Saving Speculative Markets from the Speculators

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Motivation

▪ A large and growing literature shows (some) investors have a preference for assets with lottery-like payoffs:
  • ... a small probability of unusually high returns
  • Originally, Friedman and Savage (1948) and Markowitz (1952)

▪ These preferences affect:
  • Investor engagement in financial markets
  • Investor trading behavior
  • Asset prices
  • Expected returns
What if Price Moves are Restricted?

- Strict limits on the moves of asset prices will eliminate lottery-like payoffs

- Which in turn should:
  - Reduce the demand by investors with a preference for such payoffs
  - Reduce asset prices
  - Increase expected returns

- Moreover, lower asset prices may affect firm desire to sell equity to outside investors
Our Study

- Uses a natural experiment to examine these questions

- In 2012, the Securities Exchange Board of India (SEBI) imposed price bands on IPO stocks for ten days after listing
  - Pre-regulation, daily returns are unbound
  - Post-regulation, daily returns are bound within:
    - ±5% for smaller IPOs (< INR 2.5 billion ~ USD 35 million)
    - ±20% for larger IPOs (> INR 2.5 billion ~ USD 35 million)

- Introduce a 45min pre-market auction on first day of trading
  - Investors can buy and sell IPO shares before the market opens
Example: Intraday Prices of Two IPOs

Before introduction of price bands

After introduction of price bands
Contributions

- Direct evidence of how changes in the distribution of stock returns affect investor demand and trading behavior
  - Friedman and Savage (1948); Markowitz (1952) and many others

- Effect of investor sentiment on the demand and pricing of IPOs
  - Derrien (2005) and Green and Hwang (2012)

- Sentiment and activity in primary equity markets

- Ability of regulators to curb speculation by imposing price limits
  - Kim and Rhee (1997) and others
Preview of Main Findings (1)

Comparing pre-regulation to post-regulation IPOs:

- Decline in price variability of IPO stocks on first trading day
  - The decline is not temporary; persists over the first month

- Decline in upside potential on the first trading day

- Decline in retail and institutional pre-sale demand

- Decline in net buying by retail investors and an increase in net buying by institutional investors on first day of trading
Comparing pre-regulation to post-regulation IPOs:

- No change in average underpricing
- Increase in expected returns
- Sharp decline the number of medium-sized IPOs
  - IPOs most affected by the new rules

Examining pre-market auction:
- Retail (institutional) investors use the auction to sell (buy) shares
Main Data

- 393 bookbuilt IPOs on the Bombay Stock Exchange (BSE) and the National Stock Exchange (NSE). 327 IPOs on the Small & Medium Enterprise (SME) exchange.

- **Prime** provides information on:
  - Offer prices, shares offered, subscription and allocation by investor type, number of managers, underwriter reputation, VC backing, firm age.

- **BSE** provides information on:
  - Pre-market auction trades by buyer and seller types.
  - Intraday trading prices, quantities, buyer and seller types.
  - Monthly returns for the 12 months following the IPO.

- **Prowess** provides accounting data:
  - Assets, liabilities, profits.
  - Daily returns data.

- **Other** FF value factors, Bloomberg, RBI.
Empirical Approach

- Propensity score matching to control for variables related to market, firm, and offer characteristics:
  - First stage, a probit regression of whether an IPO was conducted in the post-regulation period
  - Verify matched samples are similar across the set of relevant variables

- Return tests are based on estimates from a four-factor model
  - Market, size, value, and momentum
### Panel B: Matched sample comparisons

