Why do firms pay for liquidity provision in limit order markets?

Johannes Skjeltorp\textsuperscript{a}  
Bernt Arne Ødegaard\textsuperscript{b,a}

April 2010

\textsuperscript{a}: Norges Bank  
\textsuperscript{b}: University of Stavanger
Problem

Oslo Stock Exchange
Electronic Limit order market
Liquidity provided by orders from market participants (only)

Designated Market Maker (DMM)
Listed firms pay financial intermediary (DMM) to maintain an orderly market in the firms stock.

Question in this paper
Why are listed firms willing pay for the improved liquidity provided by the DMM?
Why is this not an obvious (and trivial) question?

Prior research: When firms hire a DMM, liquidity improves. But that is what the DMM is paid to do. We ask: From a corporate finance perspective, why would a listed firm pay for liquidity? Firm already paid cost of becoming listed, making the stock available to investors. Why pay more?

Possible explanations:

- From the perspective of the owner of a stock, improved liquidity increases value of owning stock. But not clear this is relevant for the firm, why should they subsidize the owners that want to sell the firm’s stock. The firm already has the capital.
- Rather: More plausible economic reason: Liquidity in the stock only matters to the stock’s issuer when directly interacting with the capital market
  - Issue more stock
  - Repurchase stock
  - Issue debt...
Summarizing the paper

**We ask**
Is the firm’s decision to pay for DMM services related to the probability of the firm interacting with the stock market?

**We do**
We use data from the DMM deals at the Oslo Stock Exchange to empirically investigate the question.

**We show**
- Liquidity improves after the DMM deal
- DMM hirers are more likely to need new capital.
  
  Capital needs proxied by:
  - DMM hiring firms are better (higher Q)
  - They issue equity within a year after the DMM deal.
Prior literature

Two Strands:
- Market microstructure
- The interaction of liquidity and corporate finance
Prior literature, ctd

Market microstructure

- Early theoretical literature, e.g. [Glosten and Milgrom, 1985, Kyle, 1985], discuss role of market maker.
- Empirically, exchanges move away from market makers. Theoretically, inevitability of limit order markets [Glosten, 1994].
- Empirically, limit order markets (Paris, Frankfurt, Stockholm, Oslo...) reintroduce market makers for selected stocks. (Designated Market Makers – DMM)
- Evolving microstructure literature
  - Theoretically – what are the potential roles for a market maker in limit order markets (e.g. Anand and Subrahmanyam [2008].) Information production?
  - Empirically – what have been the effects of DMM introductions?
Prior literature, ctd

Studies of DMM initiations

- Anand, Tangaard, and Weaver [2008] Stockholm
- Hengelbrock [2008] Deutsche Borse
- Venkataraman and Waisburd [2007] Paris

Typically find

- Liquidity improves after the introduction of a DMM.
- One or at the most two DMMs is enough, more does not improve liquidity.
- The stock market views the hiring of DMMs as a positive signal
Prior literature, ctd

An evolving literature studies the link between stock liquidity and corporate finance. Some examples

➤ Easley and O’Hara [2004] Link information production (liquidity) to cost of capital.
➤ Brockman, Howe, and Mortal [2008] Stock market liquidity affect repurchase decisions

Most of this literature treats liquidity as an exogenous property of the stock.
Our innovation relative to the literature

By hiring a DMM, liquidity can be directly influenced by the firm that has issued the stock. We treat the hiring of Designated Market Makers as *endogenous decisions*, and ask:

- What influences this decision?
Equity trading at OSE

Electronic limit order market, main market for trading of Norwegian stocks, although also other trading venues. A Designated Market Maker is a contract between a financial intermediary and issuing firms. The intermediary is paid an undisclosed amount to “maintain an orderly market”

The DMM obligations in the standard contract:

- bid and ask quotes should be available at least 85% of the trading day.
- The minimum volume at both the bid and ask quotes should equal 4 lots.
- The relative spread should not exceed 4%.
### Describing DMM deals at the OSE

<table>
<thead>
<tr>
<th></th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total active stocks at OSE</td>
<td>207</td>
<td>236</td>
<td>258</td>
<td>287</td>
<td>286</td>
<td>261</td>
</tr>
<tr>
<td>New DMM contracts</td>
<td>5</td>
<td>24</td>
<td>13</td>
<td>16</td>
<td>13</td>
<td>3</td>
</tr>
<tr>
<td>Active DMM contracts</td>
<td>5</td>
<td>28</td>
<td>37</td>
<td>45</td>
<td>54</td>
<td>44</td>
</tr>
<tr>
<td>of which in firm size quartile 1</td>
<td>5</td>
<td>24</td>
<td>34</td>
<td>42</td>
<td>50</td>
<td>39</td>
</tr>
<tr>
<td>of which in firm size quartile 2</td>
<td>0</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
What is the effect on the market of hiring a DMM?

