

ACCESS TO FINANCE AND SOURCES OF FINANCE: WHICH INFLUENCE ON THE INVESTMENT OF EUROPEAN FIRMS?

Piero Esposito

University of Cassino and Southern Lazio
Luiss School of European Political Economy

Laurent Maurin

European Investment Bank

Webinar 30th September 2021

STAREBEI Research Grant to LUISS Guido Carli University - Changes in the European financial markets and the financing of non-financial firms

AIM AND MOTIVATION

- Motivations
 1. Slow down in investment of EU compared to US
 2. Bank based financial systems in advanced economies → low growth
 3. Underdeveloped financial markets and financial constraints → low growth
 4. Role of market based sources of finance in innovative investment
- Research questions:
 - A. How to measure financial constraints?
 - B. How important is FC for investment in the EU regions (imbalances)?
 - C. How do FC and sources of finance relate to innovative investment?
- **We exploit the information included in the EIBIS dataset**

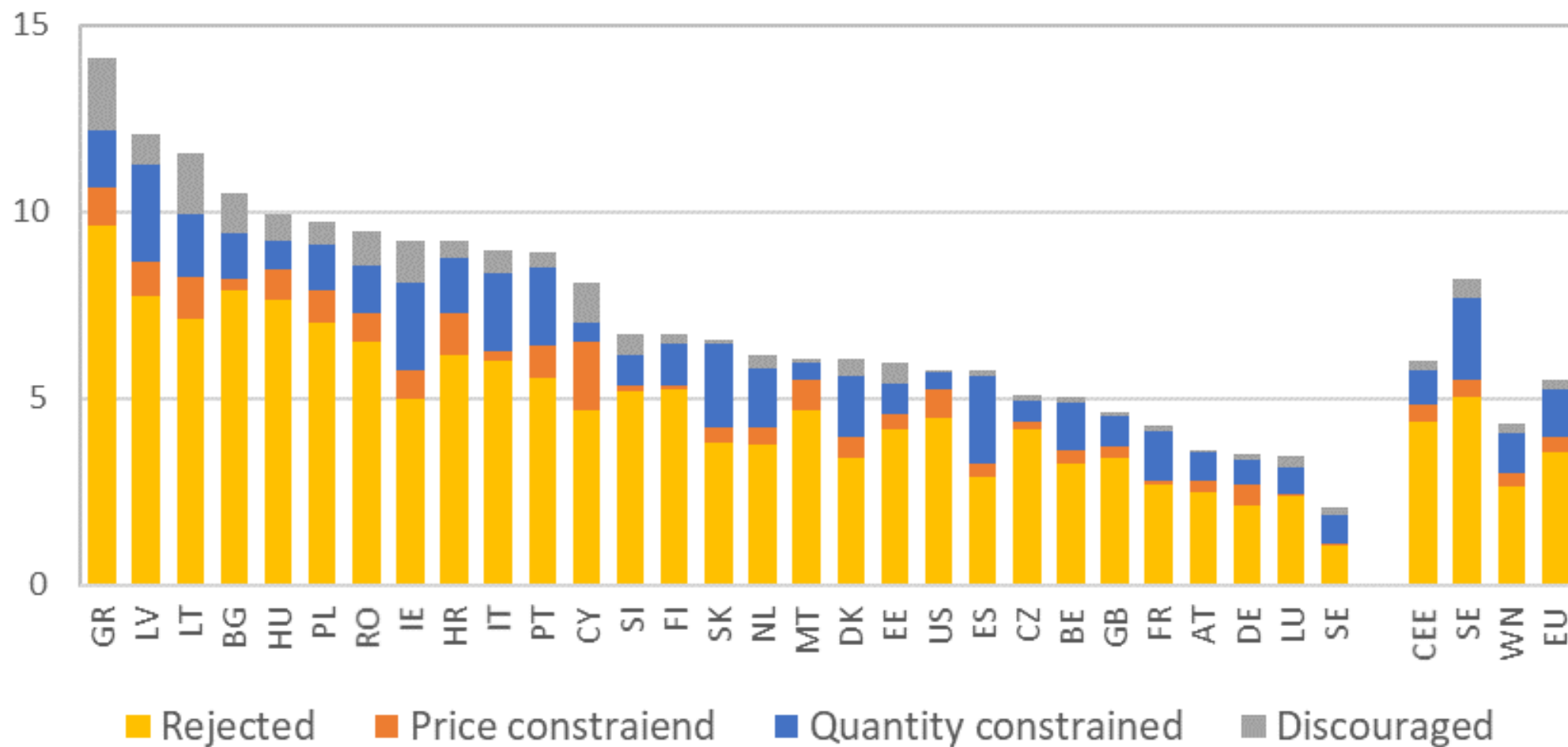
LITERATURE 1: INVESTMENT AND FINANCIAL CONSTRAINTS

