Family control and the sensitivity of investment to cash flow: Evidence from a Multi-Equation Approach

Johannes Beyenbach, Marc Steffen Rapp, and Daniel Powell

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Discussing family firm behavior in class, I am always puzzled and struggling by the discrepancy between survey evidence (managerial literature) and empirical findings in the academic literature
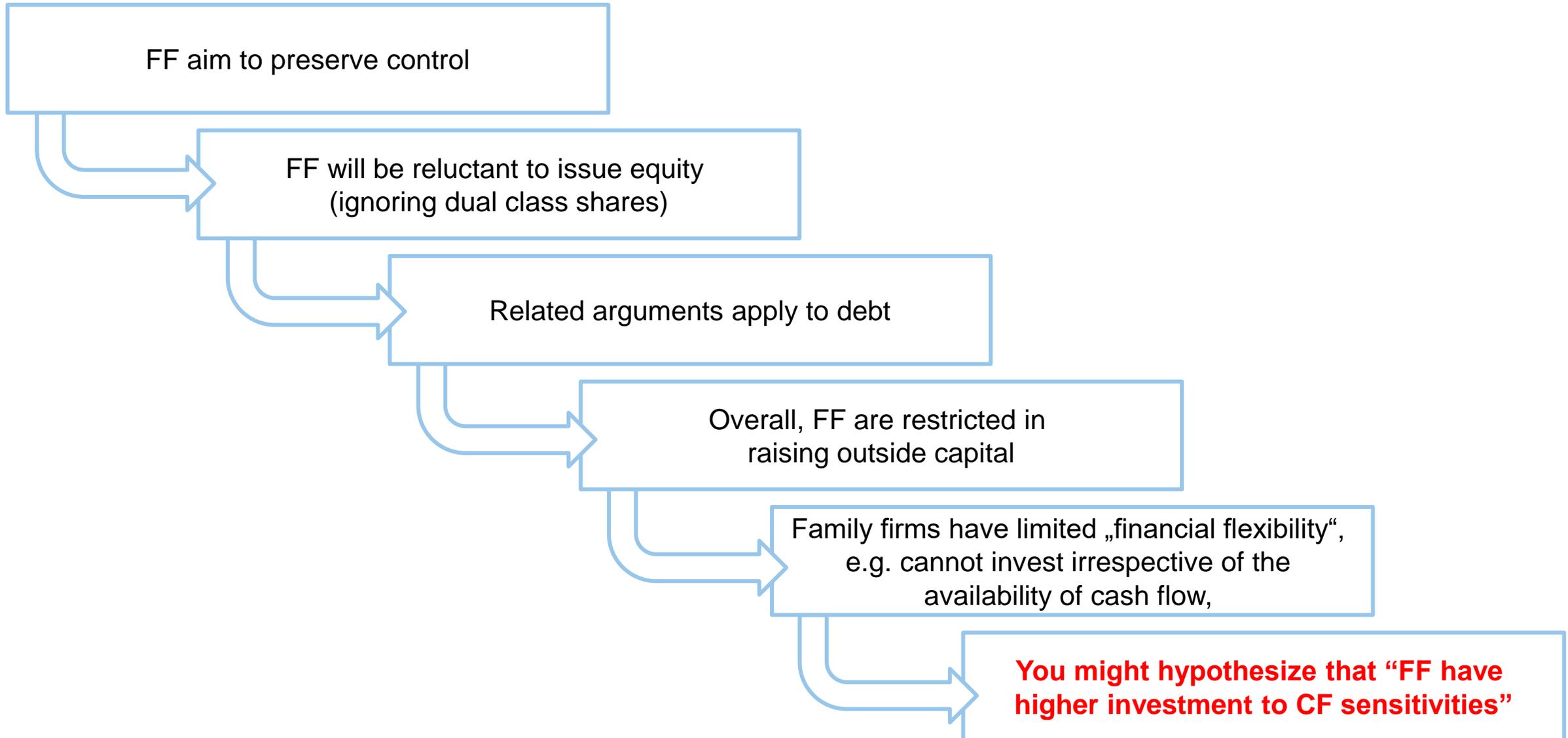

Survey Evidence

PwC Family Business Survey 2016: „*76% of family firms are finding it challenging securing financing and are using their own capital.*"

KPMG Family matters Report (2014): „A key differentiator between family businesses and other companies is the fact that the former tend to view maintaining control over their company as key to success, which can limit their financing options even further.*"*

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- 2 -

What could be hypothesized then?