<table>
<thead>
<tr>
<th></th>
<th>Pre-regulation</th>
<th>Post-regulation</th>
<th>Difference</th>
<th>t-statistic</th>
<th>p-value</th>
<th>$\Delta x$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Market cap (bill 2017 INR)</td>
<td>142.52</td>
<td>83.07</td>
<td>-59.46</td>
<td>-1.86</td>
<td>(0.065)</td>
<td>-0.199</td>
</tr>
<tr>
<td>Fraction offered (%)</td>
<td>21.00</td>
<td>23.33</td>
<td>2.33</td>
<td>1.59</td>
<td>(0.114)</td>
<td>0.170</td>
</tr>
<tr>
<td>Offer price (INR)</td>
<td>386.08</td>
<td>358.05</td>
<td>-28.03</td>
<td>-0.73</td>
<td>(0.467)</td>
<td>-0.078</td>
</tr>
<tr>
<td>ROA (%)</td>
<td>7.80</td>
<td>7.78</td>
<td>-0.02</td>
<td>-0.02</td>
<td>(0.981)</td>
<td>-0.003</td>
</tr>
<tr>
<td>Debt-to-assets (%)</td>
<td>68.30</td>
<td>98.80</td>
<td>30.51</td>
<td>1.64</td>
<td>(0.102)</td>
<td>0.176</td>
</tr>
<tr>
<td>Market-to-book</td>
<td>3.20</td>
<td>3.04</td>
<td>-0.16</td>
<td>-0.43</td>
<td>(0.665)</td>
<td>-0.047</td>
</tr>
<tr>
<td>Firm age (years)</td>
<td>20.32</td>
<td>22.49</td>
<td>2.17</td>
<td>1.20</td>
<td>(0.232)</td>
<td>0.129</td>
</tr>
<tr>
<td>VC backed IPO dummy</td>
<td>24.14</td>
<td>20.69</td>
<td>-3.45</td>
<td>-0.54</td>
<td>(0.588)</td>
<td>-0.057</td>
</tr>
<tr>
<td>Reputable lead dummy</td>
<td>75.86</td>
<td>79.31</td>
<td>3.45</td>
<td>0.54</td>
<td>(0.588)</td>
<td>0.057</td>
</tr>
<tr>
<td>Number of managers</td>
<td>3.63</td>
<td>3.37</td>
<td>-0.26</td>
<td>-0.70</td>
<td>(0.486)</td>
<td>-0.075</td>
</tr>
<tr>
<td>S&amp;P CNX Nifty three-month return (%)</td>
<td>1.34</td>
<td>2.63</td>
<td>1.29</td>
<td>0.97</td>
<td>(0.332)</td>
<td>0.104</td>
</tr>
</tbody>
</table>
Hypothesis 1

- On the first day of trading after an IPO, we expect a lower variability of IPO prices in periods when price bands are in effect, relative to periods when price bands are not in effect.

- As a corollary, we expect the upside return potential of IPO stocks on the first day of trading to be lower when price bands are in effect, compared to periods when price bands are not in effect.

- **Findings:** Strong support for H1
Hypothesis 1 (continued)

- Decline in variability of IPO prices on first day of trading
Hypothesis 1 (Contd.)

<table>
<thead>
<tr>
<th></th>
<th>Pre-regulation</th>
<th>Post-regulation</th>
<th>Difference</th>
<th>t-statistic</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard deviation of 5-minute returns</td>
<td>1.05</td>
<td>0.76</td>
<td>−0.29</td>
<td>−3.56</td>
<td>(&lt;0.001)</td>
</tr>
<tr>
<td>High price / Open price</td>
<td>1.13</td>
<td>1.06</td>
<td>−0.08</td>
<td>−4.91</td>
<td>(&lt;0.001)</td>
</tr>
<tr>
<td>Low price / Open price</td>
<td>0.88</td>
<td>0.96</td>
<td>0.07</td>
<td>4.83</td>
<td>(&lt;0.001)</td>
</tr>
<tr>
<td>(High price – Low price) / Mid price (%)</td>
<td>25.39</td>
<td>9.78</td>
<td>−15.61</td>
<td>−8.49</td>
<td>(&lt;0.001)</td>
</tr>
<tr>
<td>High / Open &gt; 1.05 dummy (%)</td>
<td>72.41</td>
<td>43.68</td>
<td>−28.74</td>
<td>−3.99</td>
<td>(&lt;0.001)</td>
</tr>
<tr>
<td>High / Open &gt; 1.10 dummy (%)</td>
<td>40.23</td>
<td>17.24</td>
<td>−22.99</td>
<td>−3.44</td>
<td>(0.001)</td>
</tr>
<tr>
<td>High / Open &gt; 1.15 dummy (%)</td>
<td>34.48</td>
<td>11.49</td>
<td>−22.99</td>
<td>−3.72</td>
<td>(&lt;0.000)</td>
</tr>
<tr>
<td>High / Open &gt; 1.20 dummy (%)</td>
<td>19.54</td>
<td>0.00</td>
<td>−19.54</td>
<td>−4.57</td>
<td>(&lt;0.000)</td>
</tr>
</tbody>
</table>
Hypothesis 2

