Has the short selling ban reduced liquidity in the Australian stock market?

By comparing a balanced sample of firms before and after the introduction of ASIC's short selling ban, we find that stock market liquidity has decreased. Intra-day volatility and idiosyncratic intra-day volatility have also increased. Investors have also been negatively affected by a slowing in the price discovery process, increases in the cost of trading and less efficient trading.

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THE PRACTICE OF SHORT SELLING was banned in Australia from 22 September 2008. If market participants who traditionally trade short positions are unable to continue trading short positions, there is likely to be a reduction in overall trading – not just on the short side, but also on the offsetting long side of long-short portfolios. There has been considerable discussion about whether this ban on short selling has adversely affected the Australian listed equity market by reducing stock liquidity, thereby potentially increasing the costs of trading. Much of this discussion has focused on overall market trading values, which do appear to have declined. However, one needs to be careful interpreting overall market value changes, when market values themselves are declining.

We analyse trading data from before and after the introduction of the ban in an attempt to see whether stock market liquidity has changed. Using two separate methodologies which control for a number of factors, we find statistically significant evidence that trading volumes have declined following the short selling ban. The first methodology is a balanced firm panel regression analysis using two 15-day periods before and after the short selling ban. The second methodology is a longer-term regression analysis using overall market trading volume data (not value data).

The ASIC moves have followed somewhat similar moves to prohibit short selling in other markets such as Canada, France, Germany, Switzerland, the United Kingdom and the United States. However, unlike these other major markets, the ban or prohibition in Australia pertains to 'all listed stocks' rather than financial sector companies.

Background

On 21 September 2008, the Australian Securities and Investment Commission (ASIC) announced that, 'Contrary to ASIC's announcement on Friday, covered short sales for all listed stocks will now not be permitted'. ASIC further announced that, it 'will reassess and advise the market in 30 days, whether or not it will at that time, or at a later date, reopen covered short sales for non-financial stocks.' The ban was effective from 22 September 2008.

This follows ASIC's 19 September announcement that it would ban or not permit naked short selling, and 'clarify and, in doing so, narrow the permitted class of covered short sales'.

The ASIC moves have followed somewhat similar moves to prohibit short selling in other markets such as Canada, France, Germany, Switzerland, the United Kingdom and the United States. However, unlike these other major markets, the ban or prohibition in Australia pertains to 'all listed stocks' rather than financial sector companies.

Data and methodology

This section outlines the methodology and data used to analyse the effect of the short selling ban. It presents the methodology for short-term stock level analysis and provides the longer-term market level analysis.

Short-term stock level analysis

For the purposes of this analysis, trade data at the stock level was collected on all stocks in the S&P/ASX300 where the trade data is sourced from IRESS (a market data provider). The data contains a stock identifier, the price at which a trade was executed, the volume of shares traded, the date of the trade, the time of the trade and the type of the trade as identified by IRESS (i.e. buy, sell or match).

For the purposes of the short-term analysis, two balanced panels are constructed – one before and one after the introduction of the short selling regulations on 22 September 2008.[1] Our panel before the introduction of the regulations covers the 15 days between 29 August 2008 and 18 September 2008.[2] Our panel after the introduction of the regulations covers the 15 days between 23 September 2008 and 13 October 2008 . The universe of stocks used to construct the panels is the S&P/ASX300. Using this universe we get two balanced panels with 283 stocks.[3] In total the panel has 8490 observations (=283x30).

A regression methodology is employed to test the effect of the introduction of the short selling regulations on stock turnover and intra-day volatility. Equation 1 presents the model for the short-term stock level analysis which is estimated using Ordinary Least Squares (OLS).

