Prof. Murillo Campello

EMPIRICAL CORPORATE FINANCE

Empirical Assignment #2

Introduction

The objective of this assignment is to familiarize students with empirical issues associated with two important, related literatures in corporate finance — "financing constraints" and "internal capital markets" — as well as with new empirical methods.

Fazzari, Hubbard, and Petersen's (1989) "Financing Constraints and Corporate Investment," in *Brookings Papers on Economic Activity*, is a landmark paper on the research of links between credit frictions and corporate investment. The authors argue that the sensitivity of firms' investment to their internal cash flow would work as a gauge of the degree to which credit frictions affect real corporate decisions. To gauge that impact, the authors propose estimating the following regression:

$$Investment_{i,t} = \beta_0 + \beta_1 Q_{i,t} + \beta_2 CashFlow_{i,t} + \sum_i firm_i + \sum_t year_t + \varepsilon_{i,t} \qquad (1)$$

where *Investment*, Q, and *CashFlow* are defined below, and *firm* and *year* absorb firm- and time-specific effects, respectively. The authors' prior is that a positive β_2 would imply that the firm is facing financial constraints (can't find external financing for its NPV>0 projects) and is forced to internal funds to invest.

The empirical relation between investment and cash flow was later adopted as a tool in other areas of corporate finance. In the internal capital markets literature, researchers looked at the relation of between the investment spending of certain subdivisions of some conglomerates and the cash flow of other subdivisions of the same conglomerate to determine whether funds are flowing from some subdivisions into others (cross-subsidization).[1] But several researchers subsequently questioned that practice.

Tasks

The first task is to estimate Eq. (1) for firms in the annual COMPUSTAT tapes over a window from 1990 to present. In the appendix below, you find a description of the construction of the variables needed and some basic data filtering criteria.

The second task starts with the random selection of 1,000 firm-year observations that were used to perform the first task. You then need to find 1 matching observation (alternatively, 4 matches) for each of the identified firm-years. Matches should be made on the basis of firm size, leverage, asset tangibility, and Altman's (unleveraged) Z-Score under the Abadie-Imbens (2002) procedure. Matches should also belong to the same industry.

The final step is to rerun Eq. (1), but for each firm-year, swapping the cash flow of the original observation with that of the matched firm-year. What do you infer from the observed coefficients on β_2? What does this tell you about the use of investment–cash flow sensitivities as a tool to explain cross-subsidization?

Note: Experiment with various alternative ways of doing each step (that's what empiricists do!). Discuss the results from the variations you experimented with (empiricists often do not reveal this).

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[1] A well-known example is found in Shin and Stulz's (1998) "Are Internal Capital Markets Efficient?" published in the *Quarterly Journal of Economics*.

Logistics

The assignment is to be performed in groups of 2 people maximum. Please submit a written report (printed with relevant tables and text) as assigned in the course schedule or discussed in class. Replication of the results is expected to be straightforward. Your report has to look professional. As such, write a coherent text addressing each of the tasks above and do not simply cut and paste output from statistical software in you paper.

Appendix

This appendix describes data selection and variable construction procedures generally found in the empirical corporate finance literature. The data is from the annual COMPUSTAT. The software language used is Stata.

Data Screening.   Each observation selected into the sample had to satisfy the following criteria:
    1. Firm-year observations are uniquely identified by COMPUSTAT's gvkey-fyear combinations:
(indfmt == "INDL" & datafmt == "STD" & popsrc == "D" & consol == "C")
    2. Drop missing company identifiers and missing years
(gvkey != .)
(fyear != .)
    3. Keep firms with fiscal years between 1988 and 2010 (start in 1988 to allow for variable lags)
(fyear >= 1988 | fyear <= 2010)
    4. Keep only manufacturing firms
(sic > 1999 & sic < 4000)
    5. Require non-missing information on assets, investment, cash flows, and stock market data
(at !=. & capxv !=. & sppe !=. & ib !=. & dp !=. & prcc_f != . & csho != .)

Variable Computation.   Variable names and commands:
    Leverage: gen Leverage = (dlc + dltt) / at
    Cash Flow: gen CashFlow = (ib + dp) / L.ppent
    Tangibility: gen Tangibility = ppent / at
    Size: gen Size = log(at)
    Q: gen Q = (at + (prcc_f*csho) - ceq - txdb) / at
    Investment: gen Investment = (capxv - sppe) / L.ppent
    Z-Score: gen ZScore = [3.3*pi + sale + 1.4*re + 1.2*(act - lct)] / at