- We expect lower demand by retail investors for IPO stocks in periods when price bands are in effect, relative to periods when price bands are not in effect.

**Findings:** Strong support for H2
- Subscription multiples of retail investors declined from 9x to 4.7x.
- Subscription multiples of institutions also declined from 36.1x to 12.6x.
- Subscription multiples of high-net-worth individuals increased from 49x to 75x.
Hypothesis 2 (continued)

<table>
<thead>
<tr>
<th></th>
<th>Pre-regulation</th>
<th>Post-regulation</th>
<th>Difference</th>
<th>t-statistic</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Times subscribed:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Qualified institutional buyers</td>
<td>36.086</td>
<td>12.603</td>
<td>−23.483</td>
<td>−4.520</td>
<td>(&lt;0.001)</td>
</tr>
<tr>
<td>Retail investors</td>
<td>9.042</td>
<td>4.678</td>
<td>−4.364</td>
<td>−3.060</td>
<td>(0.003)</td>
</tr>
<tr>
<td>High-net-worth individuals</td>
<td>48.643</td>
<td>75.437</td>
<td>26.794</td>
<td>1.830</td>
<td>(0.069)</td>
</tr>
<tr>
<td>Employees</td>
<td>0.384</td>
<td>0.208</td>
<td>−0.176</td>
<td>−2.270</td>
<td>(0.024)</td>
</tr>
<tr>
<td>Existing shareholders</td>
<td>0.038</td>
<td>0.171</td>
<td>0.133</td>
<td>0.920</td>
<td>(0.357)</td>
</tr>
<tr>
<td>All investors</td>
<td>28.613</td>
<td>18.970</td>
<td>−9.643</td>
<td>−2.080</td>
<td>(0.039)</td>
</tr>
<tr>
<td>All investors</td>
<td>100.000</td>
<td>100.000</td>
<td>0.000</td>
<td>0.000</td>
<td>(1.000)</td>
</tr>
</tbody>
</table>
Hypothesis 3

- In the IPO aftermarket on the first day of trading, we expect less net buying by retail investors in periods when price bands are in effect, relative to periods when price bands are not in effect.

- As a corollary, we expect more net buying by institutional investors in periods when price bands are in effect, relative to periods when price bands are not in effect.

- **Findings:** Strong support for H3
Hypothesis 3 (continued)

