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Does Venture Capital Foster Growth?

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The Impact of Venture Capital on Firm Growth and Innovation

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George Washington University (GWU), Round Table on Financing Innovation

Washington, 25-03-2011

Outline

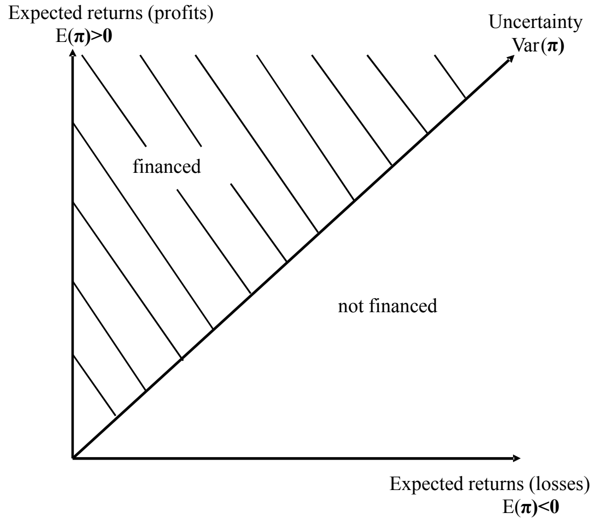
1. **Three economic functions** of venture capital
2. Specific financing function
   - theoretical argument
   - empirical indications
3. Impact study: **selection vs. causal effect**
   - data and research plan
   - empirical findings
4. Summary and conclusions
5. *Annexes*

Three economic functions

- **Specific financing function**: providing finance, when alternative sources are missing (or insufficient)
- **Selection function**: allocation of scarce financial resources in situations with high uncertainty and asymmetric information
- **Value added function**: active investors contribute not only capital, but also management experience, networks and professional business models.

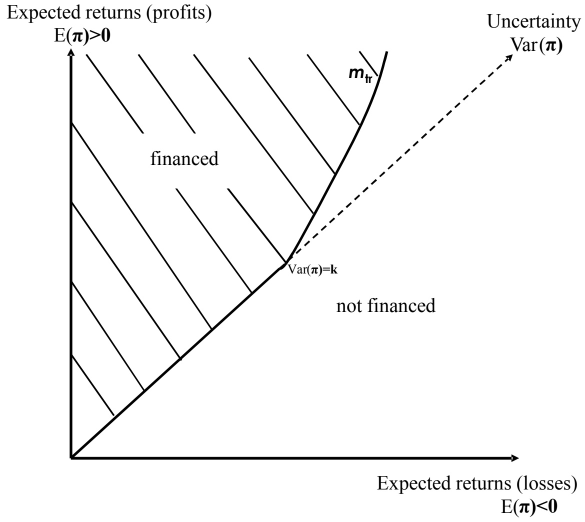
Perfect capital market without problem of asymmetric information

$$F(\pi) = \begin{cases} 1 & if \quad E(\pi) > 0 \\ 0 & if \quad E(\pi) \leq 0 \end{cases}$$



Asymmetric information and monitoring cost

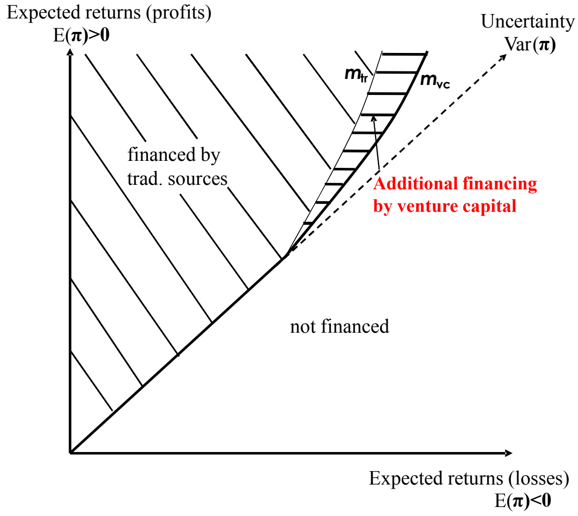
$$F(\pi)=\begin{cases}1 & if \quad E(\pi)>m\\ 0 & if \quad E(\pi)\le m\end{cases}$$