$$\begin{aligned}\text{Liquidity Variable} = {} & \alpha + \beta_R(\text{Regulation Dummy}) \\ & + \sum_{w=1}^{4} \beta_w(\text{Weekday Dummy})_w \\ & + \beta_B(\text{NSW Labour Day Holiday Dummy}) \\ & + \sum_{f=1}^{282} \beta_f(\text{Firm Dummy})_f \\ & + \varepsilon \end{aligned} \quad (1)$$

where the Liquidity Variable is our measure of stock turnover, spread, number of trades and intra-day volatility. Stock turnover is defined as the number of shares traded in a stock divided by the shares outstanding at the start of the day. Stock turnover is measured at the total daily level (Total Daily Turnover) and is further broken up into three groups reflecting different periods during the day: Open Turnover measures turnover in the opening match, Intra-day Turnover measures all turnover outside the opening and closing matches, and Close Turnover measures turnover in the closing match. We estimate the average percentage spread for each stock (Spread) using the absolute difference between all trade prices which cross between bid and ask or ask and bid divided by the current share price.[4] The Number of Trades measures the actual number of trades in each share each day. Intra-day volatility is measured in both absolute and index relative or idiosyncratic terms. The absolute measure (Intra-day Vol HL) measures the ratio of the highest traded price during a day divided by the lowest traded price during a day, for each individual stock. The idiosyncratic volatility measure takes the absolute measure for each stock and subtracts the same measure for the market on each individual day.

The Regulation Dummy takes a value of 1 if the date is 22 September or later, and 0 otherwise. This is the main test variable to determine whether the introduction of the short selling regulations has had an effect on stock turnover or intra-day volatility. Our null hypothesis is that the short selling ban has not impacted volumes, spreads or volatility and, if so, this dummy variable should be insignificantly different from zero.

Several controls are included in the regression to capture other explanations for any changes in stock turnover or intra-day volatility. We expect that turnover

or volatility may differ across days of the week, so four weekday dummies are included where each respective dummy takes a value of 1 if the weekday is Monday, Tuesday, Wednesday or Thursday, and 0 otherwise. A firm-specific dummy is then included for each firm. We expect that this firm-specific dummy will capture individual firm characteristics such as size, industry, capital structure and ownership structure which will explain differences in turnover between firms.[5] We control for the NSW Labour Day holiday on 6 October 2008 by way of a dummy variable, as we expect turnover to be lower on this day in the post regulation period. Simple descriptive statistics are presented in Table 1.

Figure 1 graphically displays turnover and spread pre and post the introduction of the short selling ban.

Figure 2 shows intra-day volatility and idiosyncratic volatility pre and post the introduction of the short selling ban.

Longer-term market level analysis

For the purposes of the longer-term analysis we analyse total trading volumes and the total number of transactions traded at the market level over the period from 2 January to 13 October 2008.[6] In total, the analysis has 199 daily observations. To be consistent with our shorter-term analysis, we again exclude the days of 19 September and 22 September.

A regression methodology is employed to test the effect of the introduction of the short selling regulations on stock turnover and intra-day volatility. Equation 2 is the model used in the longer-term market level analysis and is estimated using OLS.

$$\begin{aligned}\text{Liquidity Variable} = {} & \alpha + \beta_R(\text{Regulation Dummy}) \\ & + \sum_{w=1}^{4} \beta_w(\text{Weekday Dummy})_w \\ & + \beta_{HL}(\text{HLC}) \\ & + \beta_B(\text{NSW Labour Day Holiday Dummy}) \\ & + \varepsilon \end{aligned} \quad (2)$$

TABLE 1: **Descriptive statistics**

	Average	Median	Standard Deviation	P10	P90
Panel A: Whole Sample					
Total Daily Turnover (%)	0.400	0.289	0.474	0.073	0.805
Open Turnover (%)	0.019	0.007	0.049	0.000	0.032
Intra-day Turnover (%)	0.352	0.253	0.433	0.063	0.705
Close Turnover (%)	0.029	0.021	0.038	0.001	0.061
Spread (%)	0.457	0.292	0.580	0.078	1.036
Number of Trades	1545	880	2151	118	3487
Intra-day Vol. HL	1.065	1.051	0.057	1.023	1.121
Intra-day Idio. Vol. HL	0.038	0.026	0.054	-0.002	0.087
Panel B: Pre Short Selling Regulations					
Total Daily Turnover (%)	0.436	0.321	0.483	0.078	0.885
Open Turnover (%)	0.025	0.007	0.065	0.001	0.038
Intra Day Turnover (%)	0.384	0.282	0.431	0.070	0.772
Close Turnover (%)	0.028	0.020	0.039	0.001	0.058
Spread (%)	0.415	0.260	0.595	0.067	0.913
Number of Trades	1702	1061	2191	133	3725
Intra-day Vol. HL	1.054	1.043	0.044	1.021	1.095
Intra-day Idio. Vol HL	0.033	0.023	0.043	-0.001	0.074
Panel C: Post Short Selling Regulations					
Total Daily Turnover (%)	0.363	0.261	0.462	0.070	0.704
Open Turnover (%)	0.013	0.007	0.022	0.000	0.029
Intra Day Turnover (%)	0.321	0.223	0.431	0.058	0.627
Close Turnover (%)	0.030	0.022	0.036	0.001	0.064
Spread (%)	0.498	0.325	0.562	0.095	1.144
Number of Trades	1389	745	2099	106	3140
Intra-day Vol. HL	1.077	1.061	0.065	1.028	1.143
Intra-day Idio. Vol HL	0.043	0.029	0.063	-0.004	0.102