FF aim to preserve control

FF will be reluctant to issue equity
(ignoring dual class shares)

Related arguments apply to debt

Overall, FF are restricted in
raising outside capital

Family firms have limited „financial flexibility",
e.g. cannot invest irrespective of the
availability of cash flow,

**You might hypothesize that "FF have
higher investment to CF sensitivities"**

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Family control and the sensitivity of investment to cash flow: Evidence from a Multi-Equation Approach

- 3 -

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Survey Evidence

PwC Family Business Survey 2016: „*76% of family firms are finding it challenging securing financing and are using their own capital.*"

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Academic literature:

- **Pindado, Requejo and de la Torre (2011, FCF): European FF with lower ICFS**
  The authors interpret their findings, in a way that family firms reduce information asymmetries between the firm and capital markets
- **Andres (2011, AE): Confirms for a sample of German FFs**
  The author interpret his findings similarly as … "*founding family ownership is associated with lower agency costs and can help to diminish information asymmetries with external suppliers of finance.*"
- **Kuo and Hung (2012, CGIR):** Confirms for a sample of FF from Taiwan

All the existing papers, rely on the classical single-equation approach proposed by Fazzari, Hubbard and Peterson (1988)

Standard investment regression approach following FHP (1998)

$$I_{i,t} = \alpha + \beta_1 CF_{i,t} + \beta_2 Q_{i,t-1} + X'_{i,t-1}B + \varepsilon_{i,t}$$

- ❑ I = CAPEX deflated by beginning-of-period capital (i.e., PPE)

- ❑ Q = Tobin's Q calculated as market value divided by book value of assets

- ❑ CF = operating cash flow deflated by beginning-of-period capital

- ❑ X = set of additional controls, mainly leverage, size (Log. total assets) and uncertainty;

$$I_{i,t} = \alpha + \beta_{11} CF_{i,t} + \boldsymbol{\beta_{12} FF_{i,t} \times CF_{i,t}}$$
$$+ \beta_{21} Q_{i,t-1}\left(+\beta_{22} FF_{i,t} \times Q_{i,t-1}\right)$$
$$+ X'_{i,t-1}B_1\left(+FF_{i,t} \times X'_{i,t-1}B_2\right) + \varepsilon_{i,t}$$

Now, these single-equation models have their difficulties

THE FIRM DECISION PROCESS: AN ECONOMETRIC INVESTIGATION *

Dennis C. Mueller

This article adds to an already long list of econometric studies of firm behavior. Its emphasis is upon the complexity of this behavior, and upon the eventual need for attempting to explain this behavior with models of corresponding complexity. It differs from much of the previous work on firm behavior in that it stresses the inherent simultaneity of many of the firm's decisions, and asserts that a complete understanding of this decision process can be obtained only by explicitly accounting for the numerous interactions which are a result of this simultaneity. Similarly, in formulating policy recommendations one must be aware of these interactions, not only in order to avoid undesirable side effects which might stem from a given policy, but also to be certain that these interactions do not actually result in a negation of a policy's primary goal.

The more forces a model takes into account, the more difficult full comprehension of the mechanisms depicted in the model be...