- FC: frictions in the supply of capital due to information asymmetries and agency costs
- Measures of FC
 - Investment cash flow sensitiveness: non-monotonic → Cost vs revenue effect and internal vs external FC (Guariglia 2008, Cleary et al. 2007);
 - Firms characteristics (Whited and Wu, 2006; Hadlock and Pierce 2010; Mulier et al 2016)
 - Survey based measures (Savignac, 2009; Beck et al., 2008; Campello et al., 2010) → what do they actually measure?
 - Mix of the two (Schauer et al., 2019; Cherchye et al., 2020) → Possibility to extend the sample and link the self-reported measure to balance sheet data
- We build on Schauer et al (2019) by using a mixed approach →
 - Extend the sample to firms/years not included in EIBIS
 - Address potential biases in reporting the FC status

LITERATURE 2: INNOVATIVE INVESTMENT AND FINANCIAL INSTRUMENTS

- Market based vs non-market based financial systems
 - Criticism to the neutrality view (Pagano et al, 2014, Langfield and Pagano, 2015, Levine et al. 2015)
 - MB better for advanced economies (Pagano et al. 2014; Gambacorta, 2014)
 - MB → Positive effects on investment and growth (Demirgüç-Kunt and Levine, 1999; Moradi et al., 2016; Adarov, 2019)
 - MB systems deal better with systemic risk (Bats and Houben, 2020)

EIBIS MEASURE OF FINANCIAL CONSTRAINT



Source: Authors' calculations based on the EIBIS 2016-2019.

MIXED APPROACH TO ESTIMATE FC I

- **Probit model:** probability to be financially constrained as a function of economic and financial indicators used in the previous literature;
- Step-wise approach to eliminate in each replication the least significant variable;
- Predicted probabilities, hp: the higher tertile is financially constrained;
- Main advantages:
 1. Correct (in part) the self-reporting bias → over/under-statement of FC depending on managers' quality, limited information;
 2. Extend the sample over space and time;

MIXED APPROACH TO ESTIMATE FC II

Variables used in the estimation

Variable name	Definition	Previous use
SALES	Sales turnover	WW
TSALES	Total industry sales	WW
Age and Age ²	Age of the firm	SA
WCTA	Working capital on previous year total assets	Schauer et al. (2019)
TFATA	Total fixed assets on previous year total assets	Schauer et al. (2019)
SIZE and SIZE ²	Number of employees	ASCL, SA, WW
LIQ	Liquidity ratio	Schauer et al. (2019)
ICR	Interest coverage ratio	Cleary
Profitability	EBIT on previous year total assets	Cleary, FCP
CR	Current ratio: current assets on current liabilities	Cleary
FINLEV	Financial Leverage	KZ, WW, ASCL
CASHTA	Cash on previous year total assets	FCP
CFTA	Cash flow on previous year total assets	KZ, WW, ASCL

ESTIMATED EQUATION

- Significant regressors:
 - Interest coverage ratio (-)
 - Working capital (-)
 - Size and Size square → negative but diminishing (L-shaped) marginal impact (zero at 95 pctile)
 - Profitability (-)
 - Leverage (+)

	Coeff	M. Effects
WCTA	-0.220***	-0.032***
	[0.058]	[0.008]
Size	-0.271***	-0.010***
	[0.069]	[0.001]
Size ²	0.007**	0.004**
	[0.002]	[0.002]
ICR	-0.000**	-0.000**
	[0.000]	[0.000]
Profitability	-0.525***	-0.076***
	[0.125]	[0.018]
Leverage	0.362***	0.053***
	[0.072]	[0.010]
N	18591	18591

* Significant at 10% level; **significant at 5% level; *** significant at 1% level.

