	0.0298*** (0.0000)	0.0207** (0.0470)

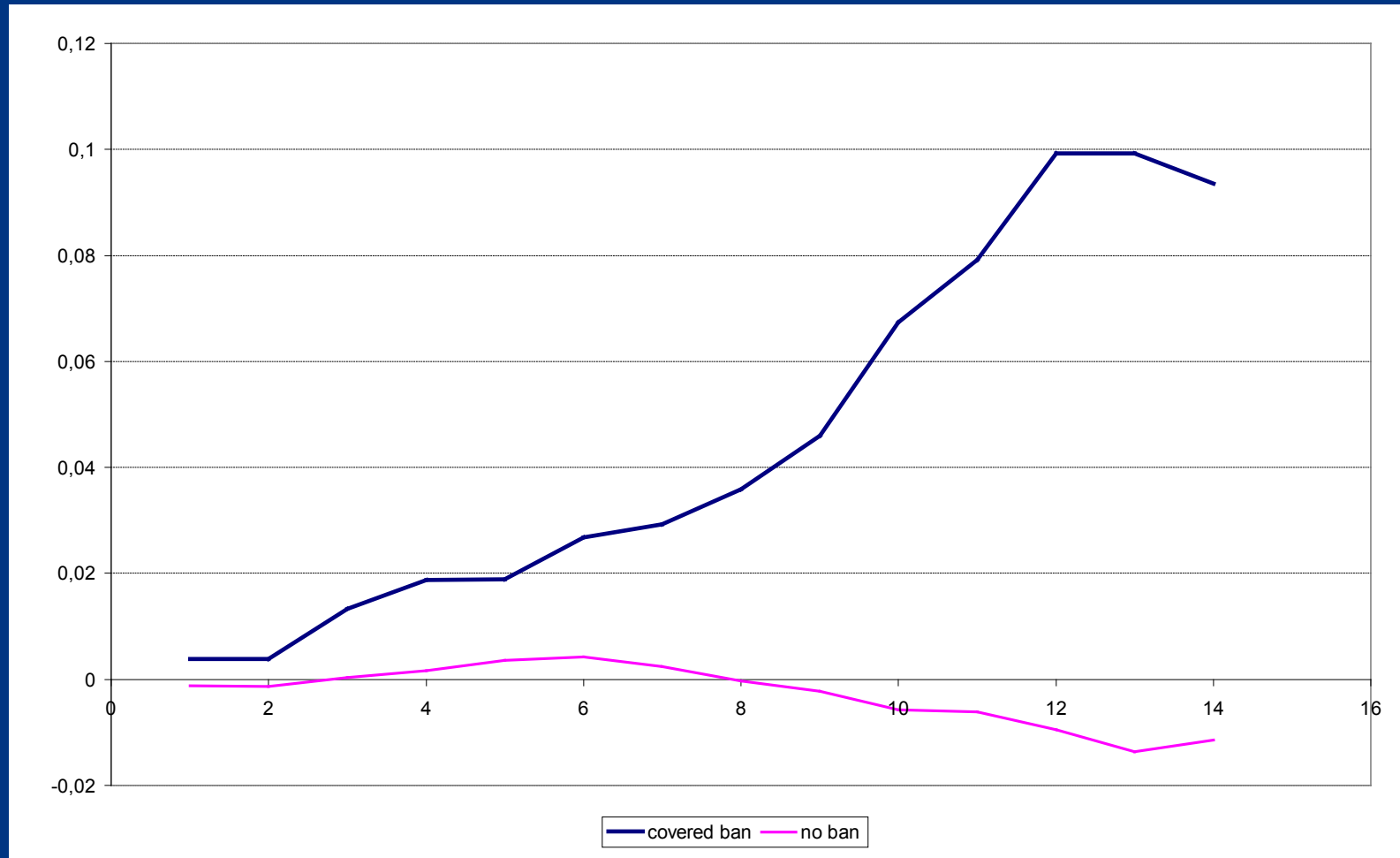
Bans associated with slower price discovery

- A variance-ratio test shows that for **banned** stocks, the random-walk hypothesis can be rejected more often:

	Random walk hypothesis cannot be rejected	Random walk hypothesis cannot be rejected
Ban = 0	53%	52%
Ban = 1	39%	39%
Difference	14% ^{***} (0.0000)	13% ^{***} (0.0000)
Sample	All Stocks	Only Stocks that were eventually banned