The Interdependent and Intertemporal Nature of Financial Decisions: An Application to Cash Flow Sensitivities

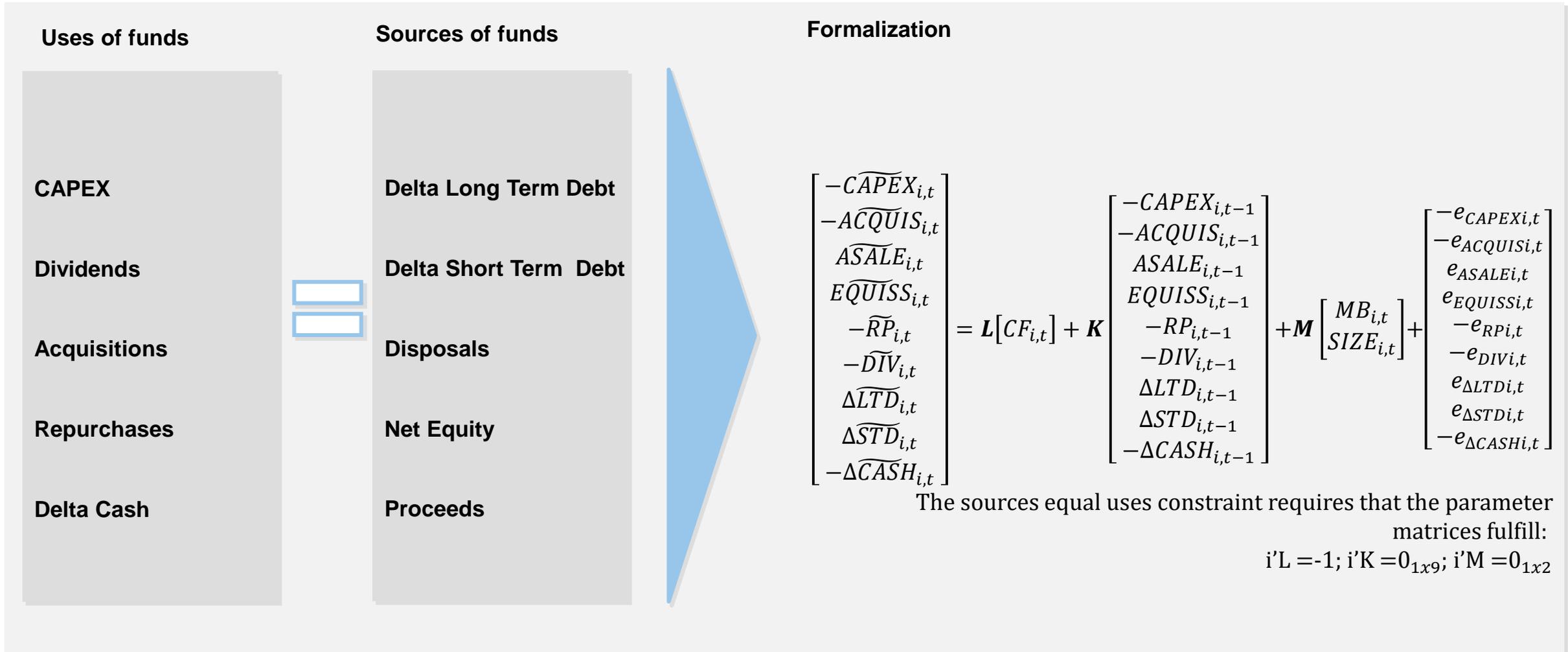VLADIMIR A. GATCHEV, TODD PULVINO, and VEFA TARHAN*

ABSTRACT

We develop a dynamic multiequation model where firms make financing and investment decisions jointly subject to the constraint that sources must equal uses of cash. We argue that static models of financial decisions produce inconsistent coefficient estimates, and that models that do not acknowledge the interdependence among decision variables produce inefficient estimates and provide an incomplete and potentially misleading view of financial behavior. We use our model to examine whether firms are constrained from accessing capital markets. Unlike static single-equation studies that find firms underinvest given cash flow shortfalls, we conclude that firms maintain investment by borrowing.

