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# Recent trends in Venture Capital academic literature

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# Agenda

- The role of venture capital in the financing of entrepreneurial ventures
- Global trends in the research on VC
- Research output from VICO 1.0
  - Investment patterns of European VC investors
  - Impact of different types of VC on the economic and innovation performance of investee firms
  - Internationalization
  - Certification and removal of financial constraints
- Key highlights and future research



# **The role of venture capital in the financing of entrepreneurial ventures**

# Venture capital

- **Venture Capital (VC)**: financial capital provided by external professional investors to early-stage, high-potential, high risk entrepreneurial ventures (EVs):
  - New owner-managed firms created with the aim of developing and exploiting commercially an innovative technology
  - Examples: Facebook, Google, Amgen, Skype...
- EVs are:
  - An important source of new jobs (Audretsch, 1995)
  - An important source of radical innovations (Schneider and Veugelers, 2010)

# Entrepreneurial ventures and financial constraints

- EVs are exposed to severe financial constraints (e.g. Carpenter and Petersen 2002, Denis 2004)
- **External finance is costly for EVs:**
  - Uncertainty
    - Difficult to predict future revenues, payback time, cash flows...
    - Asset intangibility and specificity (no collateral)
  - Information asymmetries
    - Hidden information and hidden action
    - Appropriability concerns
    - Lack of track record
- **Debt is not an option....**

# Venture capital

- **VC investors** are better able to deal with information asymmetries:
  - Intermediaries with superior **screening** capabilities (Gorman and Sahlman 1989):
    - Specialization and syndication
  - Intensive **monitoring** (Kaplan and Stromberg 2001):
    - “hands on” investors, staged financing
- Fundamental for the development of high-potential innovative entrepreneurial ventures and economic growth (Gompers and Lerner 2001; Samila and Sorensen 2011)

# Value added vs cost of VC



Substantial infusion of **financial resources**

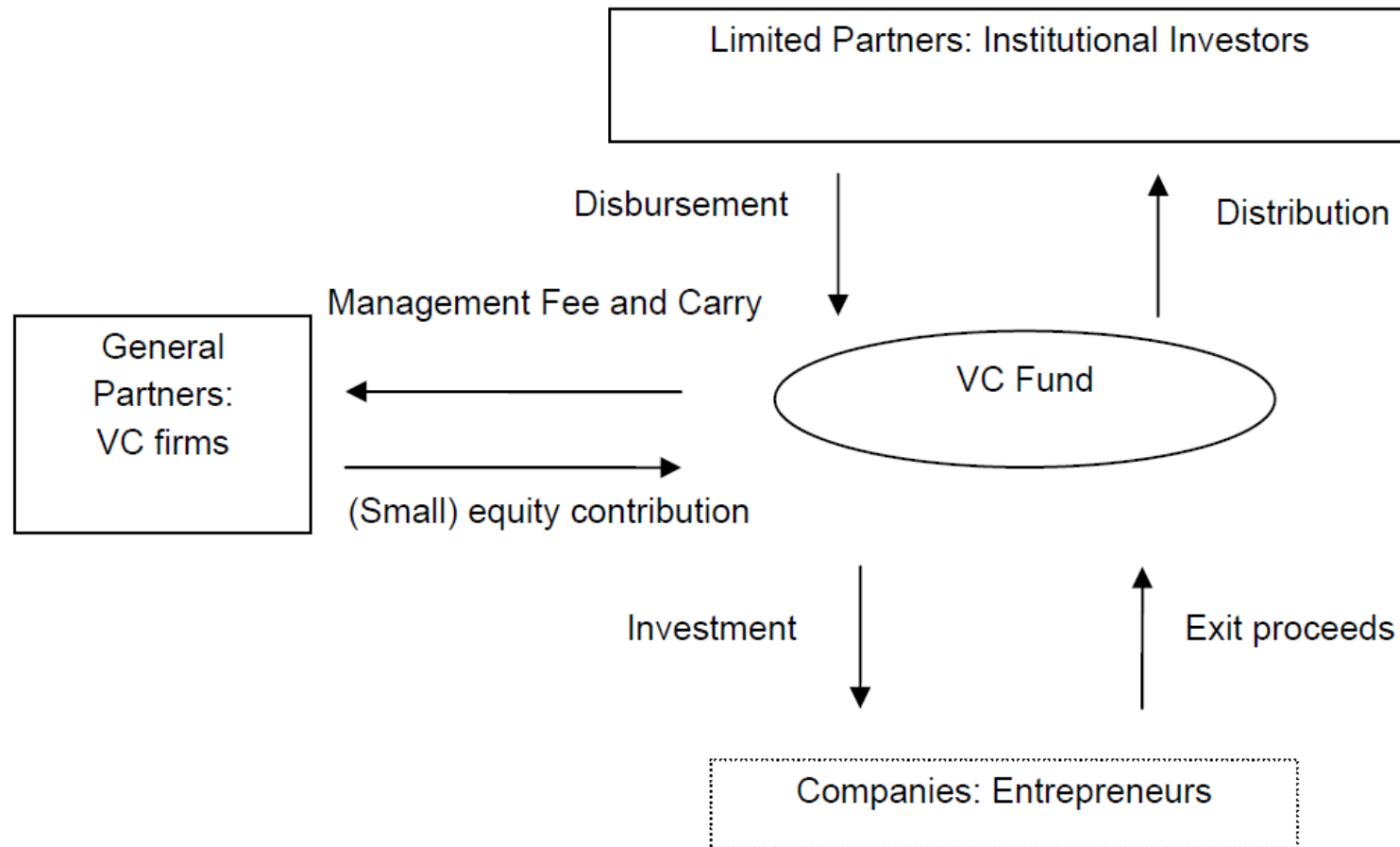


**Professionalization** (Hellmann and Puri, 2002): Enlargement of firm's resources and capabilities due to the **coaching** performed by the VC investor and its **network of business contacts**