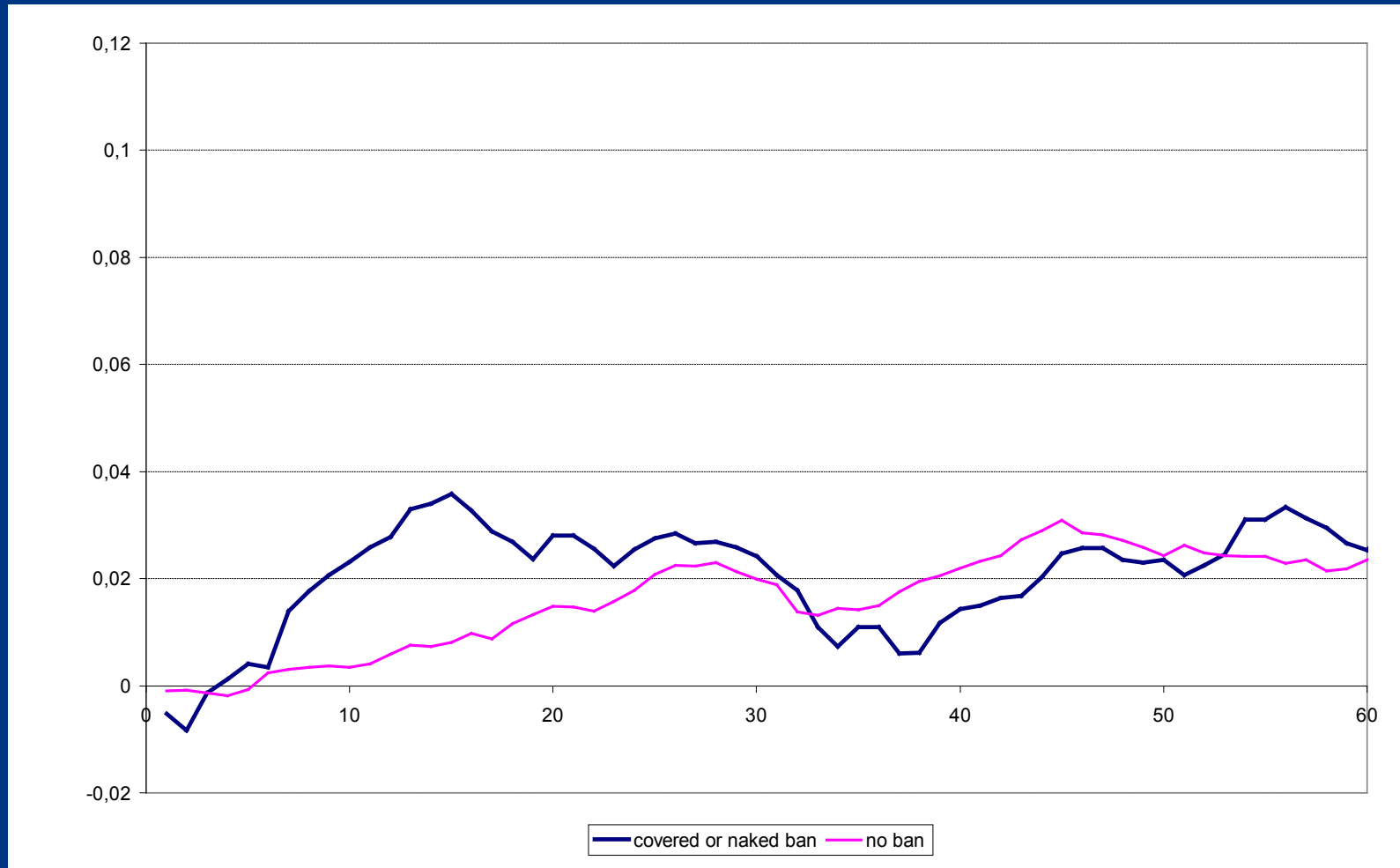
Bans associated with abnormal returns?

In the United States, yes, but



Bans associated with abnormal returns?

elsewhere, no.



Bans are not associated with higher returns (except for the U.S.)

	Panel Methodology	Panel Methodology	Matching Methodology	Matching Methodology
Constant	0.0583*** (29.82)	-0.0017*** (-58.50)	0.0022*** (10.78)	-0.0008 (-1.17)
Naked Ban		-0.0026 (-0.67)		-0.0081*** (-3.13)
Covered Ban	0.0611*** (18.82)	-0.0004 (-0.12)	0.0041*** (3.77)	-0.0025 (-0.67)
Disclosure		0.0066 (1.17)		-0.0006 (-0.17)
Stock-Level Fixed Effects	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes
Countries in the sample	U.S.	Partial ban exc. U.S.	U.S.	Partial ban exc. U.S.

Conclusion

- **The short-selling bans imposed during the crisis have damaged stock market liquidity:**
 - at a time when liquidity was already low
 - more so for small-caps, high-volatility and no listed options stocks
- **They have slowed down price discovery.**
- **They have failed to support stock prices, except (perhaps) for U.S. financial stocks.**