Discussion of
External Equity Financing Shocks, Financial Flows, and Asset Prices
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Context: External financing, investment, macro-economy

- Interaction between firm financing, corporate investment and savings decisions, and the macroeconomy
  - Bernanke and Gertler (88), Kiyotaki and Moore (97), Bernanke, Gertler, Gilchrist (99)
  - Jermann and Quadrini (12), Covas and den Haan (14), Khan and Thomas (14)
- Financial crisis hindered external financing, corporate investment, employment. But debate about importance of external financing frictions
  - Empirical corporate: work on causal effects of shocks to supply of credit: Chodorow-Reich (13), Ivashina and Scharfstein (12), vs. Paravisini et al. (12)
  - Macro: importance for business cycle fluctuations: Justiano et al. (10), Christiano et al. (10), Hall (11), Gilchrist and Zakrajsek (12) vs. Chari et al. (07, 08)
- **Contribution**: learning about role of financial friction from firms’ investment and financing choices, and **asset prices**
  - Similar in spirit to Bolton, Chen, and Wang (13), Riddick and Whited (14), Eisfeldt and Muir (14), Begenau and Salamao (14)
What the paper does

1. Proposes a measure of the direct and indirect costs of raising external equity: fraction of firms that have positive net equity issuance
   - In model, the % raised fraction is positively correlated with shock to cost of equity financing (30%)

2. Innovation in cost of raising external equity (Issuance Cost Shock) is priced source of risk
   - Heterogeneous exposure to ICS accounts for value premium, small firm premium, investment rate anomaly, returns on portfolios sorted by change in debt and equity issuance

3. Develops a neoclassical production model with shocks to the cost of raising external equity and collateral constraints
   - Model quantitatively replicates cross-sectional asset pricing patterns
Model

- Standard neoclassical production-based asset pricing model in Cochrane-Jermann-Zhang tradition with
  - Decreasing returns to scale in production
  - Permanent aggregate and persistent idiosyncratic productivity shocks
  - Convex, asymmetric adjustment costs to capital (Zhang 05)
  - Fixed operating costs (Zhang 05, Bazdrech, Belo, Lin 13)

- External debt issuance:
  - Collateral constraint, $B_{t+1} \leq \varphi K_{t+1}$
  - Convex, symmetric adjustment cost to debt
  - Debt is tax advantaged

- External equity issuance:
  - **Stochastic** equity issuance cost:
    $\Psi(H_t) = (\eta_0 X_t + \eta_1 H_t) \exp(-\eta_2 \xi_t) \mathcal{I}_{H_t>0}$
  - ICS $\xi_t$ is aggregate shock, persistent
  - High $\xi_t$ realization, low aggregate cost of external equity issuance
Main insight

- After a negative issuance cost shock ($\xi_t$), more costly to raise equity and equity market is frozen for almost all firms

- But productive firms can *switch to debt financing* - their collateral value $K$ is high so they can borrow

- Productive firms increase their investment today; future dividends increase; their returns increase today

- *Financial flexibility* makes productive firms less exposed to ICS shocks

- Because positive ICS are good news for the stand-in investor, the price of ICS risk is positive $\Rightarrow$ productive firms have low average returns

- Productive firms tend to be: growth firms, large firms, high investment rate firms, high debt-issuance firms, high equity-issuance firms
Calibration

- Model delivers impressive fit:
  - Five cross-sectional return spreads
  - Equity risk premium, Sharpe ratio, risk-free rate
  - Volatility of aggregate profits and equity issuance-to-capital ratio
  - First four moments of firm-level investment
  - Firm financial leverage, persistence of leverage, vol of debt growth, and frequency of equity issuance

- Some important parameter choices:
  - Volatile and persistent $\xi$ shock
  - Large, positive prices of risk for both shocks $\gamma_x, \gamma_\xi$
  - Sufficient borrowing capacity $\varphi$
  - Only downward capital adjustment costs: $c_k^+ = 0$
    - Otherwise productive firms finance too much with debt, not enough with equity compared to unproductive firms
Outline of discussion

1. What does ICS proxy for?
   - Cost of raising external equity and debt?
   - Cost of repurchasing equity?
   - Cost of holding cash?
   - Future investment opportunities?

2. Inspecting the substitution hypothesis
   - Do productive firms actually substitute between debt and equity?
   - Too much equity-financed investment?
   - Cyclical properties of debt and equity issuance for large and small firms?

