*discussion of*

# Is Bank Debt Special for the transmission of Monetary Policy? Evidence from the Stock Market

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# Outline

# Objective

Empirical paper

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Bank-lending channell vs. interest rate pass-trough channel

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new datasets (nests balance sheet data and financial market data).

# Major comments /1

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the original idea of Bernanke and Kuttner was ($r$ is the unexpected change in policy rate and $S$ is the stock market index)

$$\Delta r \Rightarrow \Delta S/S$$

but bot variables are daily. This paper idea is

$$\Delta r \cup \textit{leverage} \Rightarrow \Delta S/S$$

but you have some proble since the EMH may not hold, i.e.

$$S_t = E(S_{t+1}|I_t)$$

as you miss some information (for example a December FOMC meeting with balance-sheet data of the previous fiscal year, almost one year of information is missing)

# Major comments /2

3 There is some missing link in the empirical part (see levered betas and cross sectional variation of stocks, a tenet in asset pricing )

# Outline

# Leverage, Business risk vs Financial risk

Financial leverage is the use of debt and preferred stock.

Financial risk is the additional risk concentrated on common stockholders as a result of financial leverage – more interest expense (fixed expense)

Business risk depends on business factors such as competition, product liability, and operating leverage.

Financial risk depends only on the types of securities issued to finance the business.

- More debt, more financial risk.
- Concentrates business risk on stockholders.

# An example: Illustrating effects of financial leverage /1

Two firms with the same operating leverage, business risk, and probability distribution of EBIT.
Only differ with respect to their use of debt (capital structure).

| Unlevered firm (U) | Levered firm (L) |
|---|---|
| No debt | €10,000 of 12% debt |
| €20,000 in Assets | €20,000 in Assets |
| 40% tax rate | 40% tax rate |

# An example: Illustrating effects of financial leverage /2

| Unlevered firm | | | | Levered firm | | |
|---|---|---|---|---|---|---|
| Assets = 20,000, Equity = 20,000 | | | | A = 20,000, Eq. = 10,000<br>Debt 10,000 @ 12% | | |
| | Bad | Avg | Good | Bad | Avg | Good |
| $\pi$ | 1/4 | 1/2 | 1/4 | 1/4 | 1/2 | 1/4 |
| EBIT | €2,000 | €3,000 | €4,000 | €2,000 | €3,000 | €4,000 |
| Interest | 0 | 0 | 0 | €1,200 | €1,200 | €1,200 |
| EBT | €2,000 | €3,000 | €4,000 | €800 | €1,800 | €2,800 |
| Taxes (40%) | €800 | €1,200 | €1,600 | €320 | €720 | €1,120 |
| NI | $1,200 | $1,800 | $2,400 | €480 | €1,080 | €1,680 |

# An example: Illustrating effects of financial leverage /3

Ratio comparison between leveraged and unleveraged firms

| U firm | Bad | Avg | Good |
|---|---|---|---|
| BEP= EBIT/A | 10% | 15% | 20% |
| ROE= NI/Equity | 6% | 9% | 12% |
| TIE=EBIT/Interest | $\infty$ | $\infty$ | $\infty$ |
| **L firm** | **Bad** | **Avg** | **Good** |
| BEP= EBIT/A | 10% | 15% | 20% |
| ROE= NI/Equity | 5% | 11% | 17% |
| TIE=EBIT/Interest | 1.67 | 2.50 | 3.30 |

# An example: Illustrating effects of financial leverage /4

Risk and return for leveraged and unleveraged firms

| Expected Values | U firm | L firm |
|---|---|---|
| E(BEP)= E(EBIT/Asset) | 15% | 15% |
| E(ROE)= E(NI/Equity) | 9% | 10.8% |
| E(TIE)=EBIT/Interest | $\infty$ | 2.5 |
| **Risk Measures** | **U firm** | **L firm** |
| $\sigma(ROE)$ | 2.12% | 4.24% |
| $\sigma(ROE)/E(ROE)$ | 0.24 | 0.39 |

# The effect of leverage on profitability and debt coverage

For leverage to raise expected ROE, must have $BEP > r_d$ (i.e. 12%).