The specific vc-financing function

$$\frac{\partial m_{VC}}{\partial Var(\pi)}<\frac{\partial m_{tr}}{\partial Var(\pi)}$$

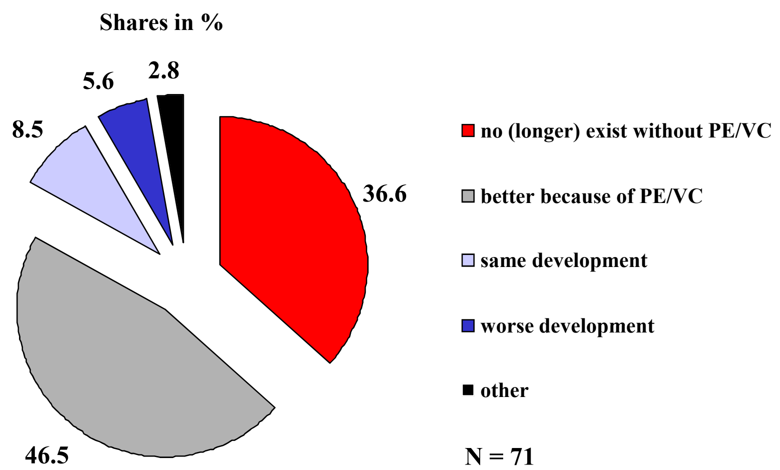
$$\Rightarrow F(\pi,m_{VC})\ge F(\pi,m_{tr})$$



Test group: why venture capital?

	Alternative sources of financing not ... possible	sufficient	attractive	N
	Shares in %			
IPOs (stock market)	92.3	2.6	5.1	39
Corporate bonds	86.5	2.7	10.8	37
Securities	70.6	11.8	17.6	34
Loans	46.7	40.0	13.3	45
Strategic investors	35.3	17.6	47.1	34
Owners	27	64.9	8.1	37
Mezzanine financing	25.8	45.2	29	31
Business Angels etc.	25	34.4	40.6	32
Public subsidies	16.2	83.8	-	37

Test group: how did venture capital affect your company?



Impact study: selection vs. causal effect

- Do *venture capital* financed firms perform better than others?
- If so, why?
  - because venture capitalists invest in firms with particularly high performance → **selection**
  - because of a direct causal impact → **value added function**

Data and research plan (1)

1. **166 vc-financed firms** operating in Austria
   - identification by AVCO and independent sources
   - almost identical performance of firms from different sources

2. **KSV firm database** (ca. 250.000 companies)
   - restriction to identical *legal forms*, *industry*, and *region*
   - selection of 4 ‘twins‘ by means of propensity score matching
   - structural variables:
     - *age*, *size* (employm., turnover, joint capital), *credit rating*
     - for a subset: *equity ratio*, *cash-flow* ratio, and *return on investment* (roi)
     - use also quadratic terms

Data and research plan (2)

3. **Enterprise survey** (conducted by Gerhard Schwarz)
   - Sample: 238 firms out of 829 (return rate = 28,7%)
     - Test group: 84 out of 166 (= 50,6%)
     - Control group: 154 out of 663 (= 23,2%)

4. **Second matching**
   - Eliminate new bias from lower return of control group
   - Make use of additional structural variables
     - geografic scope of the market
     - product innovations
     - use of intellectual property rights

Main results (further specifications in the annex)

Performance variable	PE/VC-backed	Control group … without matching	with matching … 1st stage	2nd stage
Innovation (share in sales)	43.6		27.4*	38.4
Export growth	26.2		14.8	25.9
Total asset growth	16.6		5.0	13.4
Employment growth	13.3	1.6*	3.3*	3.1*
Sales growth [1]	24.9	5.5*	9.4*	14.4*

[1] *KSV-database, ~1996-2004.*

N=209; R^2=0,31; * Differences to PE/VC backed companies is significant at 1%.

