IPO Market Cycles: “Bubbles or Sequential Learning?”

Michelle Lowry
G. William Schwert

IPO “Hot Issue” Markets

- Facts:
  - Dramatic cycles in the number of IPOs & in initial returns to IPO investors
    - AKA “underpricing”
  - Also, autocorrelations in:
    - Length of time in registration ("book-building")
    - Price updates (between initial filing & IPO)
Why Care About IPO “Hot Issue” Markets?

- **Underpricing is an interesting and pervasive phenomenon**
  - To the extent that it is predictable, it seems to imply that firms could manage the amount of underpricing by timing their IPOs
    - Ceteris paribus, lowering underpricing would seem to be desirable

- Are cycles an indication that investment bankers and firms do not adapt (completely) to market conditions?
  - Why?

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**Figure 1.** Ibbotson, Sindelar, and Ritter’s (1994) monthly data on aggregate US initial public offerings per month (NIPOISR) and average initial returns to IPO investors (IREW), 1960-2000.
### Table 1

Descriptive Statistics for Aggregate IPO Returns and Volume

<table>
<thead>
<tr>
<th></th>
<th>Sample Size, T</th>
<th>Mean</th>
<th>Median</th>
<th>Std Dev</th>
<th>Min</th>
<th>Max</th>
<th>p_1</th>
<th>p_2</th>
<th>p_3</th>
<th>p_4</th>
<th>p_5</th>
<th>p_6</th>
<th>p_7</th>
<th>p_8</th>
<th>p_9</th>
<th>S(p)</th>
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<tbody>
<tr>
<td><strong>1990–97</strong></td>
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<td>Number of IPOs</td>
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<td>IPOs</td>
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<td>NR/CO</td>
<td>18.8</td>
<td>12.4</td>
<td>18.4</td>
<td>-28.8</td>
<td>119.1</td>
<td>442</td>
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<td><strong>1985–97</strong></td>
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<tr>
<td>Time to Registrations in Days</td>
<td>REGTIME</td>
<td>52.1</td>
<td>65.1</td>
<td>61.3</td>
<td>110</td>
<td>624</td>
<td>156</td>
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<tr>
<td>Average Initial Returns</td>
<td>IRT</td>
<td>13.9</td>
<td>13.4</td>
<td>7.1</td>
<td>0.0</td>
<td>45.0</td>
<td>156</td>
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<tr>
<td>Average Price Updates between Filing and Offer Dates</td>
<td>APUR</td>
<td>10.6</td>
<td>10.2</td>
<td>6.6</td>
<td>-5.0</td>
<td>27.0</td>
<td>156</td>
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</table>

**IPO “Hot Issue” Markets**

- **Facts:** Looks like there are lead-lag relations between returns and IPOs
  - Seems to imply that underpricing varies in predictable ways
  - IPO returns seem to predict future number of IPOs
  - Number of IPOs seems to predict future IPO returns
    - equal-weighted, but not proceeds- (or value-) weighted
Figure 2. Cross correlations of the number of IPOs in month $t+k$ with the return to IPOs in month $t$, for $k = -12, \ldots, 12$. The large sample standard error for these correlations is .05 for 1960-98 and .07 for 1981-97.
VAR(3) Models for Returns & IPOs

- Taking into account own autocorrelation cleans up inferences about lead-lag relations
  - Returns predict the future number of IPOs
  - But, not vice versa

Table 2
Do IPO Initial Returns Predict the Number of IPOs, or Vice Versa?

Third order vector autoregressive (VAR(3)) models for initial returns and the number of IPOs using ISR’s data on aggregate IPO activity in the U.S., 1960-97. IR\textsuperscript{WR} is the equal-weighted return to IPO investors and NIPO\textsuperscript{WR} is number of IPOs offered in the month. Also, VAR(3) models for initial returns and the number of IPOs using SDC data on aggregate IPO activity in the US, 1985-97. IR\textsuperscript{PR} is the proceeds-weighted return to IPO investors and NIPO\textsuperscript{PR} is the number of IPOs offered in the month. The t-statistics use White’s (1980) heteroskedasticity-consistent standard errors, and the Granger F-tests for incremental predictability (“causality”) are also corrected for heteroskedasticity. The F-tests indicate the incremental explanatory power of the three lags of the predictor variable, given three lags of the dependent variable. R\textsuperscript{2} is the coefficient of determination, adjusted for degrees of freedom. S(α) is the standard error of the regression.