EMPIRICAL STUDIES IN CORPORATE finance routinely examine firms' financial policy decisions in isolation. In particular, they use a single-equation framework wherein the relevant policy variable is regressed on a set of explanatory variables. For example, tests of payout policy often regress payout measures on a variety of financial variables without explicitly accounting for the interdependence between payout policy and other corporate policies. Similar approaches are used to study capital structure, management compensation, and various other financing and investment decisions.

Methodology – Structural Equation Model (SEM)

We build on Gatchev et al (2010, JF)'s dynamic multi-equation model to reflect spectrum of cash flow sources and uses (also used by Chang et al., 2011, RFS)

Uses of funds

CAPEX

Dividends

Acquisitions

Repurchases

Delta Cash

Sources of funds

Delta Long Term Debt

Delta Short Term Debt

Disposals

Net Equity

Proceeds

Formalization

$$\begin{bmatrix} -\widehat{CAPEX}_{i,t} \\ -\widehat{ACQUIS}_{i,t} \\ \widehat{ASALE}_{i,t} \\ \widehat{EQUISS}_{i,t} \\ -\widehat{RP}_{i,t} \\ -\widehat{DIV}_{i,t} \\ \Delta\widehat{LTD}_{i,t} \\ \Delta\widehat{STD}_{i,t} \\ -\Delta\widehat{CASH}_{i,t} \end{bmatrix} = L\begin{bmatrix} CF_{i,t} \end{bmatrix} + K\begin{bmatrix} -CAPEX_{i,t-1} \\ -ACQUIS_{i,t-1} \\ ASALE_{i,t-1} \\ EQUISS_{i,t-1} \\ -RP_{i,t-1} \\ -DIV_{i,t-1} \\ \Delta LTD_{i,t-1} \\ \Delta STD_{i,t-1} \\ -\Delta CASH_{i,t-1} \end{bmatrix} + M\begin{bmatrix} MB_{i,t} \\ SIZE_{i,t} \end{bmatrix} + \begin{bmatrix} -e_{CAPEXi,t} \\ -e_{ACQUISi,t} \\ e_{ASALEi,t} \\ e_{EQUISSi,t} \\ -e_{RPi,t} \\ -e_{DIVi,t} \\ e_{\Delta LTDi,t} \\ e_{\Delta STDi,t} \\ -e_{\Delta CASHi,t} \end{bmatrix}$$

The sources equal uses constraint requires that the parameter matrices fulfill:

i'L =-1; i'K =0_{1x9}; i'M =0_{1x2}

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- 7 -

Sample construction and descriptive analysis

- We apply the previous methodology to a sample of German listed firms
- The sample covers all German Prime Standard firm over the 2001-2015 period

- Accounting data from ThomsonReuters
- Ownership and founder data hand-collected

- Ambitious data requirements, thus only 2,039 FY observations

- Standard filters apply (non-financial, pos. sales, non-negative equity, etc)

- *All numbers, except for Market-to-Book and Firm Size, are a proportion of firm assets.*
- *Firm Size is measured as the ln of book assets in millions of Euros.*

Variable	N	mean	p25	p50	p75	sd
Cash Flow	2,039	0.073	0.029	0.075	0.127	0.126
Δ Cash balances	2,039	0.002	-0.021	0.002	0.029	0.078
Δ Long-Term Debt	2,039	0.006	-0.017	0.000	0.018	0.065
Δ Short-Term Debt	2,039	-0.002	-0.015	0.000	0.016	0.058
Equity Issues	2,039	0.012	0.000	0.000	0.001	0.043
Share repurchases	2,039	0.003	0.000	0.000	0.000	0.013
Capital expenditures	2,039	0.045	0.018	0.035	0.058	0.039
Acquisitions	2,039	0.014	0.000	0.000	0.009	0.040
Asset Sales	2,039	0.010	0.001	0.002	0.008	0.024
Dividends	2,039	0.019	0.000	0.010	0.023	0.035
Firm size	2,039	13.370	11.749	13.007	14.691	2.172
Market-to-book	2,039	1.534	1.037	1.269	1.659	0.895

Baseline Results

- **Method: S**

- **Family firm: 50% ownership**

- **397 FYO to 1.642 FYO**

- **Approach: Sample split**

1.