1. Does liquidity improve?
2. Does the market react?
Does liquidity improve?

Liquidity measures before and after market maker deals

<table>
<thead>
<tr>
<th></th>
<th>Period before</th>
<th>Period after</th>
<th>t-test diff</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 year</td>
<td>6 months</td>
<td>6 months</td>
</tr>
<tr>
<td>Rel Spread</td>
<td>0.037</td>
<td>0.038</td>
<td>0.024</td>
</tr>
<tr>
<td>LOT</td>
<td>0.041</td>
<td>0.040</td>
<td>0.033</td>
</tr>
<tr>
<td>Amihud</td>
<td>0.524</td>
<td>0.568</td>
<td>0.265</td>
</tr>
<tr>
<td>Monthly Turnover</td>
<td>0.045</td>
<td>0.045</td>
<td>0.053</td>
</tr>
</tbody>
</table>

(“Low tech” liquidity measures, from daily data)

- Relative spread
- LOT: # non trading days
- ILR: Amihuds measure, elasticity of price
- Turnover: Trading volume measure
Market reaction to DMM introduction

Event study, centered at date of DMM introduction.

(Straight excess returns)
What is the effect on the market of hiring a DMM?

Summarizing results:

1. Liquidity improves
2. The market react positively
Analyzing decision to hire DMM

Object of interest:
Firm’s decision to hire DMM to improve liquidity of the stock.
What affects this?
Decision theoretic empirical analysis (Logit/Probit).

Determinants of the decision:

- Likelihood of issuing capital (our hypothesis)
  - Growth potential (Q)
  - Ex post decision to raise equity capital

- Likelihood of repurchasing (alternative reason for hiring DMM).
  - Actually repurchase next year.

- Liquidity measure (control).
  - Only want to hire DMM is liquidity is low.

- Firm size (control) – only small firms hire DMM
  - Either use firm size as a control
  - or only do analysis for small firms.
Logit analysis, decision to hire DMM

Proxy for probability of issuing capital: Tobin’s Q (ex ante)

<table>
<thead>
<tr>
<th>Variable</th>
<th>coeff</th>
<th>pvalue</th>
</tr>
</thead>
<tbody>
<tr>
<td>liquidity last year (spread)</td>
<td>-0.09</td>
<td>(0.07)</td>
</tr>
<tr>
<td>ln(firm size)</td>
<td>-0.45</td>
<td>(0.00)</td>
</tr>
<tr>
<td>q last year</td>
<td>0.19</td>
<td>(0.00)</td>
</tr>
<tr>
<td>repurchase within a year</td>
<td>0.67</td>
<td>(0.01)</td>
</tr>
<tr>
<td>constant</td>
<td>5.58</td>
<td>(0.00)</td>
</tr>
</tbody>
</table>

\[ n \] 1156

Pseudo \[ R^2 \] 0.089
Logit analysis, decision to hire DMM

Proxy for probability of issuing capital: Actual capital issue (ex post)

<table>
<thead>
<tr>
<th>Variable</th>
<th>coeff</th>
<th>pvalue</th>
</tr>
</thead>
<tbody>
<tr>
<td>liquidity last year (spread)</td>
<td>-0.13</td>
<td>(0.02)</td>
</tr>
<tr>
<td>ln(firm size)</td>
<td>-0.41</td>
<td>(0.00)</td>
</tr>
<tr>
<td>issue capital within a year</td>
<td>-0.06</td>
<td>(0.81)</td>
</tr>
<tr>
<td>repurchase within a year</td>
<td>0.69</td>
<td>(0.01)</td>
</tr>
<tr>
<td>constant</td>
<td>5.21</td>
<td>(0.00)</td>
</tr>
<tr>
<td><em>n</em></td>
<td>1156</td>
<td></td>
</tr>
<tr>
<td>Pseudo $R^2$</td>
<td>0.072</td>
<td></td>
</tr>
</tbody>
</table>
Decision to hire *or keep* a DMM

