KAUFFMAN

The Foundation of Entrepreneurship

KAUFFMAN DISSERTATION EXECUTIVE SUMMARY

Part of the Ewing Marion Kauffman Foundation's Emerging Scholars initiative, the Kauffman Dissertation Fellowship Program recognizes exceptional doctoral students and their universities. The annual program awards up to fifteen Dissertation Fellowship grants of $20,000 each to Ph.D., D.B.A., or other doctoral students at accredited U.S. universities to support dissertations in the area of entrepreneurship.

Since its establishment in 2002, this program has helped to launch world-class scholars into the exciting and emerging field of entrepreneurship research, thus laying a foundation for future scientific advancement. The findings generated by this effort will be translated into knowledge with immediate application for policymakers, educators, service providers, and entrepreneurs as well as high-quality academic research.

Kauffman Dissertation Fellowship Program KDFP Kauffman Dissertation Fellowship Program KDFP

www.kauffman.org/kdfp

Venture Capital and Innovation

Juanita Gonzalez-Uribe

Submitted in partial fulfillment of the
requirements for the degree of
Doctor of Philosophy
under the Executive Committee
of the Graduate School of Arts and Sciences

COLUMBIA UNIVERSITY
2013

Abstract

This dissertation delves into the relation between venture capital and innovation. There are three main findings. First, venture funding is associated with an increase in the rate of companies' innovative activity. However, this increase appears to occur at the expense of quality. Second, venture funding increases the diffusion of companies' technical knowledge. Results are consistent with two mechanisms: venture capital investors certify the value of innovations to the general public, and facilitate communication among companies in their portfolios. Third, companies in the same venture capital network produce similar innovations, especially if the companies belong to different industries or geographies.

Dissertation Summary: Venture Capital and Innovation

Juanita González-Uribe

May 31, 2013

The impact of Venture Capital (VC) on innovation has been a popular topic in the finance literature for the past two decades. Although most of the empirical work at the industry level finds that VC increases innovative activity (e.g., Kortum and Lerner (2000), Mollica and Zingales (2007), Hirukawa and Ueda (2008) and Popov and Roosenboom (2009)), evidence at the company level suggests that this impact is weak at best (e.g., Engel and Keilbach (2007), Caselli et al. (2009), and Stuck and Weingarten (2005)).

Theoretically, even if VC spurs innovation at the industry level it is not clear that VCs necessarily encourage the innovative activity of the companies they invest in. While VC can positively affect the rate of industrial innovation by facilitating the diffusion of technical knowledge, or increasing access to financial resources, once companies are VC financed incentives to innovate may be curtailed. For example, the competition for future funding inside VC portfolios can push companies to exert more effort on the development part of research and development (R&D), relative to research. In light of these complex trade-offs, the studies that use data at the company and at the industry level do not necessarily offer contradictory evidence. More systematic evidence is required to have a better understanding of how VC interacts with innovation.

This dissertation provides new evidence on the interaction between VC and innovative activity and departs from the existing literature on two accounts. First, the data used is at the company-level

and corresponds to U.S.-based startups. In contrast, existing research using data at the company level is based on European-based companies. This is an important departure as the landscape for financing innovation has been shown to be fundamentally different across these two regions. While the role of VC in the U.S. is mainly to target high-risk, high-payoff innovations, in Europe this role seems to be partially filled by business-groups (Belenzon et al. (2013)). Thus, it is likely that the types of companies that are VC financed in each region are different, and that the effect of VC on companies' innovation differs. In addition, existing work on the impact of VC at the company level is for the most part restricted to startups that ultimately went public (e.g., Stuck and Weingarten (2005) and Caselli et al. (2009)). Since approximately only a third of the companies that are VC-backed go public, and going public has its own effect on innovation (e.g., Bernstein (2012)), this dissertation offers a more comprehensive analysis of how VC interacts with innovation.

The second departure from the existing literature regards the topics covered in this study. While existing work has focused on the effect of VC on the rate of innovative activity, the three chapters in this dissertation explore other potential effects of VC, and offer a broader understanding of the interaction between VC and innovation.