2.

	Cash Flow Coefficients and T-Values - Bootstrapped (1,000 Iterations)					
	(1)	(2)	(3)	(4)	(5)	(6)
	Family Firm Definition A			**Non-Family Firm Definition A**		
	Cash Flow	Size	Market-to-Book	Cash Flow	Size	Market-to-Book
CAPEX						
Coef	0.133***	-0.001	-0.002	0.053***	0.001**	0.002*
t-Value	[5.43]	[-0.49]	[-1.57]	[7.53]	[2.49]	[1.65]
Acquisitions						
Coef	0.122***	0.003**	-0.006**	0.105***	0.001**	0.002
t-Value	[3.28]	[2.03]	[-2.17]	[7.92]	[2.21]	[1.27]
Disposals						
Coef	-0.021*	0.004***	-0.001	-0.036***	0.001***	-0.001**
t-Value	[-1.74]	[4.32]	[-0.77]	[-2.75]	[4.16]	[-2.22]
NetEquityProceeds						
Coef	-0.125***	-0.001	0.004***	-0.211***	-0.002***	0.009***
t-Value	[-3.13]	[-0.71]	[2.83]	[-8.62]	[-4.75]	[4.42]
Repurchases						
Coef	0.003	-0.001**	0.000	0.018***	0.000	0.003***
t-Value	[0.76]	[-2.34]	[-0.85]	[4.19]	[0.67]	[3.70]
Dividends						
Coef	0.164***	-0.002*	0.014***	0.071***	-0.001**	0.007***
t-Value	[4.23]	[-1.96]	[4.49]	[3.99]	[-2.17]	[3.63]
DeltaLTDebt						
Coef	-0.327***	-0.001	0.007***	-0.354***	0.002***	0.006***
t-Value	[-6.56]	[-0.97]	[2.58]	[-12.43]	[2.86]	[2.65]
DeltaSTDebt						
Coef	0.031	0.001	0.002	-0.004	0.002***	0.000
t-Value	[0.93]	[0.54]	[1.41]	[-0.15]	[2.66]	[0.26]
DeltaCash						
Coef	0.136**	0.003	0.007**	0.147***	0.002**	0.001
t-Value	[2.29]	[1.54]	[2.01]	[4.35]	[2.17]	[0.27]
Delta Uses of Fund + Delta Sources of Funds	1.0	1.0	1.0	1.0	1.0	1.0
N	397			1642		

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- 9 -

Baseline Results - Backup

- **Family firm: 50% ownership**

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- **Approach: Sample split**

- **Test differences in coefficients with bootstrapping approach**

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	(1)	(2)	(3)	(4)	(5)	(6)
	Family Firm Definition A			**Non-Family Firm Definition A**		
	Cash Flow	Size	Market-to-Book	Cash Flow	Size	Market-to-Book
CAPEX						
Coef	0.133***	-0.001	-0.002	0.053***	0.001**	0.002*
t-Value	[5.43]	[-0.49]	[-1.57]	[7.53]	[2.49]	[1.65]
	Bootstrap (1,000 Iterations) Difference Test					
	Cash Flow		Size		Market-to-Book	
CAPEX	(1) - (4)		(2) - (5)		(3) - (6)	
Difference in Coef	0.080***		-0.002**		-0.004**	
t-Value	4.287		1.859		2.102	
p-Value	0.000		0.032		0.018	
Signif. Variance Test	0.000		0.000		0.493	

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- 10 -

We challenge our baseline results along several lines

1
- **Family firm definition: So far, relatively strict definition (50 % ownership)**
- **Investment definition: So far, only CAPX**

2
- **Specification: So far only sample split**

3
- **Endogeneity of family firm status**

4
- **Financially constraint firms**

5
- **Financial crises times**

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- 11 -

We challenge our baseline results along several lines

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Figure A: Difference in I-CF-coefficients for all family firm definitions