where the Liquidity Variable is our measure of total volume or total transactions. Total Volume is the total number of shares traded in the ASX/S&P300 index each day and is sourced from IRESS. Total transactions are the total number of individual transactions in all stocks traded in the ASX/S&P300 index each day and are also sourced from IRESS.

The Regulation, Weekday and NSW Labour Day Dummies are defined as in the short-term analysis.[7] We also expect that market volumes will be influenced by market volatility, and have controlled for this by including a simple absolute measure of market trading range incorporating the current day's high and low levels together with the previous trading day's closing level of the ASX/S&P300 Index, again sourced from IRESS. This variable is called HLC. Our null hypothesis is that the short selling ban has not impacted volumes and, if so, this dummy variable should be insignificantly different from zero. Simple descriptive statistics are presented in Table 2.

FIGURE 1: **Liquidity measures before and after the short selling ban**

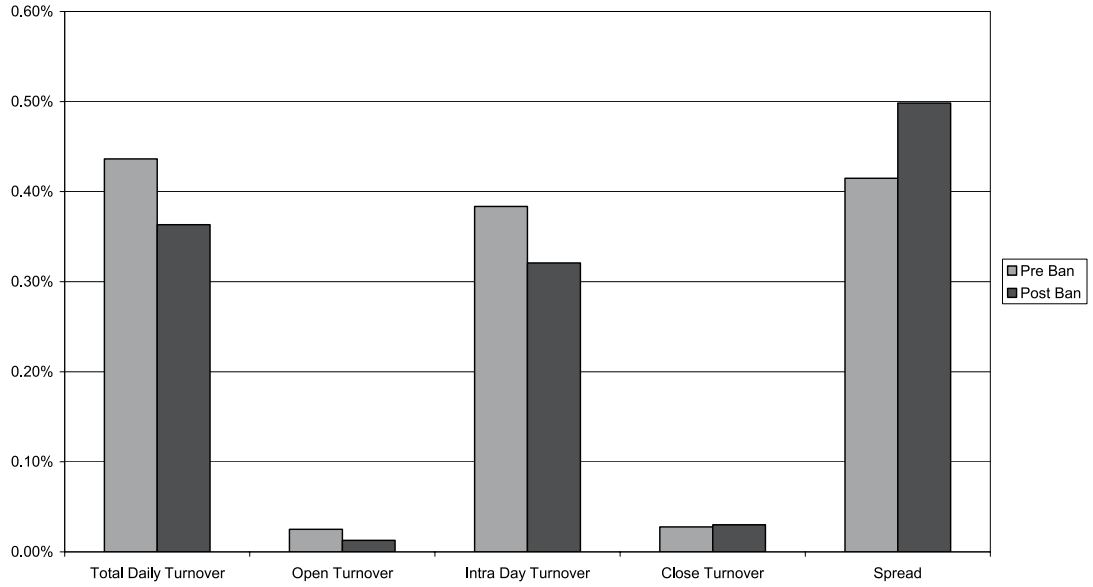

FIGURE 2: **Intra-day volatility measures before and after the short selling ban**