Chapter 1: Venture Capital and Innovative Activity (with Bruce Kogut and Morten Sorensen)

The first chapter studies the effect of VC on the composition of innovative activity of companies. Following a growing literature that uses patent-based metrics to characterize innovation at the company level (e.g., Seru (2012) Lerner et al. (2011), Bernstein (2012)), we use data on patent filings and patent citations to explore how VC affects the quality, novelty, and nature of the research output of companies. Specifically, we compare the number of patent filings, and the quality of those filings, before and after companies are first financed by a venture capital investor.

There are two main findings. First, venture funding is associated with an increase in the rate of

companies' innovative activity. This result is consistent with the evidence at the industry level, and stands in contrast to existing evidence at the company level for European-based startups. Second, interestingly, the type of innovations produced by companies also changes after venture funding. Mainly, VC is associated with a decrease in the quality of companies' research output.

One interpretation of the findings is that they simply reflect endogenous VC choices. For example, VCs may invest in companies when they expect a surge of patent filing following an innovative breakthrough. Alternatively, the presence of VC investors in a company can change companies' innovation strategy. As an attempt to disentangle between these two interpretations, we exploit an amendment by the Texas Legislature that freed public state pension funds in Texas to invest in VC. Unlike private retirement systems that are governed by the federal Employee Retirement Security Act (ERISA), the investment policy of public pension funds is governed by state laws. Different from private pension funds, most public pension funds were not explicitly allowed to invest in high-risk assets until much later than the ERISA clarification in 1979. In fact, by 1990 almost 30% of public retirement funds were prohibited from investments in VC. The clarification by the Texas Legislature led to an increase in the funds committed to VC by local public pension funds, and is useful to identify the causal impact of venture funding on innovative activity because it was likely unrelated to the arrival of innovation opportunities. Using an instrumental variable approach based on this intuition, we find that the increase in the rate of innovative activity following venture funding, as well as the decrease in the quality of innovations, are not exclusively explained by VC selection.

The findings of this chapter contribute to the literature that examines the relation between innovation and different dimensions of corporate finance such as: institutional ownership (Aghion et al. (2009)), the decision to go public (Bernstein (2012)), the decision to merge (Seru (2012)), financial constraints (Almeida et al. (2013)), corporate governance (Chemmanur and Tian (2012)), and organizational form (e.g., Belenzon and Berkovitz (2010) and Belenzon et al. (2013)). This chapter is closest to the paper by Lerner et al. (2011) which uses a similar framework to study

the effect of Leveraged Buyouts (LBOs) on innovation. Taken together, the findings suggest that LBOs and VC, the two most dominant forms of Private Equity (PE) in the US, interact with innovation very differently. While LBOs are associated with an increase in the quality of their targets' innovations, innovation novelty decreases after venture capital funding. In addition, LBOs seem to have no effect on the scale of innovative activity, while VC is associated with an increase in companies' patent filings. The difference in the interaction between LBO and VC with innovation is consistent with the differences across these PE funds' investment strategies. While LBOs target companies that have potential for improvement, VCs target companies that are very close to their innovative peak, and ripe for monetization. In addition, an LBO transaction and a VC investment can also affect differently the innovation of companies. For example, it is likely that LBOs incentivize companies to innovate in order to improve the general quality of their products, while VCs ask entrepreneurs to concentrate research efforts in finalizing and taking to market those ideas with highest commercial value.

Chapter 2: Venture Capital and the Diffusion of Knowledge

The second chapter of this dissertation estimates the effect of venture capital on the diffusion of knowledge. Specifically, I examine how the diffusion of an idea is affected by VC financing of the company that patented the idea. To measure the diffusion of ideas I use patent citations (e.g., Jaffe (1986), Hall et al. (2001)). Legislation requires inventors to cite all previous patents that their inventions build upon in their patent applications. Subject to caveats, discussed below, these citations are an indirect measure of knowledge linkages between innovations (Hall et al. (2001)).