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>ISR Data, 1960-97</th>
<th>ISR Data, 1985-97</th>
<th>SDC Data, 1985-97</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>IR\textsuperscript{WR}</td>
<td>NIPO\textsuperscript{WR}</td>
<td>IR\textsuperscript{WR}</td>
</tr>
<tr>
<td>Constant</td>
<td>7.426</td>
<td>5.18</td>
<td>0.321</td>
</tr>
<tr>
<td>IR\textsuperscript{WR}</td>
<td>0.010</td>
<td>5.06</td>
<td>0.094</td>
</tr>
<tr>
<td>IR\textsuperscript{WR}</td>
<td>0.186</td>
<td>1.91</td>
<td>0.025</td>
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<td>IR\textsuperscript{WR}</td>
<td>0.014</td>
<td>0.24</td>
<td>0.035</td>
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<tr>
<td>NIPO\textsuperscript{WR}</td>
<td>-0.023</td>
<td>-0.01</td>
<td>0.596</td>
</tr>
<tr>
<td>NIPO\textsuperscript{WR}</td>
<td>-0.007</td>
<td>-0.71</td>
<td>0.111</td>
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<tr>
<td>NIPO\textsuperscript{WR}</td>
<td>-0.012</td>
<td>-0.33</td>
<td>0.204</td>
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<tr>
<td>R\textsuperscript{2}</td>
<td>0.373</td>
<td>0.76</td>
<td>0.072</td>
</tr>
</tbody>
</table>

Granger F-tests:

| Lagged NIPO (p-value) | 1.87 (0.132) | 0.70 (0.551) | 0.09 (0.964) |
| Lagged IR (p-value)   | 7.22 (0.0001) | 7.67 (0.0002) | 4.30 (0.002) |
| Sample Size, T        | 428 | 430 | 156 | 156 | 156 | 156 |
How Can Firms Adjust the Timing of Their IPO?

- Decision of when to **File**
- After filing, the length of **Time in Registration**
  - Book-building, selling effort
- If bad news happens, can **Withdraw** registration

VAR(3)s for Returns with Filings, Time & Withdrawals

- The action seems to be with Filings
  - Time in registration and withdrawals do not seem to be related with returns
  - The relation between withdrawals and future equal-weighted returns seems to go in the “wrong” direction
    - More withdrawals are associated with higher than average initial returns to IPO investors in future months
Control for Firm- & Deal-level Effects on IPOs

- Extensive literature on the reasons for underpricing IPOs
  - Underwriter monopsony power
  - Risk
  - Asymmetric information
    - By underwriters
    - By issuing firm
  - Insurance
    - Avoid subsequent litigation

Table 3

<table>
<thead>
<tr>
<th>IPO Timing Measures</th>
<th>Initial Return Measures</th>
<th>IR%</th>
<th>p-value</th>
<th>IR%</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>NPHL</td>
<td>(1) Returns predict Filing</td>
<td>8.19</td>
<td>0.00002</td>
<td>8.72</td>
<td>0.003</td>
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<tr>
<td></td>
<td>(2) Filing predicts Returns</td>
<td>0.92</td>
<td>0.430</td>
<td>0.94</td>
<td>0.420</td>
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<tr>
<td>Sample size</td>
<td>153</td>
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<tr>
<td>REGTIME</td>
<td>(3) Returns predict Timing</td>
<td>0.58</td>
<td>0.625</td>
<td>3.36</td>
<td>0.018</td>
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<tr>
<td></td>
<td>(4) Timing predicts Returns</td>
<td>0.53</td>
<td>0.661</td>
<td>0.57</td>
<td>0.633</td>
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<tr>
<td>Sample size</td>
<td>153</td>
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<tr>
<td>NWDP*</td>
<td>(5) Returns predict Withdrawals</td>
<td>5.02</td>
<td>0.002</td>
<td>4.10</td>
<td>0.006</td>
</tr>
<tr>
<td></td>
<td>(6) Withdrawal predicts Returns</td>
<td>4.14</td>
<td>0.006</td>
<td>2.08</td>
<td>0.105</td>
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<tr>
<td>Sample size</td>
<td>119</td>
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</table>
IPO Returns at the Firm Level

- At initial registration [col. (1)]:
  - Larger firms underpriced less
  - Amex firms underpriced less
  - Tech firms underpriced more
  - Note that $R^2$ is only 3%
IPO Returns at the Firm Level