Increase of **agency costs** as the financial and/or strategic objectives of the VC investors may diverge from those of firm's owner-managers

# Typical VC investment process



Da Rin, Hellmann, Puri (2011, NBER)



# Heterogeneity of VC firms

- Heterogeneity of VC investors:
  - IVC, Independent VC (US style limited partnership)
  - CVC, Corporate VC: affiliated to a non-financial corporation
  - BVC, Bank-controlled VC: affiliated to a financial intermediary
  - GVC, Governmental VC: government owned management company
- Considerable differences relating to
  - The intensity of financial objectives
  - The intensity and type of strategic objectives
  - The ability to mobilize resources and capabilities that can be leveraged by portfolio EVs

# Heterogeneity of VC firms

	IVC	CVC	BVC	GVC
<b>Relative intensity of financial objectives</b>	High	Low	Low	Low
<b>Type of strategic objectives</b>	Raising additional capital from institutional investors	Access EVs' advanced technology (technology window)	Generate demand for bank services	Social and political objectives (job generation, local development)
<b>Resources and capabilities</b>	Capabilities and business contacts of the IVC investor	Resources, capabilities and business contacts of the parent company	Resources, capabilities and business contacts of the parent bank	Capabilities and business contacts of the GVC investor

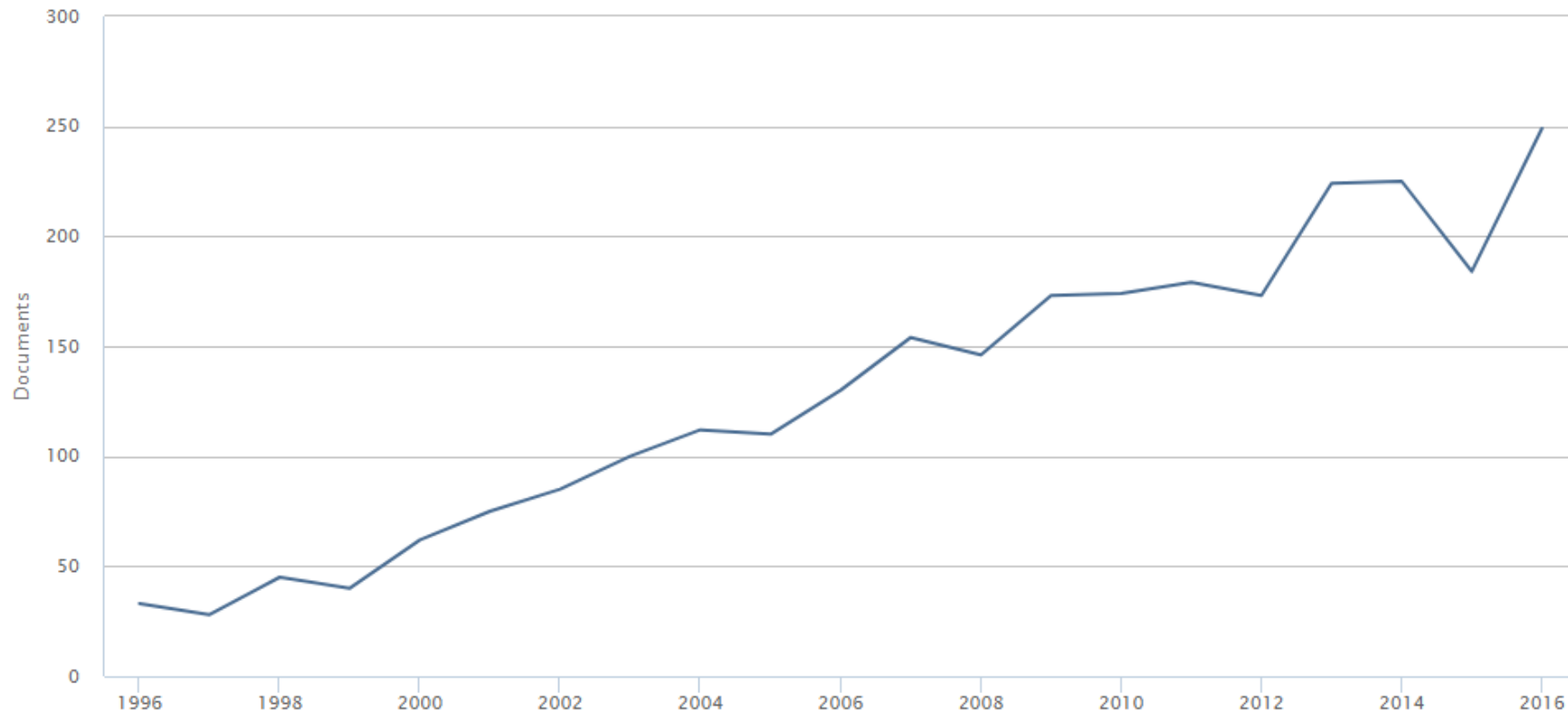


# Global trends in the research on VC

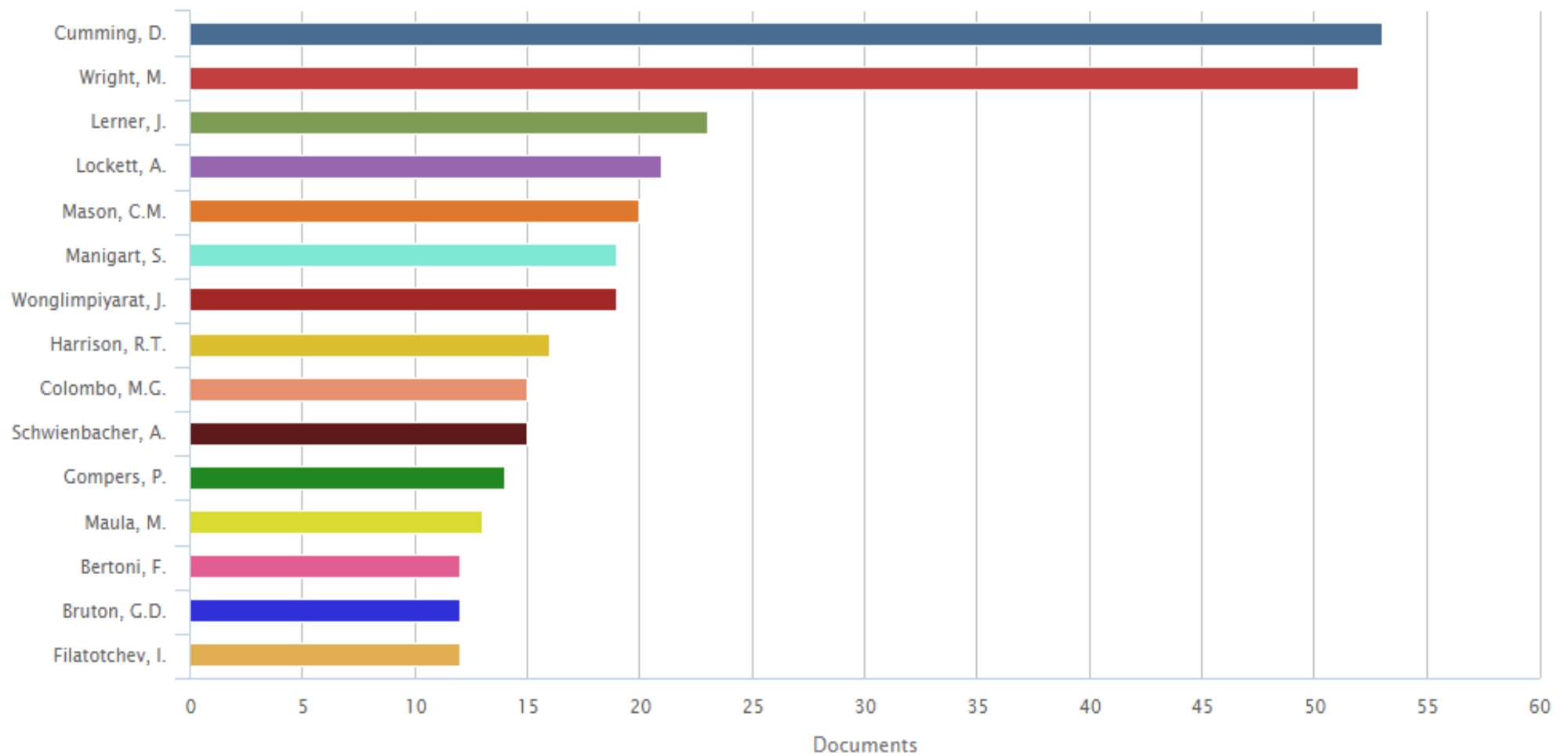
# Research on venture capital: some numbers

- Great interest in the scientific community!
- Scopus query using “Venture Capital” as keyword:
  - Period: 1996-2016
  - Management/Economics/Finance journals
  - Only articles and reviews published in English
  - **Output: 2,701 documents!**