To distinguish the effect of VC financing on knowledge diffusion from its effect on knowledge production, I study a sample of patents invented in companies before they are VC financed. I compare subsequent increases in citations to these patents to the citations of comparable patents in the same technology-class and vintage-year, and not invented in VC-backed companies. The compari-

son focuses on knowledge diffusion outside company boundaries, and only includes citations from inventors outside the patenting company. The first finding is that after VC financing citations to a given patent increase by 19% relative to the citations of comparable patents.

While this result is interesting, the precise interpretation of the findings is hard to asses. For example, VCs may be skilled in anticipating which innovations will be cited in the future. In that case, the estimated increase in citations can simply reflect the selection process of VCs. Alternatively, VC financing can increase awareness of companies' innovations and affect future follow-on innovation. To isolate the causal effect, I use time-series variation in the assets of state public pension funds as an instrumental variable (IV) (Mollica and Zingales (2007)). This IV approach relies on the home-bias of state pension funds in their VC investments (Hochberg and Rauh (2012)), and on the exclusion restriction that changes in pension assets are independent of the innovation opportunities facing the companies. One potential concern with this exclusion restriction is that unobserved economic activity at the state level may affect both the size of state pension funds and the innovative opportunities of local companies. Since the analysis compares citations to patents filed by VC-backed companies to those of comparable patents, the exclusion restriction is satisfied as long as the effect of unobserved economic activity on innovation opportunities within a state is uniform across local patents in the same technology-class and vintage-year. As a robustness check, I relax this identification assumption by eliminating citations directly linked to local innovation opportunities and only counting citations from inventors in states other than the home-state of the patent. Using this IV approach, I find evidence that the effect of VC financing on patent citations is causal.

The second part of this chapter explores some mechanisms driving the effect of VC financing on patent citations. One potential mechanism behind this effect is that VC financing increases awareness of companies' innovations, possibly certifies their value, and spurs follow-on innovation by other inventors. In addition, VCs may also facilitate communication among companies in their portfolio, and facilitate diffusion of knowledge in their networks. To test these mechanisms, I

distinguish between two types of citations: those from inventors in companies financed by the same VC, portfolio-linked, and those from all other unrelated inventors, non-portfolio-linked. Consistent with the first mechanism, I find a causal increase in non-portfolio-linked citations. Consistent with the second mechanism, I find that the increase in portfolio-linked citations is four times stronger than the increase in non-portfolio-linked citations. I also analyze inventor mobility and patent sales around the financing event as potential channels behind the effect of VC on patent citations. Inventors may choose to move to other companies after VC financing for example, if the presence of VC investors implies a transition from creative freedom to a commercial focus (e.g., Aghion et al. (2008)). This inventor mobility can facilitate knowledge flows between inventors' new and old employers. Also, companies may sell patents outside their core areas after VC financing and directly transfer knowledge to buyers. The findings suggest, however, that the effect of VC on patent citations is not driven by either of these two mechanisms.

The last part of this chapter addresses concerns about the relationship between the dependent variable in the analyses, patent citations, and what I really want to measure, knowledge diffusion. For example, patent reviewers are also likely to become aware of a company after it is VC financed. Since citations from patent reviewers are included in the analysis, citations may increase when there is no diffusion of knowledge. I test this alternative story using a sub-sample of patents for which I can distinguish the citations added by patent reviewers and exclude those from the analysis. Results remain qualitatively similar, which minimizes concerns regarding the interpretation of patent citations as knowledge flows. I consider and test other alternative stories.

The second chapter of this dissertation contributes to the literature that relates the diffusion of innovation to the institutional environment in which new technology is developed (e.g., Mokyr (2003), Gans et al. (2010), Williams (2011) and Gans and Murray (2012)). I extend this literature by focusing on the diffusion of already patented innovation and showing that conditional on disclosure VC ownership matters for diffusion.

This chapter also contributes to the literature that looks at the impact of VC on innovation.