0.080***
0.066***
0.058***
0.039***

FF A   FF B   FF C   FF D
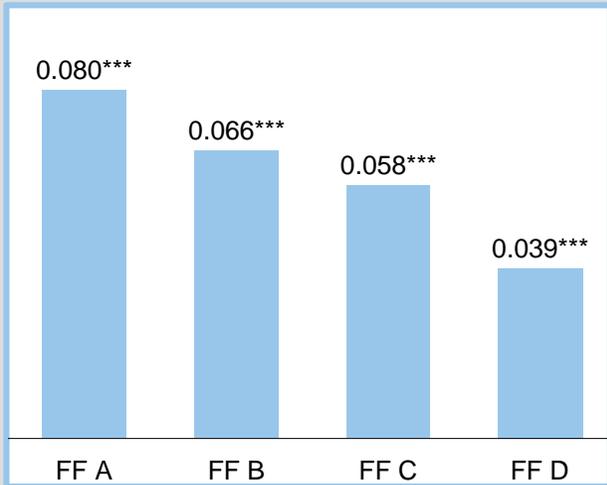
Figure B: Difference in I-CF-coefficients for all family firm definitions – CAPEX + R&D

0.088***
0.047**
0.033*
0.021

FF A   FF B   FF C   FF D
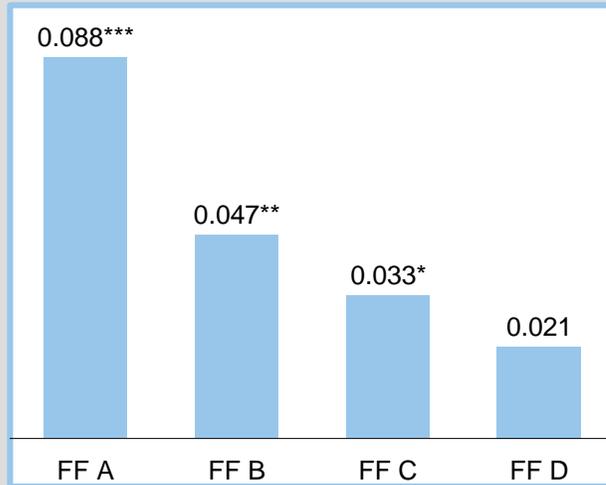
Figure C: Coefficient of Family firm dummy interacted with cash flow for all family firm definitions

0.068***
0.057***
0.055***
0.043***

FF A   FF B   FF C   FF D
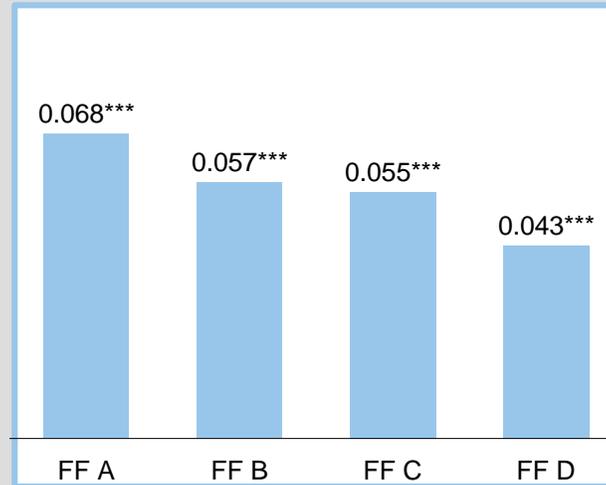
- **Different Family Firm Definitions:**
  - FF A: Members of a founding family hold 50% or more of a firms equity,
  - FF B: Members of a founding family hold 50% or more of equity or 2. Members of the family are present on the supervisory board holding more than 25% of the firm's equity or 3. Members of the family are actively involved in the management holding more than 25% of the firm's equity,
  - FF C: Members of a founding family hold 25% or more of equity or 2. Members of the family are present on the supervisory board holding more than 25% of the firm's equity or 3. Members of the family are actively involved in the management holding more than 25% of the firm's equity;
  - FF D: Members of a founding family hold 25% or more of equity or 2. Members of the family are present on the supervisory board holding more than 5% of the firm's equity or 3. Members of the family are actively involved in the management holding more than 5% of the firm's equity