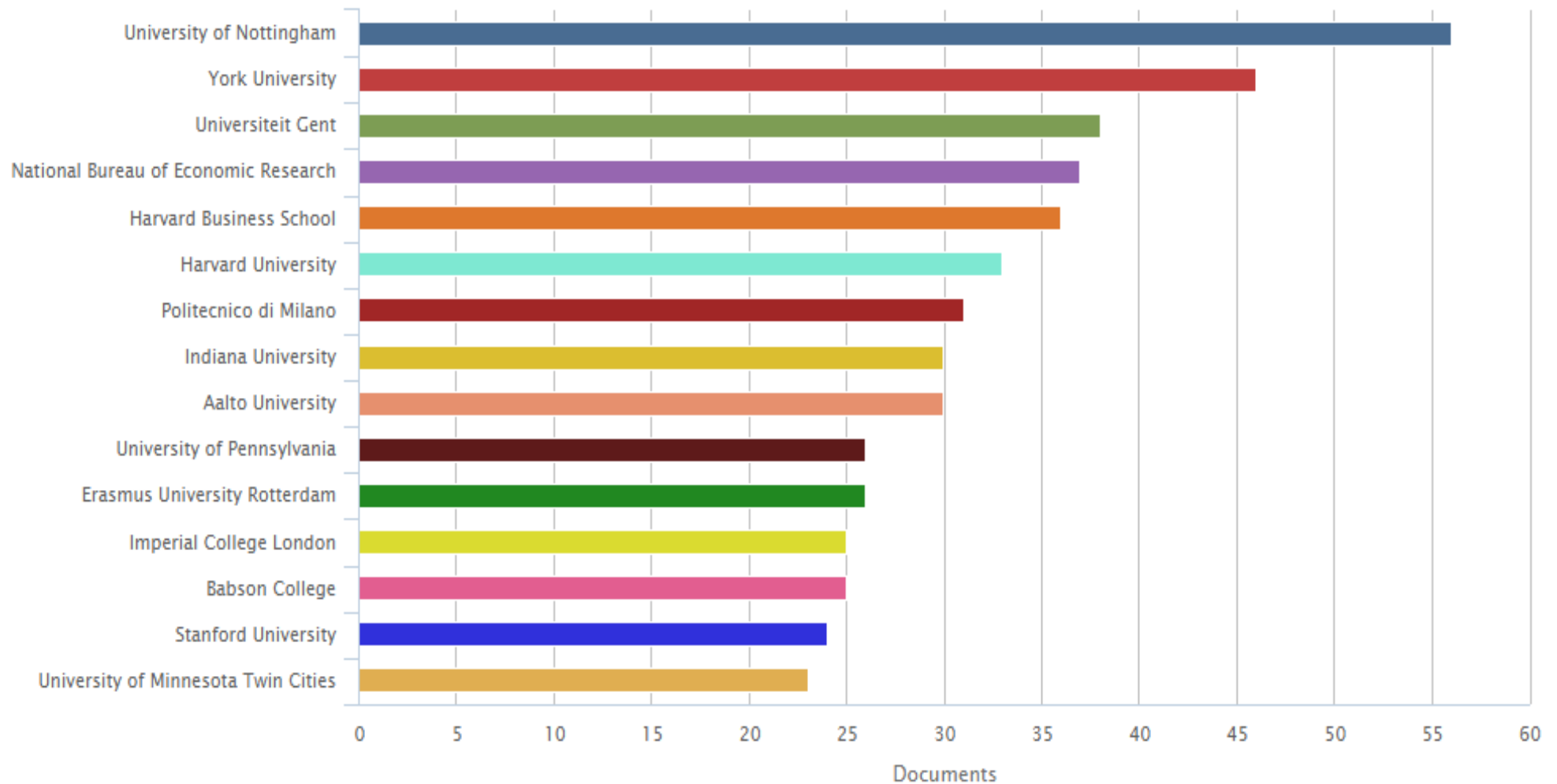
# Academic articles on VC by year 1996-2016



# Top authors (number of articles) 1996-2016



# Top institutions (number of articles) 1996-2016



# Journals (number of articles) 1996-2016

Journal	N. articles	%
Venture Capital	199	7.4%
Journal Of Business Venturing	127	4.7%
Small Business Economics	86	3.2%
Journal Of Private Equity	56	2.1%
Entrepreneurship Theory And Practice	53	2.0%
International Journal Of Entrepreneurship And Innovation Management	46	1.7%
Research Policy	40	1.5%
Journal Of Corporate Finance	36	1.3%
Journal Of Financial Economics	36	1.3%
International Journal Of Technology Management	33	1.2%
Journal Of Commercial Biotechnology	32	1.2%
Strategic Management Journal	31	1.1%
Journal Of Banking And Finance	28	1.0%
Technovation	28	1.0%
International Journal Of Entrepreneurship And Small Business	27	1.0%
Entrepreneurship And Regional Development	26	1.0%
International Entrepreneurship And Management Journal	26	1.0%
Journal Of Small Business And Enterprise Development	26	1.0%
International Small Business Journal	25	0.9%
Journal Of Small Business Management	25	0.9%
Journal Of Management Studies	23	0.9%
Journal Of Technology Transfer	22	0.8%
Review Of Financial Studies	20	0.7%
Others	1650	61.1%
<b>Total</b>	<b>2701</b>	<b>100.0%</b>



# Some useful references

- How VC works:
  - Sahlman, W. A. (1990). The structure and governance of venture-capital organizations. *Journal of financial economics*, 27(2), 473-521
  - Hellmann, T., & Puri, M. (2002). Venture capital and the professionalization of start-up firms: Empirical evidence. *The journal of finance*, 57(1), 169-197.
- Surveys on VC/entrepreneurial finance research:
  - Denis, D. J. (2004). Entrepreneurial finance: an overview of the issues and evidence. *Journal of corporate finance*, 10(2), 301-326.
  - Da Rin, M., Hellmann, T. F., & Puri, M. (2011). *A survey of venture capital research* (No. w17523). National Bureau of Economic Research.
  - Metrick, A., & Yasuda, A. (2011). Venture capital and other private equity: a survey. *European Financial Management*, 17(4), 619-654.
  - Chemmanur, T. J., & Fulghieri, P. (2013). Entrepreneurial finance and innovation: An introduction and agenda for future research. *The Review of Financial Studies*, 27(1), 1-19.
  - Drover, W., Busenitz, L., Matusik, S., Townsend, D., Anglin, A., & Dushnitsky, G. (2017). A Review and Road Map of Entrepreneurial Equity Financing Research: Venture Capital, Corporate Venture Capital, Angel Investment, Crowdfunding, and Accelerators. *Journal of Management*, forthcoming.



# Research output from VICO 1.0

# Key issues addressed with VICO 1.0

- Large scale evidence provided by the VICO 1.0 dataset concerning the **ecology of the VC landscape in Europe**
- Investment **selection**:
  - What are the investment criteria of European VCs?
  - How do different VC investors select portfolio EVs?
- **Treatment effect**:
  - What is the effect of the receipt of VC on the performance (e.g. growth, innovation, access to subsequent funding) of portfolio EVs? Do VCs nurture the EVs they invest in?
  - Does this effect depend on type of VC investor?

