Empirical Assignment - Empirical Research in Finance

Summer Semester 2020

You are hired as a consultant to write a research report on the relationship between firm leverage and the tangibility of firm assets. You know from your finance classes that the "Trade-off" and the "Pecking order" theories are a good starting point to understand this topic but you know that your report will sound more credible if you build it around empirical results. To help you with this objective, use the file **data.dta**, which you can download from Moodle. The unit of observation in this file is firm-year.

You are interested in creating the following variables:

- *leverage* which is the sum of long-term debt and debt in current liabilities all divided by the book value of total assets;
- *tangibility* which is the ratio of net property, plant and equipment to the book value of total assets;
- *market-to-book value* which is equal to book value of assets less the book value of equity plus the market value of equity all divided by the book value of assets - it is often used as a proxy for growth opportunities;
- *logsale* which is the logarithm of net sales –often used as a proxy for size; and,
- *profitability* which is EBITDA divided by book value of assets.

Apply the usual filters and create your sample. Choose the US as a country for your study. Use this sample to complete the following tasks.

a) How many observations do you have and how many firms? Find the largest and smallest values of the variables above. Do the ranges make sense? Why? Find the averages and standard deviations.
b) Compare this data to the data in the reference paper provided below (parts of Table 1 in the paper; don't forget to also compare the country and time period; it may be useful to read parts of the "Data" section from the paper.)
c) Run the simple regression of leverage on tangibility. Is the estimated slope statistically different from zero? Is it statistically different from 1? Report the t-statistics and the p-values.
d) Include *market-to-book value*, *logsale* and *profitability* in your regression. Are these variables important? Explain. Test the following hypothesis: H_0: $\beta_{tangibility} = -2*\beta_{profitability}$. Report the t-statistic and the p-value.
e) Include year and sector dummies (at two digits sic level) in your previous regression.
f) Using the regression specification from e), obtain the standard errors that are robust to cluster correlation within firm (and also heteroskedasticity). Do your estimates change significantly? Discuss the sign, statistical and economic significance of the coefficient associated to *tangibility*. What happens to leverage when tangibility increases by 0.1?
g) Include firm fixed effects in your regression from f). What happens to your industry dummies? Why? How did the inclusion firm-fixed effects affect the coefficient associated to tangibility?

Can you think of any unobserved time-invariant variable that may be captured by your firm-fixed effects which could explain the effect on the tangibility coefficient?

h) Drop your sector dummies from your previous regression. Do your estimates change significantly?

i) Take the variable "RE value" from the reference paper as comparable to your tangibility variable. Take the results from Table 4, column 1. Choose a comparable regression from your set of regressions and compare the results from the paper to your results in terms of signs, magnitudes and statistical significance. Indicate clearly which regression you are using. (Ignore the variable P^m_t from the paper)

j) Can you think of one potentially important, time-varying variable that has been omitted from the analysis? Why would it be important and how do you expect the inclusion of this variable to affect the tangibility coefficient? Explain.

Use the results from the tasks above to write your report. Use tables to report your results. You can add additional information and graphs if you wish. The report should be double-spaced, with a minimum font size of 11 and a maximum of 20000 characters (including spaces and footnotes). Please copy any tables, graphs and other relevant information to your report, and submit a single file in PDF format.

Use the following paper as your reference:

Dragana Cvijanović (2014), "Real Estate Prices and Firm Capital Structure", *Review of Financial Studies*, 27(9), 2690–2735.

In addition, find an article in the mainstream financial press relating tangibility of assets and leverage (maybe referring to a specific firm) and use it in your motivation. Examples of mainstream press are: Reuters, Bloomberg, Handelsblatt, Financial Times (FT), Wall Street Journal (WSJ)[1], etc.

The report should follow the following format:

- Front page: Title, character count and group composition.
- Abstract: State (briefly) what you do in your report and summarize (briefly) your results. Be informative and focus on *main* findings. Two or three short sentences.
- Introduction: What you do (in more detail than in the abstract). Why it is interesting (motivation): use the financial press article. Explain the reference paper and relate it to what you do. Present your main findings (in more detail than in abstract). Organization of report (one very small paragraph).
- Hypotheses: Formulate and explain your main hypothesis given your statistical tests and regression analysis. Don´t forget to base your analysis also on finance theory.

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[1] FT and WSJ are only available via paid subscription, but sometimes they have free articles.

- Data: Describe your data (points a)-b)). Don't forget to mention all the filters that you applied when cleaning your data.
- Methodology and Results: Describe your methodology (for example, write down the OLS regression model you estimate; don't forget subscripts for time and firm). Present your results (points c)-i)). Compare your results with your hypothesis.
- Conclusion: Focus on your main findings, lessons from your results, and discuss agenda for future work. Discuss point j).
- References (reference paper and financial press article)

DEADLINE: The report is due on 30 September 2020 @ 11pm via Moodle.

IMPORTANT: Remember to format your tables and graphs and make them easy to understand. Also, beware of presentation in general!

Good luck!

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You can download the reference paper <u>for free</u> when connected to HU via VPN following one of the links below:

https://www.jstor.org/stable/24465683?seq=1#metadata_info_tab_contents

https://academic.oup.com/rfs/article/27/9/2690/1618967