EULER EQUATION AND ICFS: STRATEGY

- $$\frac{I_{i,t}}{K_{i,t-1}} = a + b_1 I_{i,t-1}/K_{i,t-2} + b_2 \Delta s_{i,t-1} + b_3 \Delta emp_{i,t-1} + b_4 CF_{i,t}/K_{i,t-1} + b_5 FC_{i,t} + \sum \gamma_i X_{i,k,t} + \sum \tau_k Y_{i,k,t} + \sum \varphi_t + e_{it}$$
- Where
 - I/K=investment on total assets
 - s=sales
 - Emp=employment
 - CF/K cash flow on total assets
 - FC=measure of financial constraint
 - X, Y, ϕ =country, sector, year and firm size dummies

RESULTS I: SBFC VS EFC

- SBFC
 - Finance constraint (-)
 - No difference in CF sensitivity between constrained and unconstrained firms
- EFC
 - FC (-)
 - Cash flow sensitivity significant for financially constrained firms → cost effect+information asymmetries?

	Firms with CF/K>0			
	SBFC	EFC	SBFC	EFC
I_t/K_{t-1}	0.000***	0.000***	0.000***	0.000***
	[0.000]	[0.000]	[0.000]	[0.000]
ΔS_{t-1}	0.141**	0.131**	0.141**	0.128**
	[0.051]	[0.051]	[0.050]	[0.051]
CF_t/K_{t-1}	0.160*	0.128*	0.162**	0.096
	[0.078]	[0.066]	[0.076]	[0.063]
FC	-0.064**	-0.131**	-0.054	-0.162**
	[0.028]	[0.050]	[0.050]	[0.049]
$CF_t/K_{t-1} * FC$			-0.102	0.433**
			[0.364]	[0.124]
R2	0.002	0.002	0.002	0.002
N	23942	23942	23942	23942

* Significant at 10% level; **significant at 5% level; *** significant at 1% level.

RESULTS II: ESTIMATES BY MACRO-REGION

- FC more important in WN than SE; insignificant in CEE
- SE: CF sensitivity highly important but barely significant (heterogeneity?)
- CEE: both constrained and unconstrained firms use cash flow to finance investment but more so among constrained firms → external FC+cost effect

	EU28	WN	SE	CESE	EU28	WN	SE	CESE
CF_t/K_{t-1}	0.128*	0.002	0.932*	0.105**	0.096	0.002	1.082	0.089**
	[0.066]	[0.295]	[0.430]	[0.029]	[0.063]	[0.311]	[0.710]	[0.019]
FC	-0.131**	-0.298***	-0.191*	-0.062	-0.162**	-0.298***	-0.162**	-0.090*
	[0.050]	[0.035]	[0.083]	[0.038]	[0.049]	[0.040]	[0.043]	[0.047]
$CF_t/K_{t-1} * FC$					0.433**	0.004	-0.390	<i>0.300**</i>
					[0.124]	[0.246]	[0.770]	[<i>0.141</i>]
R ²	0.002	0.002	0.007	0.004	0.002	0.002	0.007	0.004
N	23942	7835	7865	8242	23942	7835	7865	8242

* Significant at 10% level; **significant at 5% level; *** significant at 1% level.

FINANCIAL INSTRUMENTS AND INNOVATIVE INVESTMENT: EMPIRICAL STRATEGY

- We extend the previous analysis by looking at sources of finance of innovative investment;
- Question: is the use of Market vs non Market finance affected by FC?