# Research issues addressed using VICO 1.0

1. Investment patterns of European VC investors
2. Impact of different types of VC on the economic and innovation performance of investee firms
3. Internationalization of VC activity
4. Certification and removal of financial constraints

# **Investment patterns of European VC investors**

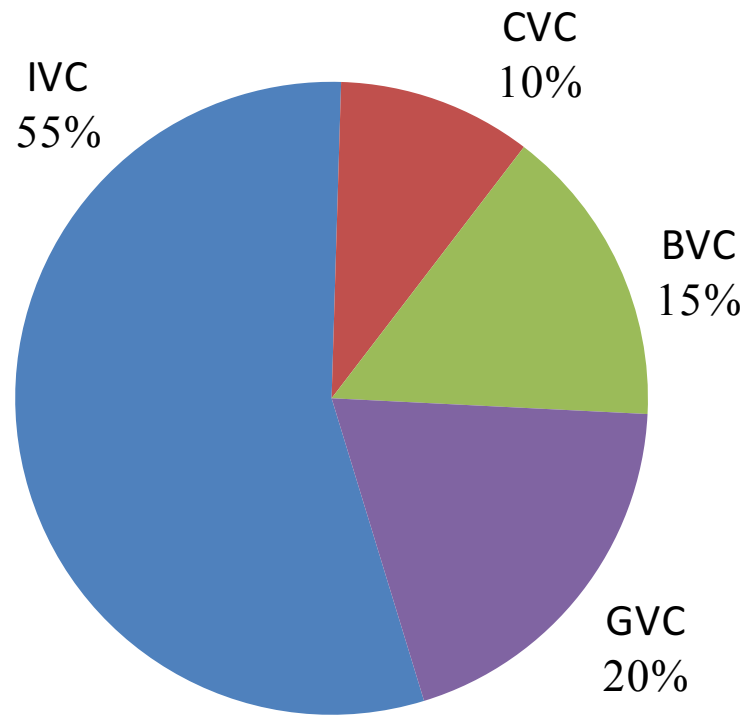
# Bertoni, Colombo and Quas (2015 SBE)

## Patterns of specialization of VC investors

- VICO 1.0 data to compare the **relative specialization of different VC investors** across several dimensions:
  - Company characteristics: Industry, Age, Size
  - Investment characteristics: Syndication, Duration, Distance
- Comparison with US evidence
- Unit of analysis: the investment:
  - 1,663 VC investments
  - by 846 VC investors
  - in 737 European firms
  - Focus on first investment by each VC investor in portfolio firms

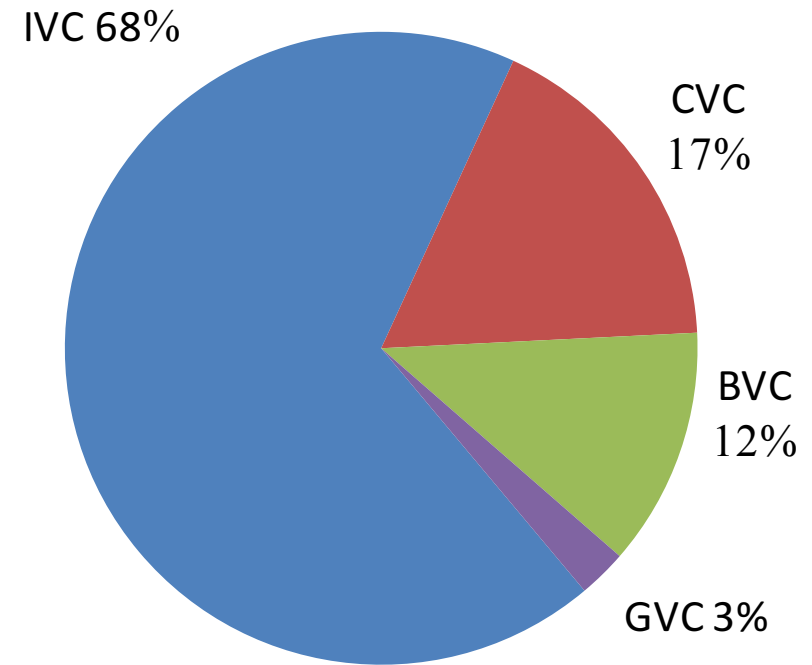
# Bertoni, Colombo and Quas (2015 SBE)