- **At offering [col. (3)]:**
  - Higher-ranked underwriters underprice less
    - Although this effect is weak
      - Given that cross-sectional standard errors are probably too small => t-stats too big
    - This doesn’t show up in col. (1) because high-ranked underwriters low-ball initial filing range
      - Price updates are predictably positive (see other Lowry-Schwert paper)

- **At offering [col. (3)]:**
  - Effect of price update is asymmetric
    - When prices rise, relation with IPO return is large and positive (0.865)
      - Benveniste & Schmidt (1989) – share gains from positive information with informed investors
      - => partial adjustment
    - When prices fall, relation with IPO return is small (0.185)
      - Investment bankers and firms avoid overpricing, so adjustment is full
IPO Returns at the Firm Level

- **At offering [col. (3)]:**
  - Given the effect of the price update, there is no additional effect of market returns
    - Different message than Loughran & Ritter (RFS, forthcoming)
    - Price updates reflect private and public information
      - Market returns just reflect public information
  - Note that $R^2$ is now 18%

IPO Returns at the Firm Level

- The reason for considering cross-sectional model in table 4 is to estimate firm- and deal-specific predictable parts of IPO returns
  - To the extent that there is clustering in the types of firms coming public through time, this may contribute to aggregate correlation patterns
Aggregate IPO Returns Adjusting for Firm and Deal Effects

- Measure expected and unexpected IPO returns at time of registration [rows (2) and (3)]:
  - Expected IPO returns based on firm & underwriter characteristics are highly autocorrelated
    - => part of IPO cycles are due to the types of firms going public
  - Unexpected IPO returns are autocorrelated for about the first 5 lags
  - Remember that the average registration period is 72 days (about 2.5 months)

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### Table 5

Descriptive Statistics for Expected and Unexpected Initial Returns to IPOs, 1985-97

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<tbody>
<tr>
<td>IR</td>
<td>10.6</td>
<td>10.2</td>
<td>6.6</td>
<td>-4.8</td>
<td>27.2</td>
<td>4.2</td>
<td>0.36</td>
<td>0.18</td>
<td>0.30</td>
<td>0.12</td>
<td>0.06</td>
<td>0.21</td>
<td>0.24</td>
<td>0.13</td>
<td>0.22</td>
<td>0.17</td>
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Initial Returns (proceeds-weighted average of issued offered in month 1)

(1) Er(IR)

(2) Er(ER)

(3) Er(ER)

Expectations at the time of the IPO, based on information in the preliminary prospectus [column (1), table 4]

(4) Er(ER)

(5) Er(ER)

Expectations at the time of the IPO, based on information in the final prospectus [column (3), table 4]
Aggregate IPO Returns Adjusting for Firm and Deal Effects

- Measure expected and unexpected IPO returns at time of offering [rows (4) and (5)]:
  - Expected IPO returns based on firm & underwriter characteristics and information learned during the registration period are highly autocorrelated
    - Strong autocorrelations at lags 1 and 2 reflect contagion – information about one IPO affects value of other contemporaneous IPOs
  - Unexpected IPO returns are not autocorrelated
    - Private information learned during multi-month book-building process induces autocorrelation in aggregate IPO returns

VAR(3) Models for IPOs and Unexpected IPO Returns

- These tests let us see what type of information affects future IPO values and issuance decisions
  - Using public information at time of registration to measure expected price updates
  - Using public & private information at time of offering to measure expected price updates
VAR(3) Models for IPOs and Unexpected IPO Returns

- At time of registration [rows (1) and (2)]:
  - It is the unexpected part of initial returns that predicts future filing and issuance decisions by firms

- At time of offering [rows (3) and (4)]:
  - It is the expected part of initial returns that predicts future filing and issuance decisions by firms

- =>Private information learned during registration period is the important predictor of future IPO activity
Conclusions

- Cyclical behavior of IPO market comes from three sources:
  - Overlap in book-building periods and information overlap between IPOs
  - Clustering of similar types of firms having IPOs
  - Partial adjustment of IPO prices to private information produced by book-building

Conclusions

- No evidence the firms/investment bankers ignore available information in setting IPO prices
  - But,
    - Asymmetric reaction of price updates to market returns is puzzling (Loughran-Ritter)
    - Predictable biases in initial filing ranges are puzzling
    - These are results in the other Lowry-Schwert paper
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