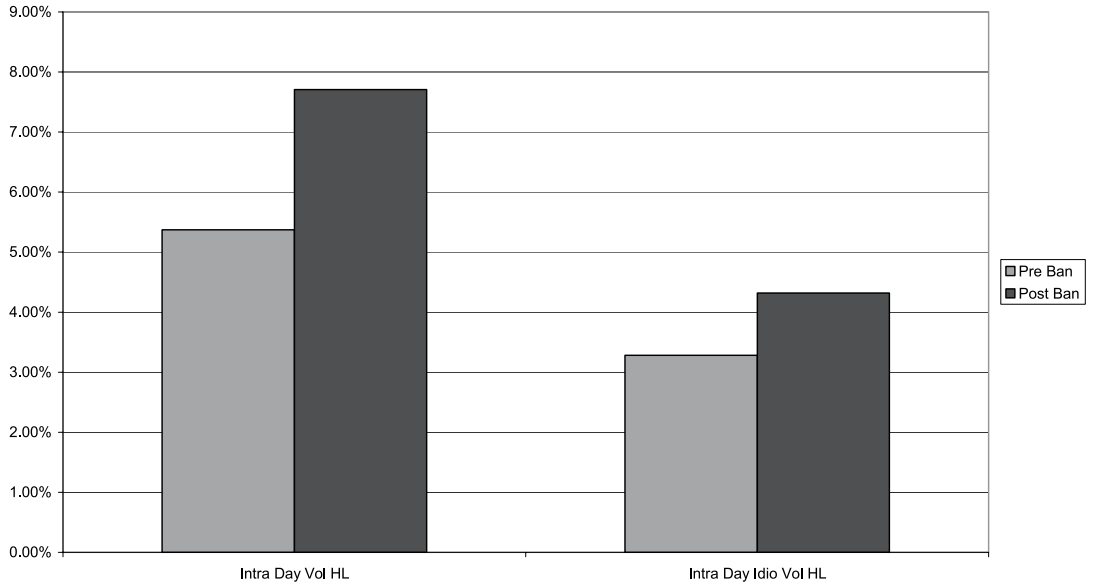

TABLE 2: Descriptive statistics – long term

	Average	Median	Standard Deviation	P10	P90
Panel A: Whole Sample					
Total Volume	924,759,883	889,211,900	238,314,725	678,278,074	1,178,629,738
Transactions	394,149	389,813	73,939	316,962	480,274
HLC	2.19%	1.79%	1.27%	1.07%	3.69%
Return	-0.19%	-0.17%	1.91%	-2.15%	1.85%
Panel B: Pre Short Selling Regulations					
Total Volume	928,677,591	885,943,487	238,793,081	708,528,399	1,168,477,674
Transactions	393,285	389,813	73,374	314,693	474,400
HLC	2.03%	1.77%	1.03%	1.06%	3.22%
Return	-0.14%	-0.14%	1.69%	-2.09%	1.82%
Panel C: Post Short Selling Regulations					
Total Volume	879,951,101	927,538,183	235,546,344	642,928,565	1,190,295,405
Transactions	404,038	395,392	82,026	341,576	508,504
HLC	4.02%	3.79%	2.09%	1.50%	5.99%
Return	-0.82%	-1.24%	3.64%	-4.66%	4.30%

TABLE 3: Regression results

Models are estimated using OLS. *T*-statistics are presented in parentheses. One, two and three asterisks denote significance at 10, 5 and 1% levels.