3. Market price of ICS risk

4. Embarrassment of riches?
External finance proxy: what we learn from paper

- Proxy for cost of raising external equity: fraction of firms raising (net) equity
  - Issuance cost shock (ICS) extracted from expanding-window VAR
  - Positive ICS $\rightarrow$ lower cost of external funding
  - ICS interpreted as shock originating in financial sector or wedge between value of firm to outside investor and inside managers (possibly driven by market sentiment as in Baker and Wurgler)

- ICS **not** a cyclical variable: weakly correlated with contemporaneous TFP shocks, GDP and consumption growth

- ICS **not** proxy for investment-specific technology shocks (Papanikolaou, 11) or labor adjustment cost shocks (Belo, Bazdreh, Lin, 13), exposure to which has been linked to the value premium before

- Not enough to have a TFP shock that is amplified by financial sector, otherwise (conditional) CAPM would hold
External finance proxy: what does it proxy for?

- Is ICS proxy for cost of raising equity or for the **cost of raising external financing (debt+equity)**?

- How correlated are ICS with shocks to the cost of raising external debt?
  - Default spread, tightening lending standards, consumer sentiment, credit shocks in Jermann and Quadrini (12)

- Implications for how to model adjustment cost of external debt, currently modeled as state uncontingent (independent of $\xi_t$)
  - Optimal debt issuance policy will depend indirectly on $\xi_t$
  - How well does model fit cyclicality of aggregate debt issuance and its correlation with aggregate equity issuance?
  - How well does model fit cross-sectional patterns in debt issuance?
External finance proxy: what does it proxy for?

- Is ICS proxy for cost of raising new equity or **benefit of share repurchases and dividend payouts**?
  - Net equity issuance = gross equity issuance – share repurchases – dividends
  - Aggregate gross equity issuance, dividend payouts, and share repurchases are all positively correlated and pro-cyclical
  - How much of fluctuations in ICS are driven by share repurchases and dividend payouts vs. gross issuance in the data?
  - Is model consistent this decomposition?

- How different would results be if we measured cost of raising external equity as % firms with positive **gross** equity issuance?
  - In data
  - How much higher would correlation be in model between $\xi_t$ and % raising gross equity?
External finance proxy: what does it proxy for?

- Is ICS proxy for **cost of holding cash**?
  - Eisfeldt and Muir (14) argue that firms will raise cash for rainy day by issuing equity or debt when it is cheap to do so
  - Their measure of cost of external finance is XS correlation between external financed raised and liquidity accumulation
  - High correlation of that measure with % of firms raising external financing (next slide)

- Model here has no cash inside the firm
  - Cannot capture that improved external financing conditions lower precautionary demand for cash buffers
  - This mechanism generates more share repurchases when share prices are high (Bolton, Chen, and Wang 13, Ditmar and Ditmar 08)
  - How does absence of cash affect model’s ability to match data on gross equity issuance, dividend payouts+share repurchases when firms hold a lot of cash?
Percent raising and Eisfeldt-Muir measure

Correlation in levels is 0.8; in first differences 0.5.
External finance proxy: what does it proxy for?

- ICS proxy for shocks to **future investment opportunities**?

- Alternative model:
  - Debt and equity adjustment costs state-uncontingent
  - $\xi$ shock to expected future productivity
  - Naturally, $\xi$ shocks would carry positive prices of risk
  - Value firms more exposed to shocks to future macro-economic conditions/medium term growth prospects, for example because downward adjustment costs to capital

- Consistent with Koijen, Lustig, and Van Nieuwerburgh (13) who show that
  - Value firms are more exposed to shocks that signal future economic growth prospects, shock to bond risk premium (CP 05)
  - Value firms' cash flows suffer more in protracted recessions

- Consistent with evidence on ICS shocks predicting future consumption growth

- Need to distinguish this from financial frictions explanation!
Inspecting the substitutability mechanism

- Paper predicts that high productivity firms should switch to debt financing when equity issuance is costly. Do they?