We challenge our baseline results along several lines

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Logit Regression - Prediction of Family Firm Status Coefficients and T-Values		
	(1)	(2)
Dependent Variable	**Family Firm Type A (Dummy Variable)**	
Size	-0.258***	-0.308***
t-Value	[-8.66]	[-8.93]
TobinsQ	0.025	0.033
t-Value	[0.48]	[0.63]
CashFlow	1.613***	1.566***
t-Value	[4.17]	[3.87]
Ln(FirmAge)		0.220***
t-Value		[3.43]
Year Effects	Yes	Yes
Industry Effects (Fama-French 12)	Yes	Yes
N	2,039	2,039

We challenge our baseline results along several lines

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	Constrained Firms measured using the Kaplan-Zingales and Whited-Wu Indexes					
	Cash Flow Coefficients and T-Values - Bootstrapped (1,000 Iterations)					
	(1)	(2)	(3)	(4)	(5)	(6)
	Complete Sample	**FF A**	**NFF A**	**Complete Sample**	**FF A**	**NFF A**
	Kaplan-Zingales Index above Median			Kaplan-Zingales Index below Median		
CAPEX	0.084***	0.212***	0.062***	0.055***	0.066**	0.054***
	[6.17]	[4.86]	[4.94]	[6.73]	[2.46]	[6.29]
	Whited-Wu Index above Median			Whited-Wu Index above Median		
CAPEX	0.071***	0.170***	0.053***	0.060***	0.083***	0.058***
	[6.15]	[4.30]	[5.33]	[5.77]	[3.82]	[5.07]

We challenge our baseline results along several lines

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Cash Flow Coefficients and T-Values - Bootstrapped (1,000 Iterations)						
	Financial Crisis (2008, 2009, 2010)			Non Financial Crisis (2002-2007;2011-2015)		
	(1)	(2)	(3)	(4)	(5)	(6)
	Complete Sample	**FF A**	**NFF A**	**Complete Sample**	**FF A**	**NFF A**
CAPEX						
Coef	0.079***	0.242***	0.041*	0.064***	0.122***	0.056***
t-Value	[3.45]	[4.57]	[1.92]	[7.45]	[4.08]	[7.27]
Bootstrap (1,000 Iterations) Difference Test						
	FF vs. NFF in Crisis		FF vs. NFF outside Crisis		FF in Crisis vs. FF outside Crisis	
	(2) - (3)		(5) - (6)		(2) - (5)	
CAPEX						
Difference in Coef	0.201***		0.066**		0.120**	
t-Value	3.534		2.135		1.886	
p-Value	0.000		0.016		0.030	
Signif. Variance Test	0.001		0.000		0.824	

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Summary and conclusion

What we do

- We are puzzled and struggle with the single-equation results of family firms' ICFS in the existing literature

- Thus, we propose to implement a dynamic simultaneous equation model following Gatchev et al.(2010)
- The model allows us to account for the intertemporal nature of investment / financing decisions and the implicit constraint equating sources and uses of cash flows promising economically more meaningful results

- We study ICFS of family firms based on a sample of German family firms covering the 2001-2015period.

Result 1

- Consistent with intuition, we find higher ICFS for family firms

Result 2

- The pattern is monotone in the strictness of the family firm definition, and more pronounced for FF classified as financially constraint

Result 3

- The pattern is robust to (i) different specifications, (Ii) examining crises times, and (ili) IV-approaches to address reverse causality concerns.

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Family control and the sensitivity of investment to cash flow: Evidence from a Multi-Equation Approach

- 16 -

Thank you very much for your attention

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- 17 -