## Distribution of VC investments by type of VC investor: Europe and the US



*EUROPE*

Source: VICO 1.0 database



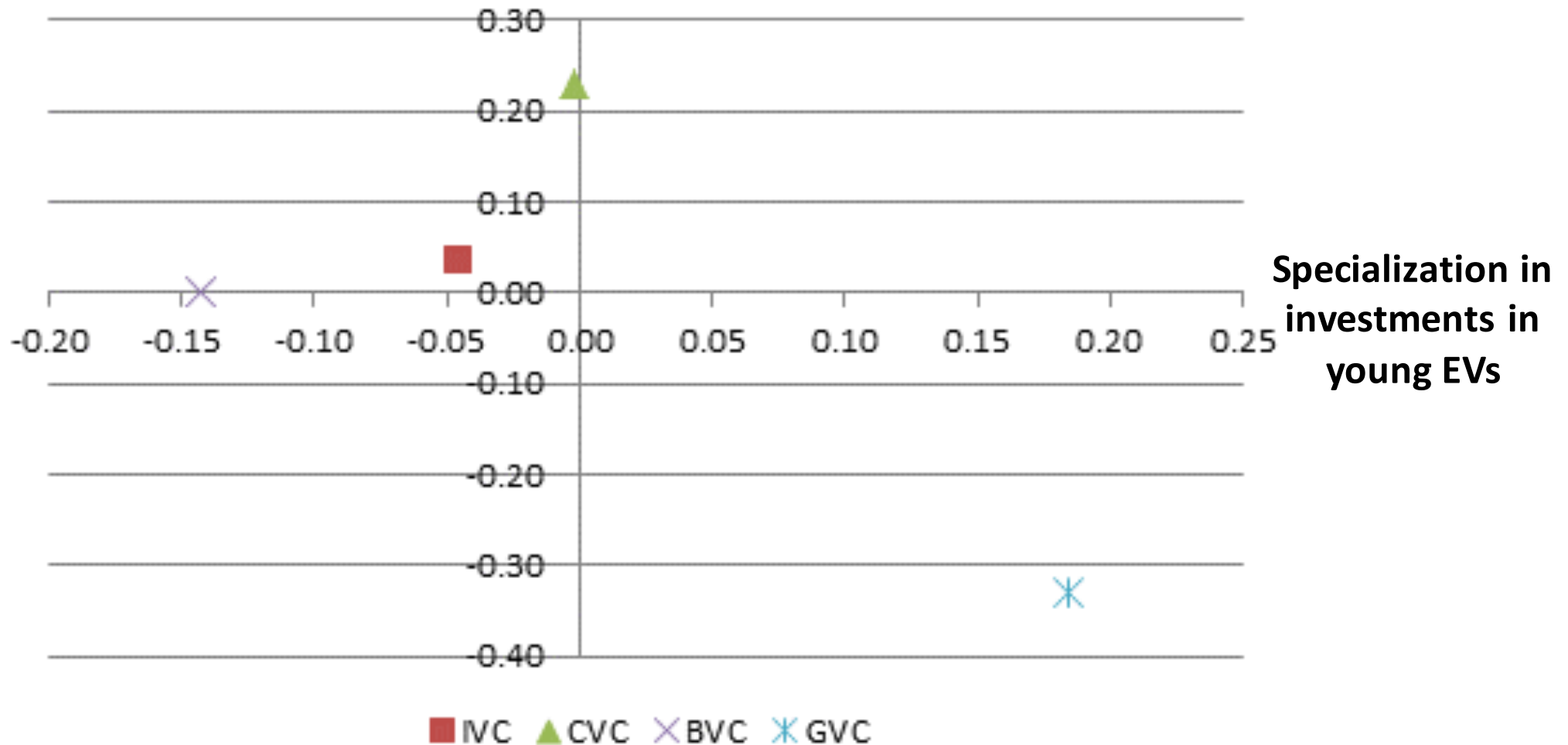
*USA*

Source: Thompson One database

# Bertoni, Colombo and Quas (2015 SBE)

## Investee firm characteristics

### Specialization in cross-border long distance investments





# Bertoni, Colombo and Quas (2015 SBE) IVC investors

- Less specialized in young, small companies in early development stage
  - **Risk aversion**
  - Need to grandstand (Gompers, 1996)
- More specialized in **relatively distant** companies
  - Silicon Valley “20 minutes rule” does not apply
  - Results coherent with Fritsch and Schilder (2008)

# Bertoni, Colombo and Quas (2015 SBE)

## CVC investors

- Invest in industries with high technological ferment (Internet) but **weak appropriability** (few investments in biotechnologies)
  - “Open innovation” strategy (Dushnitsky, 2012), looking for a “technology window” (e.g. Siegel et al 1988)
- Investee **companies located abroad**, far away from their premises
  - Results coherent with Gupta and Sapienza (1992) and Mayer et al. (2005)
- But investment patterns similar to the “average” investor as to company size, age and development stage
  - **Both IVC and CVC investors are not particularly attracted by seed and start-up investments**

# Bertoni, Colombo and Quas (2015 SBE)

## BVC investors

- **Passive investment strategy**
  - More specialized in **larger and older** companies, in **later stages of development**, closer to IPO
  - More prone to syndication, to reduce risk
  - Shorter duration, specialized in exit through IPO
  - Target **local companies**
- Interested in establishing future bank relationships with investee company (Hellman et al., 2008)

# Bertoni, Colombo and Quas (2015 SBE) GVC investors

- **Specialized in investments not attractive for other investor types** (fill the financing gap left by private VC investors, Lerner 1999; 2002)
  - Biotechnology: Longer product development cycle
  - Young small companies in earlier development stage
  - Longer investment duration
  - More prone to a “go it alone” investment strategy
- Almost exclusively local investments
  - Created to implement regional development objectives (Leleux and Surlemont 2003)
  - Results coherent with Gupta and Sapienza (1992), Mayer et al. (2005), Fritsch and Schilder (2008)

# Croce, D'Adda and Ughetto (2015 SBE) BVC investment patterns

- **Key research questions:**
  - What drives the investment strategy of BVCs?
  - Are BVCs strategic investors?
- Focus on:
  - EV's ex ante **risk of facing financial distress**
  - EV's **debt levels** after receipt of VC
- Sample of VICO 1.0 EVs that received BVC financing between 1994 and 2004
- “Two-step” matching procedure in order to build a control group composed of:
  1. Comparable firms that received financing from IVCs
  2. Comparable non-invested firms

# Croce, D'Adda and Ughetto (2015 SBE) Results

- Before the first round of financing:
  - **BVC-backed firms show a lower risk of financial distress**, in comparison with both the IVC-backed firms and non-invested firms
- After the investment:
  - **BVC-backed firms exhibit a significant increase in debt exposure**, compared to non-invested firms
- Evidence supporting the view that **BVCs act as strategic investors**

# Colombo and Shafi (2016 SMJ)

## Determinants of CVC-EV tie formation

- Replication study of Dushnitsky and Shaver (2009) in an institutional setting different from the United States
- Focus on:
  - Risk of **knowledge misappropriation** when CVC and EV operate in the same industry
  - **Protection offered by legal defenses (IPP)**
  - Likelihood of **CVC-EV tie formation**
- Dyad level analysis on the probability of CVC-EV tie formation (first round of funding):
  - 56 realized investments versus a counterfactual of 47,652 non realized investments