	(1) Total Daily Turnover (%)	(2) Open Turnover (%)	(3) Intra-day Turnover (%)	(4) Close Turnover (%)	(5) Spread (%)	(6) Number of Trades	(7) Intra-day Volatility	(8) Idiosyncratic Intra-day Volatility
Intercept	0.24*** (3.7)	5.08E-03 (0.61)	0. 22*** (3.72)	0. 01** (2.11)	0. 58*** (9.3)	274.7608* (1.79)	1.0447*** (116.81)	0.0214** (2.5)
Regulation Dummy	-0.06*** (-8.2)	-0. 01*** (-12.53)	-0. 06*** (-7.59)	3.06E-03*** (4.39)	0. 08*** (10.61)	-279.3918*** (-15.17)	0.024*** (22.33)	0.011*** (10.67)
Monday Dummy	-0.07*** (-5.32)	-2.54E-03 (-1.56)	-0. 06*** (-4.85)	-8.35E-03*** (-7.36)	-0. 01 (-1.16)	-117.9477*** (-3.93)	0.0021 (1.2)	-0.0006 (-0.38)
Tuesday Dummy	-3.75E-04 (-0.03)	9.77E-04 (0.63)	-9.11E-05 (-0.01)	-1.26E-03 (-1.17)	-0. 01 (-1.07)	35.4494 (1.24)	0.0035** (2.09)	0.0058*** (3.65)
Wednesday Dummy	-0. 01 (-1.06)	-7.35E-04 (-0.48)	-6.09E-03 (-0.54)	-6.12E-03*** (-5.67)	-0. 03*** (-2.81)	127.9205*** (4.48)	-0.0053*** (-3.15)	-0.0006 (-0.37)
Thursday Dummy	0. 07*** (6.1)	0. 03*** (19.73)	0. 05*** (4)	-1.06E-03 (-0.98)	-0. 03** (-2.26)	123.3681*** (4.32)	0.0019 (1.16)	0.0095*** (5.96)
NSW Labour Day Holiday Dummy	-0. 12*** (-5.25)	1.26E-03 (0.42)	-0. 12*** (-5.26)	-0. 01*** (-5.06)	0. 11*** (4.66)	-507.6886*** (-9.19)	-0.0097*** (-3.02)	-0.0087*** (-2.82)
Firm Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	8490	8490	8490	8490	8375	8490	8490	8490
Adjusted R^2 (%)	43.64	14.57	42.34	29.92	66.18	85.07	26.93	26.49

Results

This section presents the results for the stock level and aggregate level market analysis.

Short-term stock level analysis

The short-term stock level regression results are contained in Table 3. For all variables tested, the null hypothesis that the short selling ban has not affected market turnover can be rejected. The regression results show that Total Daily Turnover per stock, Open Turnover and Intra Day Turnover all decrease after the short selling ban, and Close Turnover increases, with all changes being significant at the 1% level. After controlling for factors like the day of the week, individual firm effects and the NSW Labour Day holiday, the regulation dummy coefficient implies that trading has fallen by approximately 0.0006 or 0.06% of average shares on issue per stock. When compared to the average level of shares traded per stock prior to the short selling ban of 0.4365% (Panel B of Table 1), this represents a fall of 13.7%. Alternatively one can consider that this coefficient is half that associated with the NSW Labour Day holiday, so the ban seems to have reduced trading by around half the impact of having Australia's largest state on holiday! The number of trades per stock has also fallen, by approximately 279 trades per stock per day, again approximately half the impact of the NSW Labour Day holiday.

The spread and volatility measures also statistically increase following the introduction of the short selling ban. We do, however, note that overall market volatility has increased since the ban, which may explain these results. Our second measure of stock volatility does attempt to control for market level volatility changes, and the regulation dummy in regression 8 is still statistically significant at the 1% level.

Longer-term market level analysis

The longer-term market level regression results are contained in Table 4. For all variables tested, the null hypothesis that the short selling ban has not affected market turnover can be rejected. The longer-term regression results support the shorter-term results in Table 4. After controlling for factors like day of the week, market volatility and the NSW Labour Day holiday, the regulation dummy coefficient implies that total volume traded in ASX/S&P300 shares has fallen by approximately 184 million shares per day following the short selling ban, and this fall is statistically significant at the 1% level. Again, the short selling ban has reduced total shares traded in the market by about half the impact of the NSW Labour Day holiday. Total transactions are also reduced following the ban, statistically significant at the 5% level. Excluding the two days surrounding the ban's introduction (regressions 3 and 4) does not statistically change the results.

TABLE 4: Regression results – long term

Models are estimated using OLS. *T*-statistics are presented in parentheses. One, two and three asterisks denote significance at 10, 5 and 1% levels.