<table>
<thead>
<tr>
<th>Panel B: Buy and sell volume, percent by investor type</th>
<th>Pre-regulation</th>
<th>Post-regulation</th>
<th>Difference</th>
<th>t-statistic</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Buy volume (% of total)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Institutional investors</td>
<td>8.502</td>
<td>24.194</td>
<td>15.692</td>
<td>5.520</td>
<td>(&lt;0.001)</td>
</tr>
<tr>
<td>Individual investors</td>
<td>50.239</td>
<td>36.003</td>
<td>-14.236</td>
<td>-6.800</td>
<td>(&lt;0.001)</td>
</tr>
<tr>
<td>Non-individual investors</td>
<td>40.841</td>
<td>34.499</td>
<td>-6.342</td>
<td>-2.330</td>
<td>(0.021)</td>
</tr>
<tr>
<td>Other</td>
<td>0.419</td>
<td>5.304</td>
<td>4.885</td>
<td>2.250</td>
<td>(0.025)</td>
</tr>
<tr>
<td><strong>Sell volume (% of total)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Institutional investors</td>
<td>16.156</td>
<td>14.911</td>
<td>-1.245</td>
<td>-0.430</td>
<td>(0.670)</td>
</tr>
<tr>
<td>Individual investors</td>
<td>49.059</td>
<td>52.056</td>
<td>2.997</td>
<td>1.370</td>
<td>(0.171)</td>
</tr>
<tr>
<td>Non-individual investors</td>
<td>34.298</td>
<td>28.152</td>
<td>-6.146</td>
<td>-2.260</td>
<td>(0.025)</td>
</tr>
<tr>
<td>Other</td>
<td>0.487</td>
<td>4.881</td>
<td>4.394</td>
<td>2.070</td>
<td>(0.040)</td>
</tr>
<tr>
<td><strong>Difference (% of total)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Institutional investors</td>
<td>7.655</td>
<td>-9.282</td>
<td>-16.937</td>
<td>-4.270</td>
<td>(&lt;0.001)</td>
</tr>
<tr>
<td>Individual investors</td>
<td>-1.180</td>
<td>16.053</td>
<td>17.233</td>
<td>7.510</td>
<td>(&lt;0.001)</td>
</tr>
<tr>
<td>Non-individual investors</td>
<td>-6.543</td>
<td>-6.347</td>
<td>0.196</td>
<td>0.060</td>
<td>(0.953)</td>
</tr>
<tr>
<td>Other</td>
<td>0.068</td>
<td>-0.423</td>
<td>-0.491</td>
<td>-1.210</td>
<td>(0.227)</td>
</tr>
</tbody>
</table>
Hypothesis 4A

- We expect lower first-day IPO returns in periods when price bands are in effect, relative to periods when price bands are not in effect.

**Findings:**
- We do not find significant differences in IPO underpricing between the two periods.
Hypothesis 4B

- We expect lower market prices, and thus higher subsequent returns, of freshly listed IPO stocks in periods when price bands are in effect, relative to periods when price bands are not in effect.

Findings: Strong support for H 4B

- Pre-regulation, IPO stocks deliver a monthly alpha of -1.2% over the first year after IPO.
- Post-regulation, IPO stocks deliver a monthly alpha of +1.5% over the first year after IPO.
- Consistent with an increase in expected return post regulation.
Hypothesis 4B (continued)

\[ R_{p,t} - R_{f} = \alpha + \beta_{MKT} \left( R_{MKT,t} - R_{f} \right) + \beta_{SMB} R_{SMB,t} + \beta_{HML} R_{HML,t} + \beta_{MOM} R_{MOM,t} + u_{i,t} \]

<table>
<thead>
<tr>
<th></th>
<th>Pre-regulation</th>
<th>Post-regulation</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \alpha )</td>
<td>-0.012**</td>
<td>0.015*</td>
<td>0.027***</td>
</tr>
<tr>
<td></td>
<td>(-2.577)</td>
<td>(1.736)</td>
<td>(2.802)</td>
</tr>
<tr>
<td>( \beta_{MKT} )</td>
<td>1.033***</td>
<td>1.127***</td>
<td>0.094</td>
</tr>
<tr>
<td></td>
<td>(15.926)</td>
<td>(4.930)</td>
<td>(0.453)</td>
</tr>
<tr>
<td>( \beta_{SMB} )</td>
<td>0.842***</td>
<td>0.507**</td>
<td>-0.335</td>
</tr>
<tr>
<td></td>
<td>(6.890)</td>
<td>(2.243)</td>
<td>(-1.329)</td>
</tr>
<tr>
<td>( \beta_{HML} )</td>
<td>0.296***</td>
<td>0.060</td>
<td>-0.236</td>
</tr>
<tr>
<td></td>
<td>(3.324)</td>
<td>(0.360)</td>
<td>(-1.269)</td>
</tr>
<tr>
<td>( \beta_{MOM} )</td>
<td>-0.194***</td>
<td>-0.115</td>
<td>0.079</td>
</tr>
<tr>
<td></td>
<td>(-2.666)</td>
<td>(-0.653)</td>
<td>(0.446)</td>
</tr>
</tbody>
</table>