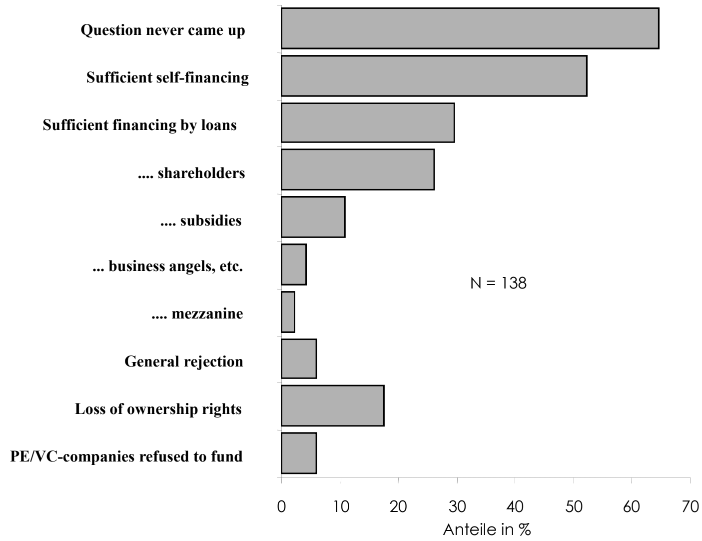
Summary

- Empirical evidence for all of three economic functions:
  - **Financing function**: venture capital bridges part of the financing gap (reduces “market failure“)
  - **Selection**: venture capital allocates scarce resources to firms with above average performance
  - **Value added function**: additional direct causal impact on firm growth, but not on firm innovation
    - commercialising innovations
    - implementating growth-oriented business plans

Annex

Supplementary tables and figures

Control group: why not venture capital?



Test group: how did venture capital affect your company?

Alternative specifications

Kontrollvariable	I.	II.	III.	IV.
Rechtsform	x	x	x	x
Region (NUTS 2)	x	x	x	x
Branche	x	x	x	x
Alter	x	x		x
Alter ^{2}	x	x		x
Mittlerer Umsatz	x	x		x
Mittlerer Umsatz ^{2}	x	x		x
Mittlere Beschäftigung	x	x		x
Mittlere Beschäftigung ^{2}	x	x		x
Gesellschaftskapital	x	x		x
Gesellschaftskapital ^{2}	x	x		x
KSV-Rating	x	x		x
KSV-Rating ^{2}	x	x		x
Eigenkapitalquote		x		
Eigenkapitalquote ^{2}		x		
Tilgungsdauer		x		
Tilgungsdauer ^{2}		x		
Cash-flow Quote		x		
Cash-flow Quote ^{2}		x		
ROI		x		
ROI ^{2}		x		
Absatzgebiet			x	x
Produktinnovationen			x	x
Schutzmaßnahmen f. geistiges Eigentum			x	x
Anzahl der Beobachtungen	33729[1])	4061[1])	228[2])	209[2])
R^2	0,269	0,320	0,264	0,309