# Colombo and Shafi (2016 SMJ) Results

- **Key independent variables:**
  - Industry overlap between CVC and EV
  - Strength of IPP regime in the EV's industry (e.g. pharmaceuticals)
- **Results:**
  - Consistent with the results of D&S, European EVs are more likely to form ties with same-industry CVCs under a strong IPP regime
  - In contrast to D&S, European EVs are still attracted to same-industry CVCs in a weak IPP regime (but the strength of this attraction is lower)
- **Institutional characteristics make the European VC market different from the U.S.**



# **Impact of different types of VC on the economic and innovation performance of investee firms**

# Croce, Marti & Murtinu (2013 JBV)

## The treatment effect of VC on productivity growth

- Evidence on the **effect of IVC on the efficiency of European high-tech entrepreneurial ventures**:
  - TFP, labor and capital productivity growth
- **Key research questions**:
  - Do EVs experience higher TFP growth because of IVC?
  - Is this effect driven by a selection or a treatment effect?
- Methodology: Matched sample extracted from the VICO dataset:
  - 267 VC-backed firms
  - 429 twin non-VC-backed firms
  - observed from foundation (or 1994) up to 2010 (or exit)

# Croce, Marti & Murtinu (2013 JBV)

## Results

- **No positive selection effect as regards TFP**
  - Contrary to the US evidence (e.g. Chemmanur et al. 2011), but in line with previous evidence relating to EU countries (e.g. Bottazzi et al., 2008; Bertoni et al. 2013)
- **Positive treatment effect on TFP growth**
  - The positive treatment effect on TFP growth materializes in the first two years after VC entry
  - The positive treatment effect persists after VC exit

# Colombo and Murtinu (2016 JEMS)

## Comparing IVC and CVC

- Evidence on the effect of **IVC and CVC** on the overall economic performance (OEP) of European EVs
- Focus on:
  - Differential treatment effect of IVC and CVC
  - Dynamics of the treatment effects
- Matched sample composed of:
  - 215 IVC-backed firms
  - 44 CVC-backed firms
  - 243 twin non-VC-backed firms

# Colombo and Murtinu (2016 JEMS) Results

Type of VC investor	% increase of OEP	% short term increase of OEP	% long term increase of OEP
<b>IVC</b>	+41%	+26%	+58%
<b>CVC</b>	+50%	Not significant	+67%

# Cumming, Grilli and Murtinu (2017 JCF)

## Comparing IVC and GVC: exit

- Evidence on the effect of **IVC and GVC** (and IVC-GVC syndicates, GVCSYND) on the **exit performance** of EVs:
  - Successful exit: IPO or trade sale
  - Unsuccessful exit: liquidation
  - No exit
- Panel data multinomial logit model predicting the likelihood of successful and unsuccessful exit
- Sample of 5901 European EVs, out of which:
  - 420 IVC-backed
  - 127 GVC-backed
  - 62 GVCSYND-backed
- **Main result: likelihood of successful exit: GVCSYND > IVC >GVC**

# Grilli & Murtinu (2014 RP)

## Comparing IVC and GVC: growth

- Focus on:
  - The **treatment effect of GVC and IVC** and on the **sales and employment growth** of European EVs
  - The treatment effect of syndicated investments, depending on who is the lead investor
- Sample composed of:
  - 239 GVC-backed firms, out of which 23 received a subsequent IVC round
  - 536 IVC-backed firms, out of which 38 received a subsequent GVC round
  - 65 GVC-IVC syndicate backed firms
  - Matched sample of non-VC-backed firms

# Grilli & Murtinu (2014 RP)

## Results

- **IVC** has:
  - A sizable **positive treatment effect on yearly sales growth** (+20-40%)
  - A negligible treatment effect on employment growth
  - The positive effect on sales growth seems to be traceable to the value added provided by the IVC investor rather than merely to the amount of financial support
- **GVC** has a negligible treatment effect on both sales and employment growth
- **GVC-IVC** syndicated investments have:
  - A sizable **positive treatment effect on yearly sales growth**, but only if the lead investor is a IVC investor (+50-60%)
  - A negligible treatment effect on employment growth



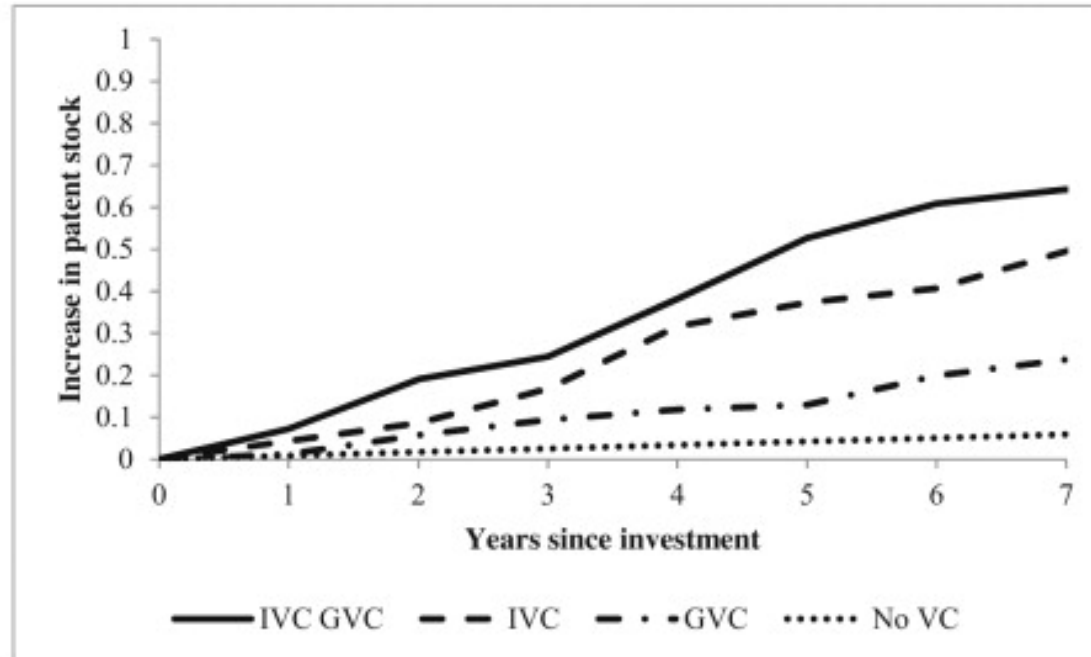
# Bertoni and Tykvova (2015 RP)