Observations: 82
Adjusted R-squared (%): 86.88
Hypothesis 5

• For IPOs most affected by the new price band rules, we expect fewer IPOs in periods when price bands are in effect, relative to periods when price bands are not in effect

Findings:
• Pre-Regulation IPO %age below INR 2.5 Billion = 71%
• Post-Regulation IPO %age below INR 2.5 Billion = 21%
• Not explained by the active IPO market of Small and Medium Enterprises
Hypothesis 5 (continued)

Percent IPOs with proceeds below 2.5 billion INR

- 2006-2007: 71%
- 2012-2013: 21%
- 2016-2017: approximate decrease trend
Hypothesis 5 (continued)

Kernel density of IPO proceeds by exchange

- Main (pre-regulation)
- Main (post-regulation)
- SME

Proceeds (million INR), log_{10} scale
Conclusion

- Price restrictions on IPO stocks *reduced price variability* and the short-term *upside potential* for investors, limiting their ability to gamble
- Leading to a significant decline in the subscription rate and the net buying by retail investors
- No significant change in IPO underpricing
- An increase in expected returns
- A disappearance of medium-sized IPOs in the Indian equity markets
  - IPOs most affected by the new rules on the main exchanges
  - Not picked up by SME

Reduced participation of speculative investors likely leads to a significant increase in the firm’s cost of capital and a possible reduction in the incentives of firms to sell their equity to public investors
REFERENCE SLIDES
Why Initial Public Offerings?

- IPOs are particularly suited for our analysis

- IPO prices are highly volatile in the initial days of trading
  - Also noted by SEBI when introducing the price limits
  - ... and verified within our sample

- Green and Hwang (2012) point out that IPO stocks in the initial days of trading are attractive to investors with a preference for lottery-like payoffs
Selected Literature

- Limited availability of public information resulting in price variability of IPOs:
  - Miller and Reilly (1987) and Asquith, Jones and Kieschnick (1998)

- Investor Demand for assets delivering high payoffs but low profitability:
  - Green and Hwang (2012)
  - Kumar (2009)
Price Discovery under new regulations

A Pre-Trading Session is conducted as a call auction for 60 minutes.

Trade orders are entered starting 9:00 AM.

The process is stopped randomly between 9:44 AM and 9:45 AM.

Equilibrium prices are determined between 9:45 AM and 9:55 AM.

9:55 AM to 10:00 AM is for ensuring a timely start.

Trading session commences at 10:00 AM with the open price equal to the equilibrium price of the pre-trading session.
Regulatory settings (SEBI Ruling)

- In response to high volatility and price movements on initial days of trading, SEBI passed a norm for predetermined IPO price-bands for ten trading days post listing.

- The daily returns are bound within ±5% for IPOs below INR 2.5 Billion and within ±20% for IPOs above INR 2.5 Billion.

- **In order to facilitate price discovery:**
  - A Pre-Trading Session is conducted as a call auction for 60 minutes
  - Trade orders are entered starting 9:00 AM
  - The process is stopped randomly between 9:44 AM and 9:45 AM
  - Equilibrium prices are determined between 9:45 AM and 9:55 AM
  - 9:55 AM to 10:00 AM is for ensuring a timely start
  - Trading session commences at 10:00 AM with the open price equal to the equilibrium price of the pre-trading session
Variables Used

Firm Financials
- Market Cap
- Return On Assets
- Debt to Assets
- Market to Book