- Augmented Euler Equation:

$$\begin{aligned} i_{i,t}^x &= a_1 + a_2 \Delta sales_{i,t-1} + a_3 \Delta emp_{i,t-1} + a_4 cashf_{i,t-1} + a_5 MKT_{i,t} + a_6 NMKT_{i,t} + a_7 EFC_{i,t} \\ &+ \sum \gamma_k country_k + \sum \theta_v sector_v + \varepsilon_{i,t} \end{aligned}$$

- MKT and NMKT=dummies for the use of market-based and non-market-based finance
- MKT=bonds and equities
- NMKT=banking and shadow banking
- Residual=self financing, private loans and grants
- Investment components: Innovative vs non-innovative; ICT, R&D, product and organizational innovation

ESTIMATION RESULTS: INNOVATIVE VS NON INNOVATIVE INVESTMENT

	Total investment				Innovative investment				Other investment			
	EU	NW	SE	CEE	EU	NW	SE	CEE	EU	NW	SE	CEE
Δs_{t-1}	-0.016 (0.067)	-0.157 (0.146)	-0.007 (0.113)	0.012 (0.097)	0.148 (0.145)	0.355 (0.242)	-0.097 (0.221)	0.276 (0.261)	-0.151** (0.077)	-0.207 (0.163)	-0.256* (0.136)	-0.077 (0.113)
Δemp_{t-1}	0.038 (0.036)	0.038 (0.063)	0.028 (0.052)	0.06 (0.065)	-0.055 (0.054)	-0.079 (0.068)	-0.03 (0.067)	-0.088 (0.146)	0.019 (0.038)	-0.064 (0.066)	0.041 (0.057)	0.048 (0.066)
$cashf_{t-1}$	0.547** (0.185)	0.390** (0.156)	2.303*** (0.450)	0.275 (0.175)	-0.174 (0.345)	0.035 (0.387)	-0.476 (0.903)	-0.317 (0.519)	0.519** (0.212)	0.468** (0.164)	2.414*** (0.508)	0.249 (0.181)
EFC	-0.578*** (0.051)	-0.594*** (0.153)	-0.463*** (0.078)	-0.700*** (0.076)	-0.685*** (0.116)	-0.108 (0.274)	-0.647*** (0.163)	-0.847*** (0.198)	-0.494*** (0.056)	-0.439** (0.161)	-0.422*** (0.088)	-0.624*** (0.080)
$NMKT_{t-1}$	0.898*** (0.036)	0.643*** (0.066)	1.017*** (0.061)	0.938*** (0.057)	0.373*** (0.082)	-0.023 (0.129)	0.430** (0.133)	0.593*** (0.154)	0.875*** (0.041)	0.751*** (0.080)	1.004*** (0.069)	0.836*** (0.063)
MKT_{t-1}	1.410*** (0.170)	1.513*** (0.230)	1.387*** (0.249)	0.981* (0.508)	1.475*** (0.181)	1.443*** (0.224)	1.667*** (0.272)	0.894 (0.582)	1.359*** (0.204)	1.526*** (0.278)	1.394*** (0.301)	0.669 (0.611)
R^2	0.533	0.543	0.538	0.454	0.258	0.296	0.227	0.192	0.484	0.488	0.501	0.412
N	10024	2616	4060	3348	8919	2313	3642	2964	7938	2118	3111	2709

* Significant at 10% level; **significant at 5% level; *** significant at 1% level.

- MKT more important than $NMKT$ (exc. CEE) especially for innovative investment
- Cash flow significant for non-innovative investment, especially in SE
- EFC : always significant, larger impacts for CEE