Each year a new decision:
If the stock doesn’t have a DMM – hire one.
If the stock has a DMM – keep it.
In the decision theoretic analysis:
View *either* as the DMM decision
Logit analysis, decision to hire or keep DMM

Proxy for probability of issuing capital: Tobin’s Q (ex ante)

<table>
<thead>
<tr>
<th>Variable</th>
<th>coeff</th>
<th>pvalue</th>
</tr>
</thead>
<tbody>
<tr>
<td>liquidity last year (spread)</td>
<td>-0.09</td>
<td>(0.07)</td>
</tr>
<tr>
<td>ln(firm size)</td>
<td>-0.45</td>
<td>(0.00)</td>
</tr>
<tr>
<td>q last year</td>
<td>0.19</td>
<td>(0.00)</td>
</tr>
<tr>
<td>repurchase within a year</td>
<td>0.67</td>
<td>(0.01)</td>
</tr>
<tr>
<td>constant</td>
<td>5.58</td>
<td>(0.00)</td>
</tr>
</tbody>
</table>

$n$ 1156

Pseudo $R^2$ 0.089
Logit analysis, decision to hire or keep DMM

Proxy for probability of issuing capital: Actual capital issue (ex post)

<table>
<thead>
<tr>
<th>Variable</th>
<th>coeff</th>
<th>pvalue</th>
</tr>
</thead>
<tbody>
<tr>
<td>liquidity last year (spread)</td>
<td>-0.13</td>
<td>(0.02)</td>
</tr>
<tr>
<td>ln(firm size)</td>
<td>-0.41</td>
<td>(0.00)</td>
</tr>
<tr>
<td>issue capital within a year</td>
<td>-0.06</td>
<td>(0.81)</td>
</tr>
<tr>
<td>repurchase within a year</td>
<td>0.69</td>
<td>(0.01)</td>
</tr>
<tr>
<td>constant</td>
<td>5.21</td>
<td>(0.00)</td>
</tr>
</tbody>
</table>

\[ n \quad 1156 \]

Pseudo $R^2$ 0.072
Measures of probability of interacting with capital markets
  ▶ issuing capital
  ▶ repurchase

*are important for the decision to hire a DMM.*
Measures of probability of issuing capital are important for the decision to hire a DMM.
Conclusion

Our empirical results points to:
For listed firms, liquidity matters in the secondary market of the firms stock mainly matters to the firm because of the market’s role when new capital is raised.
Firms are willing to pay to improve liquidity when they expect to use the stock market to raise capital
Appendix: Extra results
Logit analysis, decision to hire DMM

Tobin’s Q as a proxy for probability of issuing capital

<table>
<thead>
<tr>
<th>Variable</th>
<th>coeff</th>
<th>pvalue</th>
</tr>
</thead>
<tbody>
<tr>
<td>liquidity last year (spread)</td>
<td>-0.08</td>
<td>(0.17)</td>
</tr>
<tr>
<td>q last year</td>
<td>0.28</td>
<td>(0.00)</td>
</tr>
<tr>
<td>repurchase within a year</td>
<td>0.58</td>
<td>(0.05)</td>
</tr>
<tr>
<td>constant</td>
<td>-3.02</td>
<td>(0.00)</td>
</tr>
</tbody>
</table>

\[ n = 525 \]

Pseudo \( R^2 \) 0.075
Logit analysis, decision to hire DMM

<table>
<thead>
<tr>
<th>Variable</th>
<th>coeff</th>
<th>pvalue</th>
</tr>
</thead>
<tbody>
<tr>
<td>liquidity last year (spread)</td>
<td>-0.13</td>
<td>(0.04)</td>
</tr>
<tr>
<td>issue capital within a year</td>
<td>0.24</td>
<td>(0.43)</td>
</tr>
<tr>
<td>repurchase within a year</td>
<td>0.73</td>
<td>(0.01)</td>
</tr>
<tr>
<td>constant</td>
<td>-2.59</td>
<td>(0.00)</td>
</tr>
<tr>
<td>$n$</td>
<td>525</td>
<td></td>
</tr>
<tr>
<td>Pseudo $R^2$</td>
<td>0.040</td>
<td></td>
</tr>
</tbody>
</table>