## Comparing IVC and GVC: innovation

- Evidence on the effect of GVC and private VC on the **patenting behavior** of European biotech & pharmaceutical EVs
- Sample :
  - 159 VC-backed firms
  - Matched sample of 711 non-VC-backed firms.
- Focus on:
  - Identity of the VC investor: GVC vs. IVC
  - Syndication

# Bertoni and Tykvoa (2015 RP)

## Key results



- **IVC-backed companies generate more inventions than GVC-backed ones:**
  - No difference between GVC-backed EVs and non VC-backed EVs
  - The direct effect of GVCs on invention is thus negligible
- **GVC-backed EVs do only better than non-VC-backed EVs when the GVC syndicates with an IVC**

# **Internationalization of VC activity**

# Devigne, Vanacker, Manigart and Paeleman (2013 SBE)

## The performance of domestic and cross-border investments

- Focus on **cross-border as opposed to domestic VC** investors and the **growth** of EVs:
  - Growth: sales, total assets and payroll expenses
- Results:
  - EVs backed by **domestic** VCs exhibit higher growth in the **short term** compared to companies backed by cross-border VCs
  - In the **medium term**, EVs initially backed by **cross-border** VCs exhibit higher growth compared to companies backed by domestic VCs
  - **EVs that are initially funded by a syndicate comprising both domestic and cross-border VC investors exhibit the highest growth**

- Focus on the way in which the **exit mode** (IPO, trade sale, or write-off) of VC investments is influenced by the **additional exit opportunities brought by cross-border VC investors**
- Sample of 1,062 VC investments in 462 VICO 1.0 companies
- Results show that **cross-border VC investments compensate for inadequate local exit conditions:**
  - Trade sales are facilitated in proportion to the size of the M&A market in the cross-border investors' country
  - International syndicates are also quicker to write off their non-performing investments

# **Certification and removal of financial constraints**

# Bertoni Croce and Guerini (2015 JCF)

## IVC and financial constraints

- Focus on the **effect of IVC on the financial constraints** of EVs
- Sample comprising 128 IVC-backed and 233 non-VC-backed EVs
- Results:
  - IVC alleviates the financial constraints of EVs (i.e. EVs are no more dependent on internally generated cash-flows)
  - This effect is economically and statistically significant only after companies receive a follow-on round of IVC
- Stronger **informative content of follow-on rounds**:
  - Certification

# Guerini and Quas (2016 JBV)

## The certification role of GVC

- Focus on the **screening and certification** abilities of GVC firms in Europe:
  - Are GVC firms able to select promising companies and to certify them to PVC investors?
- Sample:
  - 183 companies received their first round of financing from 81 different GVC firms
  - Control groups
- Results:
  - **GVC funding increases the likelihood that EVs will receive subsequent private VC (at least 3 times)**
  - **GVC-funded EVs that have received a subsequent round from private VCs do not underperform** other private VC investments





## **Key highlights and future research**

# Key highlights

- 1. The investment patterns of different VCs are very heterogeneous:**
  1. IVC avoid investing in the seed stage
  2. Investments from CVCs are less likely in industries with high IPP (e.g. pharma & biotech)
  3. BVC investors are attracted by older and less risky EVs, which offer interesting opportunities for cross-selling of bank services
- 2. IVC has:**
  1. **A large very positive treatment effect on European EVs**, in terms of TFP, sales growth, and innovation performance
  2. **A negligible selection effect**, contrary to the US
  3. Played an important **certification role in removing EVs' financial constraints**
- 3. The treatment effect of CVC on TFP also is positive**, but its dynamics and are peculiar (patient investors)

# Key highlights

4. European governments have tried to fill the seed investment gap through the launch of GVC funds:
  - **GVC funds have invested in small and young companies, notably in biotech**
5. With few exceptions, **the “treatment effect” of GVC** on successful exit, sales growth, and innovation performance in Europe:
  - **Has been poor**
  - Has been considerably better when GVCs have entered a IVC-led syndicate
6. However, the bulk of value that GVC adds is the result of **GVC firms' screening abilities**
7. A **mix of domestic and cross-border VC firms** leads to better performance in terms of growth and successful exits

# Future avenues of research

- **The effect of the crisis:**
  - Investment patterns of different VC investors pre- and post-crisis
  - Role of different types of VCs on firm performance during the crisis
- **Complementarities between VC and other sources of finance:**
  - Angel finance
  - Accelerators
  - Crowdfunding
- **Geography of VC:**
  - Emergence of new VC markets
  - Agglomeration of VC activity around large metropolitan areas
  - Attraction of cross-border investments