

Discussion of

# **External Equity Financing Shocks, Financial Flows, and Asset Prices**

by Frederico Belo, Xiaoji Lin, and Fan Yang

Stijn Van Nieuwerburgh  
NYU Stern

May 31, 2014

## 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, Bazdreh, 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 (low  $\xi_t$ ), 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 → 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, Bazdrech, 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 cyclicalities of aggregate debt issuance and its correlation with aggregate equity issuance?
  - ▶ How well does model fit cross-sectional patterns in debt issuance?

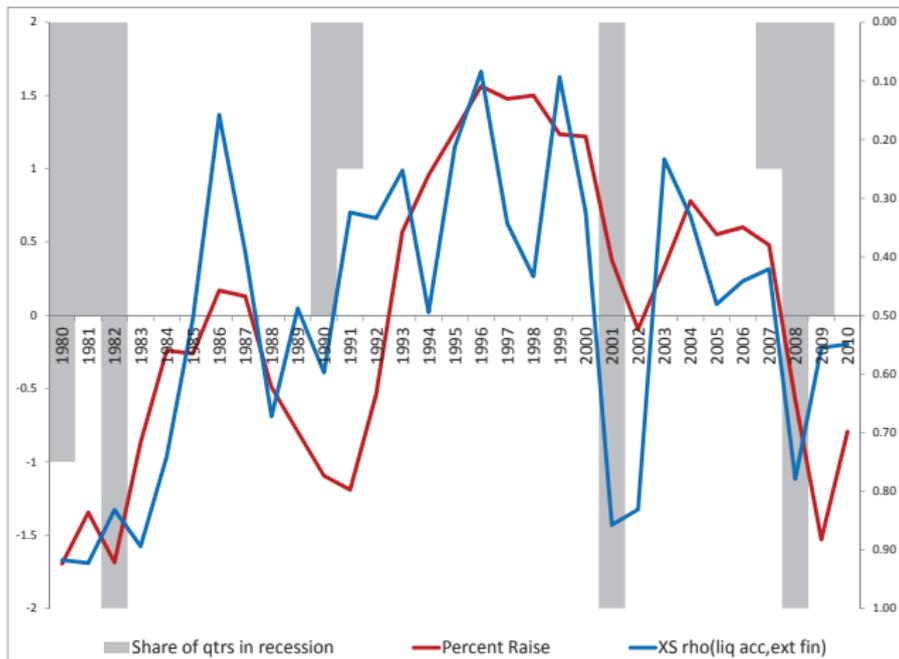
## External finance proxy: what does it proxy for?

- ▶ 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 Kojien, 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 **H**igh and **L**ow investment rate firms for different ICS values

	Panel A: Data		Panel B: Model (VAR ICS)	
	L	H	L	H
Low ICS years = external equity costs high				
Net Equity Iss.	0.01	1.24	-4.49	10.67
Net Debt Iss.	-7.22	41.91	-20.44	40.70
Mid ICS years				
Net Equity Iss.	-0.11	1.88	-3.7	13.10
Net Debt Iss.	-9.19	33.22	-18.8	35.22
High ICS years = external equity costs low				
Net Equity Iss.	-0.15	2.33	-1.48	28.58
Net Debt Iss.	-10.65	21.51	-18.33	37.47

# 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: cyclicity

- ▶ 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, Papanikolaou, Kogan and Papanikolaou)
  - ▶ 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