	(1) Total Volume (000's)	(2) Transactions	(3) Total Volume Ex (19/9, 22/9) (000's)	(4) Transactions Ex (19/9, 22/9)
Intercept	774,976*** (17.86)	322,913*** (24.16)	776,705*** (18.54)	322,788*** (24.73)
Regulation Dummy	-184,515*** (-8.2)	-39,010 ** (-2.09)	-199,148 *** (-3.31)	-38,891 ** (-2.07)
Monday Dummy	-153,598*** (-3.26)	-15,666 (-1.07)	-151,295*** (-3.29)	-12,891 (-0.90)
Tuesday Dummy	-38,949 (-0.84)	9,673 (0.68)	-23,530 (-0.52)	14,410 (1.03)
Wednesday Dummy	-11,390 (-0.24)	15,207 (1.08)	5,540 (0.12)	20,387 (1.47)
Thursday Dummy	87,278* (1.89)	19,414 (1.37)	101,086*** (2.26)	23,695* (1.70)
HLC	8,576,727*** (6.68)	3,154,099*** (7.98)	7,825,631*** (6.24)	3,154,099*** (7.98)
NSW Labour Day Holiday Dummy	-374,912* (-1.75)	-174,884*** (-2.65)	-334,439 (-1.62)	-174,884*** (-2.65)
Observations	199	199	197	197
Adjusted R^2 (%)	25.94	26.98	25.82	26.98

While a ban on short selling may have reduced the volatility of selected stocks, the objective of regulations should be to ensure the stability of the entire market, not individual stocks.

Conclusion

This paper examines the effect of the introduction of ASIC's short selling ban on the liquidity of Australian listed equity. Comparing a balanced panel of firms and observations from before and after the introduction of the ban, we find that stock market liquidity decreases, as measured by stock turnover, spread and also frequency of trades. Decreases in liquidity slow the price discovery process (i.e. the rate at which stock prices reflect information) and increase the costs of trading. Such effects are not expected to increase investor confidence. In addition, a reduction in liquidity and increase in transaction costs decreases the value of Australian equities, making Australia a less desirable market for investors.

Another interesting finding is that the largest reductions in trading volume/liquidity are in the opening match. Volumes throughout the day have also been significantly reduced, but volumes in the closing match have actually increased. Reduced opening match orders may potentially be due to lower offshore hedge fund trading. Increased closing volumes may potentially be due to increased market on close orders associated with fund flows, particularly redemptions given market direction.

This report also documents that intra-day volatility and idiosyncratic intra-day volatility have increased, both of which make efficient trading more difficult for investors. Hong and Stein (2003) demonstrate this in their model where short sales constraints reduce the speed at which negative information is released to the market. Such constraints increase the incidence of large negative returns resulting in negative skewness and potentially increased volatility. While a ban on short selling may have reduced the volatility of selected stocks, the objective of regulations should be to ensure the stability of the entire market, not individual stocks.

The ban on covered short selling of Australian non-financial securities was lifted effective from the opening of trading on 19 November 2008.

Notes

1 We exclude 19 September as this is the date that the UK FSA banned short selling and, as such, could lead to misleading effects on this day.

2 Similarly we exclude 21 September as this is the first day of the ASIC short selling ban and, as such, could lead to misleading effects associated with trades motivated by the change in legislation.

3 The lower number of stocks is due to the S&P index rebalance mid-September. We only include stocks which were in the S&P300 both before and after the rebalance.

4 While the spread on individual stocks is available real time in IRESS, to our knowledge, it is not available historically. That is why we have used this trading-based measure to estimate the spread.

5 We also considered specifying the control variables as size and sector dummies rather than stock specific dummies. This alternative control mechanism provided extremely similar results and is not reported here for simplicity but is available upon request.

6 We also completed a short-term analysis (using the same period as our earlier stock level analysis) for the market level data, finding similar results. These results are excluded for brevity but are available on request.

7 We considered including dummy variable(s) for other state holidays which occurred in the pre short selling period, but decided against this on the basis that other states are smaller and would have less impact on trading volumes. Including these other state holiday days as normal trading days and including very low trading days in the first part-week in January would, if anything, make it more difficult to reject the null hypothesis.

Reference

Hong, H. and Stein, J. 2003, 'Differences in opinion, short-sales constraints and market crashes', *Review of Financial Studies*, vol. 16, pp. 487–525.