IPO
- Offer Amount
- Offer Price
- Fraction Offered

Firm Details
- Age
- VC Backed
- Reputable Lead
- Number of Managers

Market Conditions
- S&P CNX NIFTY 3-Month Return
Sources of Data

**RBI**: 91-day T-bill rate

**BSE**: Time Stamp
- Price
- Quantity Traded
- Type of investors
- Daily Returns

**Prime**: Offer Price
- Shares Offered
- Underwriter reputation
- Number of managers
- VC Backing
- Number of shares

**Bloomberg**: Market Conditions
- Offer Price
- Shares Offered
- Underwriter reputation
- Number of managers
- VC Backing
- Number of shares

**Prowess**: Total Assets
- Total Liabilities
- Net Income
- Daily Returns

- 431 IPOs from BSE and NSE
- 393 Book-building and 38 Fixed Priced
- 568 Book-building and 53 Fixed Priced
- Bloomberg: Market Conditions
- CMIE
Hypotheses

Under the price band regulations (relative to periods when price bands are not in effect):

1. On the first day of trading after an IPO, a lower variation in IPO prices are expected
2. Lower demand of IPO stocks among retail investors is expected
3. Less net buying by retail investors is expected
4A. Lower first day IPO returns are expected
4B. Higher subsequent returns are expected for freshly listed IPO Stocks
5. Fewer IPOs are expected
<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Std. dev.</th>
<th>1st quartile</th>
<th>Median</th>
<th>3rd quartile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Market cap (bill 2017 INR)</td>
<td>55.49</td>
<td>129.25</td>
<td>4.50</td>
<td>12.20</td>
<td>39.01</td>
</tr>
<tr>
<td>Fraction offered (%)</td>
<td>26.40</td>
<td>11.18</td>
<td>18.18</td>
<td>25.37</td>
<td>32.35</td>
</tr>
<tr>
<td>Offer amount (bill 2017 INR)</td>
<td>8.76</td>
<td>17.77</td>
<td>1.38</td>
<td>2.92</td>
<td>7.68</td>
</tr>
<tr>
<td>Offer price (INR)</td>
<td>249.35</td>
<td>228.94</td>
<td>91.00</td>
<td>170.00</td>
<td>320.00</td>
</tr>
<tr>
<td>ROA (%)</td>
<td>7.56</td>
<td>7.00</td>
<td>3.01</td>
<td>6.71</td>
<td>10.63</td>
</tr>
<tr>
<td>Debt-to-assets (%)</td>
<td>84.35</td>
<td>125.96</td>
<td>12.19</td>
<td>41.30</td>
<td>84.04</td>
</tr>
<tr>
<td>Market-to-book</td>
<td>2.38</td>
<td>2.05</td>
<td>1.19</td>
<td>1.69</td>
<td>2.77</td>
</tr>
<tr>
<td>Firm age (years)</td>
<td>24.75</td>
<td>13.75</td>
<td>17.00</td>
<td>23.00</td>
<td>28.00</td>
</tr>
<tr>
<td>VC backed IPO dummy</td>
<td>0.12</td>
<td>0.32</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Reputable lead dummy</td>
<td>0.55</td>
<td>0.50</td>
<td>0.00</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Number of managers</td>
<td>2.46</td>
<td>1.75</td>
<td>1.00</td>
<td>2.00</td>
<td>3.00</td>
</tr>
<tr>
<td>S&amp;P CNX Nifty 3-month return (%)</td>
<td>4.30</td>
<td>10.50</td>
<td>-3.40</td>
<td>4.00</td>
<td>12.30</td>
</tr>
</tbody>
</table>
Testing the First Hypothesis

Price Variability (steps)

- New Rules have imposed significant restrictions on price variability of IPO Stocks
- Steep Drop in daily high prices relative to open prices post 2012
- Plotting Cross Sectional Kernel Density of returns from open to close on first day of trading
- Examining the variability of IPO stock prices on first day of trading
- Are new regulations restrictive enough to affect price movements?
- Plotting the ratio of daily prices to open prices on first day of trading
## Probit Regression Results