Why? If $r_d > BEP$, then the interest expense will be higher than the operating income produced by debt-financed assets, so leverage will depress income.

As debt increases, TIE decreases because EBIT is unaffected by debt, and interest expense increases (Interest $= r_d D$).

Conclusion:

- Basic earning power (BEP) is unaffected by financial leverage.
- L has higher expected ROE because $BEP > r_d$.
- L has much wider ROE (and EPS) swings because of fixed interest charges. Its higher expected return is accompanied by higher risk.

# Outline

# What effect does increasing debt have on the cost of equity for the firm?

If the level of debt increases, the riskiness of the firm increases.

We have already observed the increase in the cost of debt.

However, the riskiness of the firm's equity also increases, resulting in a higher return ($k_s$).

# The Hamada Equation

Because the increased use of debt causes both the costs of debt and equity to increase, we need to estimate the new cost of equity.

The Hamada equation attempts to quantify the increased cost of equity due to financial leverage. Uses the unlevered beta of a firm, which represents the business risk of a firm as if it had no debt.

Suppose, the risk-free rate is 6%, as is the market risk premium. The unlevered beta ($\beta_U$) of the firm is 1.0. We were previously told that total assets of firm $A =$€$20,000$ and $D =$€$10,000$,

$$\beta_L = \beta_U \times \left[1 + (1 - T)\frac{D}{A}\right] = 1 \times \left[1 + (1 - 0.40)\frac{10,000}{20,000}\right] = 1.3$$

then we have

$$\begin{aligned} k_s &= k_{RF} + (k_M - k_{RF})\beta_L \\ k_s &= 0.06 + 0.06 \times 1.3 \\ k_s &= 13.8\% \end{aligned}$$

# Outline

# Multifactor asset pricing models

Usually stock returns are modelled as **linear functions of factor(s)**.

The issue of **cross-sectional variation os stock returns is treated by means of portfolios** (stocks gathered according to some criteria) for example the Fama-French 3-factors. Let's see an application to the same sample **without balance-sheet data.**

In general the literature shows that **the negative relation between the market-to-book ratio and leverage ratio** is one of the most widely documented empirical regularities in the capital structure literature. Most studies take this negative relation as given and debate about its economic interpretation.

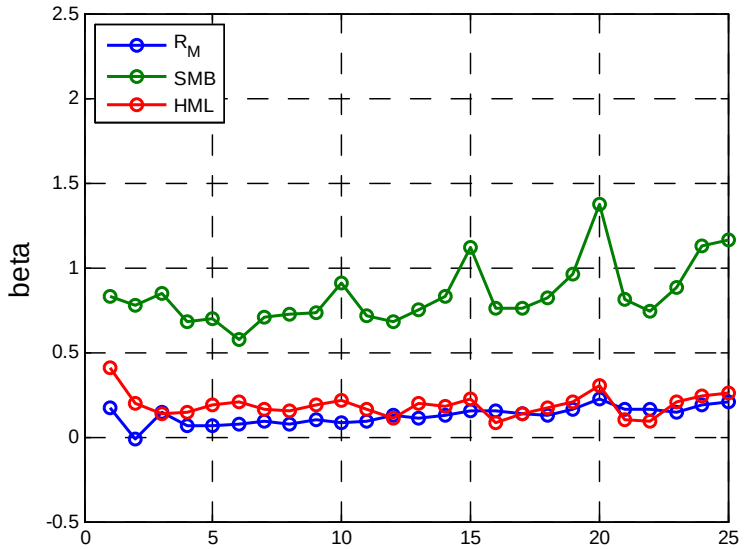
# Fama-French 3-factor model (FF3 factor model)