- Table compares **High** and **Low** investment rate firms for different ICS values

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<th>Panel A: Data</th>
<th>Panel B: Model (VAR ICS)</th>
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<td>L</td>
<td>H</td>
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<tr>
<td><strong>Low ICS years = external equity costs high</strong></td>
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<tr>
<td>Net Equity Iss.</td>
<td>0.01</td>
<td><strong>1.24</strong></td>
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<tr>
<td>Net Debt Iss.</td>
<td>-7.22</td>
<td><strong>41.91</strong></td>
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<td><strong>Mid ICS years</strong></td>
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<tr>
<td>Net Equity Iss.</td>
<td>-0.11</td>
<td>1.88</td>
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<tr>
<td>Net Debt Iss.</td>
<td>-9.19</td>
<td><strong>33.22</strong></td>
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<td><strong>High ICS years = external equity costs low</strong></td>
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<tr>
<td>Net Equity Iss.</td>
<td>-0.15</td>
<td><strong>2.33</strong></td>
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<tr>
<td>Net Debt Iss.</td>
<td>-10.65</td>
<td><strong>21.51</strong></td>
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Inspecting the substitutability mechanism: too much equity-financed investment?

- Productive firms substitute debt for equity when raising external equity becomes cheaper

- Substitution seems smaller in model than in data
  - Table 6 also suggests too much correlation between debt and equity issuance: high debt-issuance firms issue too much equity and high equity-issuance firms issue too much debt, on average, in model relative to data

- Productive firms issue too much equity in the model, on average
  - Seems like model may generate too much correlation between investment and equity issuance (-0.15 in aggregate)
  - Can increase in debt capacity parameter $\varphi$ lower equity issuance for productive firms, increase correlation between investment and debt issuance, and increase substitution between debt and equity?
  - But recall that when productive firms invest less with equity/more with debt than unproductive firms, return spreads flips
Inspecting the substitutability mechanism: cyclicality

- In aggregate, firms’ debt issuance is pro-cyclical and equity issuance is counter-cyclical: corporate sector substitutes between debt and equity over the business cycle (Jermann and Quadrini 11)

- Aggregate pattern is driven by large firms who substitute; small firms have pro-cyclical debt and equity issuance (Begenau and Salomao 14)

- Can model with acyclical $\xi$ shocks match these facts?
  - Is equity issuance pro-cyclical for small firms but counter-cyclical for large firms?
  - Is debt issuance pro-cyclical for both large and small firms?
  - Do large firms have negative equity issuance and positive debt issuance on average?
  - Do small firms issue both equity and debt on average?
Market price of ICS risk

- Model does a good job matching the average return spreads and the failure of the CAPM to account for these.
- But, the difference in ICS betas between high-low portfolios is order of magnitude too small.
- Example: value-growth has ICS beta of 2.0 in data and 0.2 in the model.
- \( \lambda_\xi \) that is required to fit average return spreads is 10 times larger than in data.
- ICS shock volatility is 11% per year in model and 5% in data.
- Makes market price of risk \( \gamma_\xi \) still 5 times too large.
- How sensible are these market prices of risk?
Market price of ICS risk

- In equilibrium, why does the stand-in investor require compensation for ICS risk and how large?

- Earlier: if ICS is proxy for future investment opportunities and EZ preferences, would get positive and could get potentially large $\gamma_\xi$

- If ICS is proxy for financial frictions relating to raising external equity, why marginal utility high when these costs are high?
  - Natural framework is intermediary-based asset pricing model with equity constraint (He and Krishnamurty, 13)
  - MU of stand-in agent decreases in net worth of intermediary sector
  - Raising equity would be more costly when intermediary capital is low
  - But note that this model only has one aggregate shock, which the financial sector friction amplifies, not a separate shock that hits intermediary sector
  - What is this shock? Regulatory changes? Uncertainty regarding government bailouts? Shocks to payoffs of assets only intermediaries hold?

- Would be nice to integrate firm financing and investment problem with intermediary-based SDF model in future!
Embarrassment of riches?

- Multiple two-factor models that account for excess return patterns in cross-section and the failure of the CAPM to explain them
- Even within class of production-based asset pricing models
  - Investment-specific technological change (Fischer, Pappanikolaou, Kogan and Papanikolau)
  - Stochastic adjustment costs to labor and capital (Bazdrech, Belo, and Lin)
  - Cost of raising external equity/debt (Belo, Lin, and Fang)
- What are the different implications of these models? Is there a workable meta-model that nests them?
- What test assets would allow us to distinguish between them?
Conclusion

- Ambitious paper with impressive quantitative results

- More guidance on what the ICS captures; distinguish it from future investment opportunities

- More checking of model implications for how much investment is financed with debt vs. equity in aggregate and across firms

- More justification for market price of risk parameter choice, possibly informed by intermediary-based AP literature

- More explanation of whether this is alternative or complementary explanation to return anomalies