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R&D investment and internal finance: the cash flow effect

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Abstract

This paper investigates the cash flow effect on R&D investments for firms in Denmark.

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Comments from Ebbe Graversen, the editor and two anonymous referees are gratefully acknowledged.

Notes

Classical references are Akerlof ([1970](#)) and Stiglitz and Weiss ([1981](#)).

See, e.g. Holmstrom and Tirole ([1997](#)) and Townsend ([1979](#)).

Examples are Fazzari et al. ([1988](#)), Gilchrist and Himmelberg ([1995](#)).

Among them, Hao and Jaffe ([1993](#)), Himmelberg and Petersen ([1994](#)), Hall ([1992](#)), Mulkay et al. ([2001](#)), Boughaes et al. (2003). A review of literature on the financing of R&D can be found in Hall ([2002](#)).

See, e.g. Østrup ([1994](#)) and Andersen et al. ([2001](#)).

See, e.g. Østrup ([1994](#)).

Annual account data are from the Account Database from the Copenhagen Business School. Stock market data is obtained from the Danish Stock Database from the Center of Analytical Finance at the Aarhus School of Business. A more detailed description of the R&D data is given in the appendix.

See [Kaplan and Zingales \(1997, 2000\)](#) and the reply to their arguments in Fazzari et al. ([2000](#)).

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A firm with a flow to

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That is, average Q, which empirical approximations are a proxy of, is equal to marginal Q. See Hayashi ([1982](#)).

Though, see Himmelberg and Petersen ([1994](#)).

See, e.g. Fazzari et al. ([1988](#)) and Hubbard ([1998](#)).

See also Cleary ([1999](#)).

That is, the expected value of Q in period $t + 1$ based on information in period t .

As a reference, the market capitalization of the NYSE (source: NYSE's web site) was slightly higher than US GDP in 2001 (GDP data from OECD).

R&D among firms listed on the CSE amounts to a little under half of total private sector R&D in Denmark, which was DKK 21.9 billion. See Danish Centre for Studies in Research and Research Policy (2003).

See, e.g. Malerba and Orsenigo ([1997](#)).

Where, due to the number of observations, some sectors have been combined [industrials (20), materials (15) and utilities (55); consumer discretionary (25) and consumer staples (30); information technology (45) and telecommunications (50)].

The regression method used is least squares with dummy variables. Mulkay et al. ([2001](#)) also use a fixed effects estimator for similar reasons. In addition, fixed effects estimation is the most commonly used method for cash flow analyses using the Tobin's

Q model (approach).

Among the others, see Fazzari and Hubbard and Jaffe ([1993](#)).

See Hausman and Pagan (1978) for a discussion of random effects models. It can be

See Hausman

Coefficient estimates are available on

request



Where as larger firms, for example, may be able to issue their own bonds.

See [Table A1](#).

Their classifications take into account other factors, among them management statements on liquidity positions in annual reports, though firms' cash positions are a central factor.

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