But remember that the negative (positive) relation between the market-to-book (book-to-market) ratio and leverage ratio is one of the most widely documented empirical regularities; **then as leverage** $\Uparrow$ $\longrightarrow$ **HML factor** $\Uparrow$

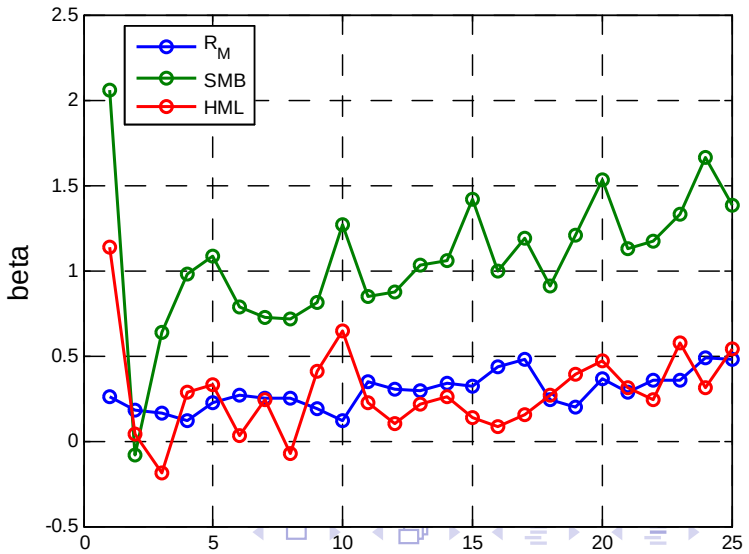
$$r_i = \alpha + \beta_1 r_M + \beta_2 SMB + \beta_3 HML + \varepsilon$$

but we have that also HML-betas are polsitive correlated with the HML factor

February 1994 - June 2008 (daily data)



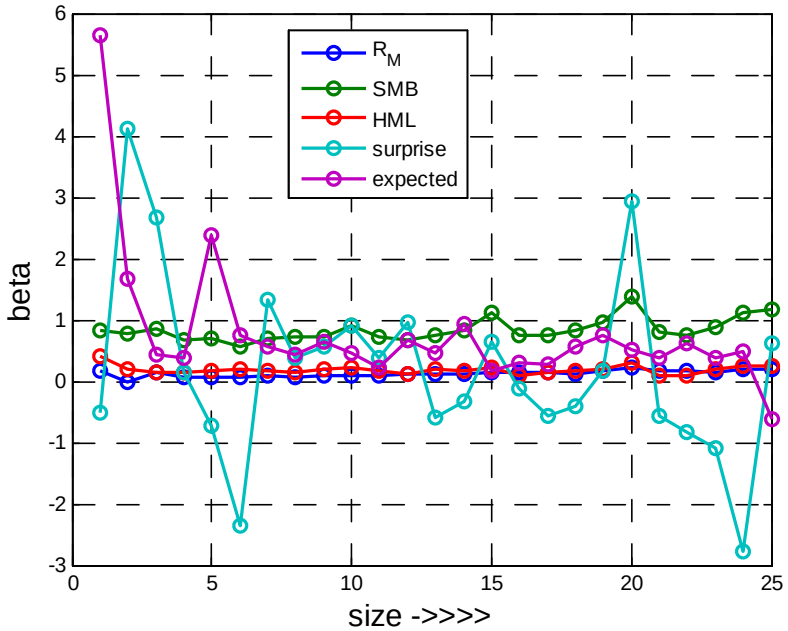

February 1994 - June 2008 (FOMC meeting)



# Interaction with surprises (FF3 factor model)

$$r_i = \alpha + \beta_1 r_M + \beta_2 SMB + \beta_3 HML + \beta_4 surprise + \beta_5 expected + \varepsilon$$

February 1994 - June 2008 (daily data)