<table>
<thead>
<tr>
<th>Dependent variable is whether an IPO was conducted post-regulation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Intercept</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Market cap (2017 INR, log)</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Fraction offered (%)</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Offer price (INR, log)</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>ROA (%)</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Debt-to-assets (%)</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Market-to-book</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Firm age (years, log)</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>VC backed IPO dummy</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Reputable lead dummy</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Number of managers (log)</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>S&amp;P CNX Nifty three-month return (%)</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Observations</strong></td>
</tr>
<tr>
<td><strong>Pseudo R-squared (%)</strong></td>
</tr>
</tbody>
</table>
Testing the first hypothesis (additional)

To examine this possibility of subsequent volatility spillover effects:

- we calculate the cross-sectional standard deviations of daily returns over the first 30 trading days in the post-IPO period.
- **Some increase in return volatility** on the 11\(^{th}\) trading day is observed after the price bands are removed but the increase in volatility is relatively **small and short-lived** as volatility declines again
- Uncertainty about the IPO firm has also declined and hence, opportunities for speculative trading have also declined.

![Standard deviation of daily returns after IPO](image)
Investor Trading Behavior

**Pre-Regulation**
- Trades per minute = 502
- Shares Traded/Shares Offered per Minute = 0.438%
- Shares Traded/Shares outstanding per minute = 0.1%

**Post-Regulation**
- Trades per minute = 247
- Shares Traded/Shares Offered per Minute = 0.05%
- Shares Traded/Shares outstanding per minute = 0.01%
## Testing the third hypothesis

<table>
<thead>
<tr>
<th>Panel A: Overall trading activity</th>
<th>Pre-regulation</th>
<th>Post-regulation</th>
<th>Difference</th>
<th>t-statistic</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of trades per minute</td>
<td>502.540</td>
<td>246.850</td>
<td>– 255.690</td>
<td>– 5.530</td>
<td>(&lt;0.001)</td>
</tr>
<tr>
<td>Shares traded / shares offered per minute (%)</td>
<td>0.438</td>
<td>0.051</td>
<td>– 0.387</td>
<td>– 9.350</td>
<td>(&lt;0.001)</td>
</tr>
<tr>
<td>Shares traded / shares outstanding per minute (%)</td>
<td>0.107</td>
<td>0.011</td>
<td>– 0.096</td>
<td>– 7.080</td>
<td>(&lt;0.001)</td>
</tr>
</tbody>
</table>
Investor Trading Behavior

**Institutional Investors post-regulation**
- Buying volume has increased from 8.5% to 24.2%
- Selling volume is stable at 15%
- Net Selling 7.7% to Net Buying 9.3%

**Individual Investors post-regulation**
- Buying volume has declined from 50.2% to 36%
- Selling volume has increased from 47.1% to 52.1%
- Stable net position to Net Selling 16.3%

**Non-Individual Investors post-regulation**
- Buying volume has declined from 41% to 34.5%
- Selling volume has declined from 34.2% to 28.1%
- Net Selling stable around 6.4%

**Other Investors post-regulation**
- Buying volume increased from 0.4% to 5.3%
- Selling volume increased from 0.5% to 4.9%
- Net Buying 0.07% to Net Selling 0.42%
Institutional Investors post-regulation:
- Buying volume has increased from 8.5% to 24.2%
- Selling volume is stable at 15%
- Net Selling 7.7% to Net Buying 9.3%

Individual Investors post-regulation:
- Buying volume has declined from 50.2% to 36%
- Selling volume has increased from 47.1% to 52.1%
- Stable net position to Net Selling 16.3%

Non-Individual Investors post-regulation:
- Buying volume has declined from 41% to 34.5%
- Selling Volume has declined from 34.2% to 28.1%
- Net Selling stable around 6.4%

Other Investors post-regulation:
- Buying volume increased from 0.4% to 5.3%
- Selling volume increased from 0.5% to 4.9%
- Net Buying 0.07% to Net Selling 0.42%
## Testing the fourth hypothesis