ESTIMATION RESULTS: ICT AND R&D INVESTMENT

	ICT				R&D			
	EU27	WN	SE	CESE	EU27	WN	SE	CESE
Δs	-0.088	0.106	-0.17	-0.118	0.089	-0.051	0.213	0.093
	[0.074]	[0.168]	[0.140]	[0.100]	[0.159]	[0.285]	[0.253]	[0.249]
Δemp	-0.016	-0.108	-0.039	0.134**	-0.007	0.055	-0.022	0.006
	[0.048]	[0.067]	[0.068]	[0.057]	[0.039]	[0.069]	[0.060]	[0.072]
cashf	-0.155	-0.976**	0.097	-0.085	0.059	0.316**	0.236	-0.139**
	[0.188]	[0.321]	[0.474]	[0.161]	[0.131]	[0.141]	[0.864]	[0.070]
EFC	0.295***	0.599***	0.312***	0.311***	0.447***	-0.832**	-0.306**	0.515***
	[0.056]	[0.166]	[0.083]	[0.085]	[0.093]	[0.264]	[0.145]	[0.149]
NMKT	0.018	-0.213**	0.147**	0.06	-0.09	-0.384**	-0.075	0.174
	[0.040]	[0.073]	[0.066]	[0.067]	[0.069]	[0.129]	[0.107]	[0.125]
MKT	0.716***	0.569**	0.880***	0.374	0.155	0.721**	-0.183	-0.564
	[0.175]	[0.251]	[0.260]	[0.467]	[0.243]	[0.277]	[0.382]	[0.662]
R2	0.492	0.536	0.463	0.344	0.436	0.433	0.398	0.383
N	6550	1771	2651	2128	2808	789	1229	790

† Significant at 10% level; ** Significant at 5% level; *** Significant at 1% level.

- ICT investment
 - Results broadly in line with total innovative investment
 - Lower impact of NMKT
- R&D investment
 - Weak evidence
 - MKT important in WN

ESTIMATION RESULTS: PRODUCT AND ORGANIZATIONAL INNOVATION

	New Products				Organizational Innovation			
	EU27	WN	SE	CESE	EU27	WN	SE	CESE
Δs	-0.049	-0.065	-0.158	0.105	0.001	0.08	-0.191	0.16
	[0.100]	[0.168]	[0.160]	[0.180]	[0.119]	[0.267]	[0.166]	[0.210]
Δemp	0.01	0.026	-0.018	0.127**	-0.065	-0.005	-0.11	0.056
	[0.052]	[0.080]	[0.069]	[0.058]	[0.066]	[0.049]	[0.087]	[0.057]
cashf	0.209	0.063	1.278**	0.059	-0.17	-0.72	-0.931	0.215
	[0.213]	[0.536]	[0.650]	[0.178]	[0.346]	[0.502]	[0.682]	[0.585]
EFC	0.418***	0.794***	-0.284**	0.568***	-0.201**	-0.199	-0.264**	-0.212
	[0.080]	[0.219]	[0.118]	[0.128]	[0.081]	[0.243]	[0.116]	[0.138]
NMKT	0.446***	0.267**	0.489***	0.567***	0.047	-0.032	0.058	0.132
	[0.057]	[0.102]	[0.091]	[0.104]	[0.059]	[0.103]	[0.099]	[0.109]
MKT	0.735***	0.795**	0.515*	0.854	0.352	0.358	0.379	-0.021
	[0.202]	[0.268]	[0.288]	[0.665]	[0.222]	[0.337]	[0.366]	[0.485]
R2	0.486	0.531	0.485	0.388	0.383	0.409	0.355	0.259
N	4097	1103	1793	1201	3458	1003	1427	1028

† Significant at 10% level; * Significant at 5% level; ** Significant at 1% level.

- New products
 - Results in line with total innovative inv.
 - Also in the role of NMKT
 - In SE and CESE no significant difference between MKT and NMKT
- Organizational innovation
 - No significant effect of fin structure
 - EFC negative for SE

CONCLUSIONS

- Mixed approach to estimate finance constraints:
 - Different interaction with CF
 - Cost effect seems to prevail in CESE
 - In SE, FC-firms tend to use more cash flow → bad internal financial health/revenue effect?
- Sources of finance:
 - Cash flow important to finance traditional investment, especially in SE
 - Market-based finance important for both innovative and traditional investment, especially in WN and SE; in CESE traditional (bank) sources play the main role → invalidity of the neutrality view
 - ICT and product innovation are more sensitive to the financial structure
 - In the WN region FC has little effect on innovative investment
- Policy implications?
 - Reduce (external) FC is important to increase investment
 - Market based finance might help to fill the Core-Periphery gap
 - → help deleveraging after the COVID19 Pandemics
 - Use of cash flow associated with cultural factors/low entrepreneurial skills? Further research needed!

THANK YOU!