1) KSV-Datenbank
2) Befragung

Results based on comparison of means

	PE/VC-finanziert ∅	Kontrollgruppe ... vor Matching ∅	t-Wert	... nach Matching ∅	t-Wert	*Impact-Faktor*
			MATCHING 1. Stufe			
Spezifikation I (N=33729; R2=0,27)						
Umsatzwachstum[1])	20,1	6,5	*7.48****	8,8	*2.41****	*1,292*
Beschäftigungswachstum[1])	11,8	2,9	*5.80****	2,9	*7.07****	*3,008*
Spezifikation II (N=4061; R2=0,32						
Umsatzwachstum[1])	20,2	5,5	*6.22****	9,7	*4.17****	*1,088*
Beschäftigungswachstum[1])	10,9	1,6	*5.10****	1,5	*6.94****	*6,431*
			MATCHING 2. Stufe			
Spezifikation III (N=228; R2=0,264)						
Umsatzwachstum[1])	24,9	9,2	*4.23****	11,0	*3.83****	*1,272*
Beschäftigungswachstum[1])	14,4	2,9	*5.47****	4,6	*3.4****	*2,127*
Umsatzwachstum[2])	26,3	6,1	*5.56****	6,9	*3.80****	*2,838*
Beschäftigungswachstum[2])	10,6	3,0	*1.83**	0,6	*1,59*	*18,092*
Exportwachstum[2])	30,8	14,7	*2.20***	27,0	*0,34*	*0,143*
Innovationen: Umsatzanteil[2])	45,6	28,2	*3.71****	35,3	*1,66*	*0,291*
Spezifikation IV (R=209; R2=0,31)						
Umsatzwachstum[1])	24,9	9,4	*4.13****	14,4	*2.38***	*0,725*
Beschäftigungswachstum[1])	13,3	3,3	*4.90****	3,1	*3.47****	*3,357*
Umsatzwachstum[2])	24,7	6,0	*4.96****	6,6	*3.32****	*2,718*
Beschäftigungswachstum[2])	8,5	3,2	*1,26*	-1,3	*1,49*	*-7,604*
Exportwachstum[2])	26,2	14,8	*1,5*	26,4	*0,03*	*-0,010*
Innovationen: Umsatzanteil[2])	43,6	27,4	*3.40****	38,4	*0,78*	*0,136*

1) KSV-Datenbank
2) Befragung

Results based on comparison of medians

	PE/VC-finanziert Median	Kontrollgruppe ... vor Matching Median	z-Wert	Kontrollgruppe ... nach Matching Median	z-Wert	*Impact-Faktor*
			MATCHING 1. Stufe			
Spezifikation I (N=33729; R2=0,27)						
Umsatzwachstum[1])	19,4	2,8	*5.06****	4,4	*4.17****	*3,464*
Beschäftigungswachstum[1])	13,6	2,4	*4.69****	4,2	*3.57****	*2,219*
Spezifikation II (N=4061; R2=0,32						
Umsatzwachstum[1])	11,1	2,8	*5.52****	4,4	*4.26****	*1,539*
Beschäftigungswachstum[1])	7,5	2,5	*4.18****	0,8	*5.00****	*8,456*
			MATCHING 2. Stufe			
Spezifikation III (N=228; R2=0,264)						
Umsatzwachstum[1])	20,3	3,6	*5.00****	4,9	*4.63****	*3,116*
Beschäftigungswachstum[1])	11,7	2,2	*4.11****	2,9	*2.94****	*3,079*
Umsatzwachstum[2])	14,5	5,7	*3.65****	4,1	*3.43****	*2,490*
Beschäftigungswachstum[2])	3,7	2,3	*0,85*	1,4	*1,3*	*1,565*
Exportwachstum[2])	19,4	8,1	*2.17***	10,2	*1,17*	*0,906*
Innovationen: Umsatzanteil[2])	35,0	20,0	*2.76****	20,0	*1.86**	*0,750*
Spezifikation IV (R=209; R2=0,31)						
Umsatzwachstum[1])	19,9	3,6	*6.10****	5,1	*2.91****	*2,905*
Beschäftigungswachstum[1])	9,8	2,0	*4.18****	4,2	*1.69**	*1,321*
Umsatzwachstum[2])	15,2	5,6	*3.61****	4,4	*2.84****	*2,424*
Beschäftigungswachstum[2])	3,7	1,9	*1,15*	2,5	*0,17*	*0,454*
Exportwachstum[2])	15,1	8,6	*1,34*	14,7	*0,32*	*0,024*
Innovationen: Umsatzanteil[2])	30,0	20,0	*1.85**	25,0	*0,78*	*0,200*

1) KSV-Datenbank
2) Befragung

Annex

Thank you for your attention!