<table>
<thead>
<tr>
<th></th>
<th>Pre-regulation</th>
<th>Post-regulation</th>
<th>Difference</th>
<th>t-statistic</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Unmatched samples</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Open price / Offer price – 1 (%)</strong></td>
<td>15.041</td>
<td>11.528</td>
<td>–3.513</td>
<td>–1.358</td>
<td>(0.175)</td>
</tr>
<tr>
<td><strong>Close price / Offer price – 1 (%)</strong></td>
<td>19.511</td>
<td>12.483</td>
<td>–7.028</td>
<td>–1.522</td>
<td>(0.129)</td>
</tr>
<tr>
<td><strong>Matched samples</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Open price / Offer price – 1 (%)</strong></td>
<td>14.205</td>
<td>10.900</td>
<td>–3.305</td>
<td>–1.080</td>
<td>(0.282)</td>
</tr>
<tr>
<td><strong>Close price / Offer price – 1 (%)</strong></td>
<td>12.714</td>
<td>11.956</td>
<td>–0.758</td>
<td>–0.190</td>
<td>(0.852)</td>
</tr>
</tbody>
</table>
First Day IPO Returns

Hypothesis 4:

- Offer-to-Open Returns = 15%
- Offer-to-Close Returns = 19.5%

- Offer-to-Open Returns = 11.5%
- Offer-to-Close Returns = 12.5%

Standard deviation of daily returns after IPO:

- Pre-regulation
- Post-regulation

Trading days after IPO:

0 5 10 15 20 25 30

Standard deviation (%):

0 5 10 15 20 25 30 35
One-Year Returns

Testing the Fourth Hypothesis

Monthly Alpha = 1.5%
Annualized Excess Return = 19.5%

Pre Regulation

Monthly Alpha = -1.2%
Annualized Excess Return = -13.5%

Post-Regulation
Impact on size of IPOs

Testing the Fifth Hypothesis

Significant Drop in Medium-Sized IPOs
Pre-Regulation IPO %age below INR 2.5 Billion= 71%
Post-Regulation IPO %age below INR 2.5 Billion= 21%

Firms face reduced valuations post-IPO
Hence, they choose to remain private

SME Exchange was highly active
327 IPOs over the period of 2012-2017.
Hypothesis 5(Contd.)

<table>
<thead>
<tr>
<th>Period</th>
<th>All IPOs</th>
<th>IPOs (proceeds &lt; INR 2.5bill)</th>
<th>IPOs (proceeds ≥ INR 2.5bill)</th>
<th>Percent IPOs (proceeds &lt; INR 2.5bill)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006-2007</td>
<td>143</td>
<td>107</td>
<td>36</td>
<td>75%</td>
</tr>
<tr>
<td>2008-2009</td>
<td>52</td>
<td>36</td>
<td>16</td>
<td>69%</td>
</tr>
<tr>
<td>2010-2011</td>
<td>102</td>
<td>68</td>
<td>34</td>
<td>67%</td>
</tr>
<tr>
<td>2012-2013</td>
<td>14</td>
<td>8</td>
<td>6</td>
<td>57%</td>
</tr>
<tr>
<td>2014-2015</td>
<td>25</td>
<td>6</td>
<td>19</td>
<td>24%</td>
</tr>
<tr>
<td>2016-2017</td>
<td>57</td>
<td>6</td>
<td>51</td>
<td>11%</td>
</tr>
</tbody>
</table>

- Post regulation, there is a sharp decline in IPOs raising below INR 2.5 billion and listing on the main exchanges.
- A sample of IPOs that listed on the SME exchange over the 2012-2017 period. With 327 IPOs, the SME exchange was highly active over that period. All these IPOs raised proceeds lower than INR 2.5 billion. Thus, there is no shortage of relatively smaller firms willing to go public in more
Significant decline in price variability of IPO Stocks on first trading day
Retail Demand of IPO Stocks has decreased significantly
Significant drop in net buying by retail investors
Significantly higher Expected Returns
Sharp decline in medium-sized IPOs

Results