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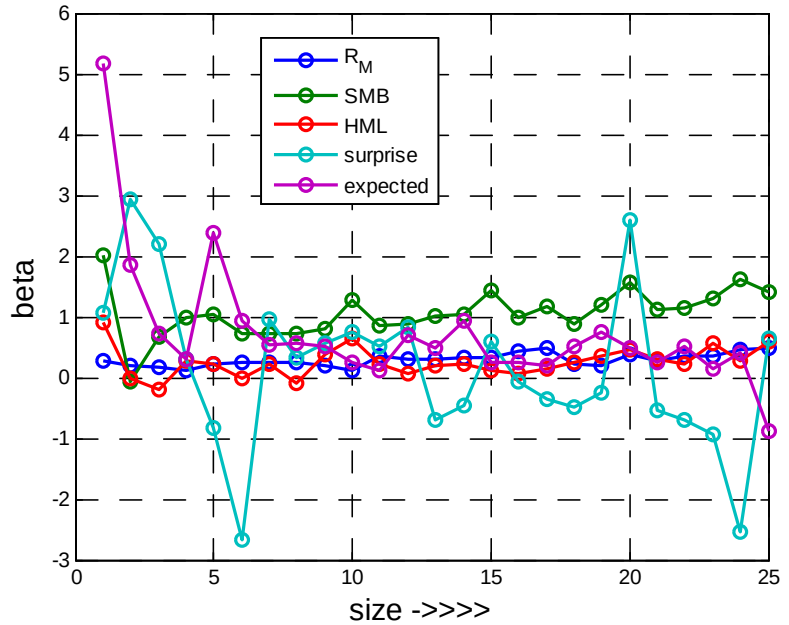

# Outline

# Omitted variable bias /1

Assume the real model is:

$$R_{it} = \alpha + \beta_i R_{Mt} + \theta' X_{it} + \phi' Z_t + \varepsilon_{it}$$

where $R_{Mt}$ is the market return. The regression with time dummies looks like:

$$R_{it} = \delta + \theta' X_{it} + \eta_{it}$$

Here you get:

$$\begin{aligned} \delta &= \alpha + \beta R_{Mt} + \phi' Z_t \\ \beta &= \textstyle\sum_{i=1}^{N} \beta_i / N \\ \eta_{it} &= \varepsilon_{it} + (\beta_i - \beta) R_{Mt} \end{aligned}$$

So the residual contains the 'excess'correlation between firm's $i$ return and the market return, the excess being measure w.r.t. the cross sectional average. **This is going to bias the results if a firm's "excess beta" is correlated with its bank dependece, i.e. if $(\beta_i - \beta)$ is correlated with** $BankDebt/At$.

# Omitted variable bias /2

Suppose that:

- the two are positively correlated, i.e. firms that depend a lot on bank debt have returns that covary more strongly with $R_{Mt}$; so that $(\beta_i - \beta) > 0 \Longleftrightarrow BankDebt/At$. This could be the case in a world with lots of small firms and few big banks. Here aggregate/systematic shocks that hit the banks are going to move around $R_{Mt}$, and the more you depend on bank credit the stronger your correlation with the market return.
- Monetary contractions push down aggregate returns – ie $Surprise > 0$ implies lower $R_{tM}$.

# Omitted variable bias /3

In this case, the coefficient on the key regressor $Surprise \times (BankDebt/At)$ is going to be biased upwards (in an absolute sense). Basically $\beta_3$ is negative not because bank-dependent are more affected by the policy shock, but because they covary more with the market, and the market is affected by the shock.

To prevent this from happening, the authors should make sure that the firm-specific controls they use kill $(\beta_i - \beta)R_{Mt}$ completely; i.e. that once you control for $X_{it}$ there is no "excess correlation" between firm returns and market returns.

Maybe this is something they could check separately – eg by checking if in $R_{it} = \alpha + \beta_i R_{Mt} + \theta' X_{it} + error$ the betas are approximately the same across $i$.

# Outline

# Conclusion

- levered vs. unlevered beta
- asset pricing model and model specification (do other factors play a role?)
- data frequency (daily vs. yearly frequency)