The findings show that the effect of VC on innovative activity goes above and beyond financing the patent filings of their portfolio companies. Importantly, VC also facilitates the diffusion of technical knowledge in the economy. A back-of-the-envelope calculation based on the findings suggests that by facilitating the diffusion of their companies' patents, VCs have contributed 2% to 10% of patent production in the U.S. This finding helps explain why researchers using industry-level data estimate that VCs contribute to 14% of patent production (Kortum and Lerner (2000)) even though less than 4% of patents have been assigned to VC-backed companies. The findings in this chapter suggest that part of this difference can be attributed to knowledge spillovers generated by VCs.

Finally, this chapter also relates to the literature that explores non-financial services VCs provide to their companies. Previously documented mechanisms include recruiting key managers (Hellmann and Puri (2002)), implementing strong governance mechanisms (Hochberg (2011)), and facilitating strategic alliances (Lindsey (2008)). I find evidence that VCs help diffuse knowledge across companies in their portfolio. Consistent with Hellmann (2002), the findings suggest that VC portfolios change the complementary assets available to companies. Given that patent citations have been shown to be associated with value (Hall et. al (2005)), the documented increase in citations can have value implications for VC-backed companies.

Chapter 3: Direction of Inventive Activity in Venture Capital Networks

The final chapter of this dissertation explores whether the strategic interaction of companies in the same venture capital network affects the direction of companies' innovative activity.

A central characteristic of the Venture Capital (VC) industry is its network-based structure. In contrast to more traditional financial intermediaries, VC investors facilitate relationships among the companies they finance. For example, VC investors establish links inside their portfolios by participating in their companies' boards. In addition, VCs tend to syndicate their investments rather

than invest alone (Lerner (1994)). Syndicated investments further web VC-backed companies into networks of complex relationships with each other. While the literature has shown that the links among VC-backed companies matter for performance (e.g., Lindsey (2008), Hochberg et. al (2007)), their effect on the strategic behavior of companies remains understudied. In the third chapter I contribute to filling this gap in the literature by examining how the links among VC-backed companies affect the direction of companies' innovative activity. Theoretically, this effect is not clear. Whereas the presence of common investors can stir companies' research in the same direction by facilitating knowledge spillovers, competition for the same financial resources may undermine the incentives of companies in the same venture capital network to collaborate, or even work in similar areas.

To examine this question empirically, I use patent citations to measure the similarity or convergence between the innovative activities of filing companies. The empirical strategy uses data on patents filed by VC-backed companies in the US, and estimates the likelihood of a citation between random pairs of patents. The main explanatory variables are measures of "VC-proximity" as determined by whether the companies that file the patents share a common VC investor, and thus have a "portfolio-link", or whether their VC investors are syndication partners and have thus a "syndication-link". My first finding is that VC proximity increases the likelihood of a citation between patents.

One interpretation of the first finding is that VC proximity induces companies to pursue similar innovations for instance, by facilitating the transfer of tacit knowledge among companies. An alternative interpretation is that VCs fund companies that fit well in a strategic sense with the rest of the portfolio, and that the estimated effect reflects this strategic selection. In an attempt to disentangle between these two interpretations, I do two things. First, I control in the regression models for geographical- and technological- proximity among filing companies that can affect both the likelihood of a citation, and their VC-proximity.

Second, since these controls cannot address selection on companies' unobservables, I exploit

"indirect" linkages across VC-backed companies. Indirect linkages occur when companies end up connected inside the VC network not because they are financed by the same VC or because their VCs syndicate together, but because their VCs have a common syndication partner. If indirect linkages occur for reasons unrelated to companies' potential fit in VCs' networks, the estimated impact of indirect links on the likelihood of a citation provides an unbiased instrumental variable estimate of the impact of VC-proximity on the convergence of companies' innovative activities. As with any exclusion restriction, this assumption cannot be tested. However, it is likely to be satisfied, as prior research shows that syndication allows VC investors to explore distinct industries and geographies, and invest in companies with lower ex-ante synergy potential with incumbent companies in VC networks (e.g., Kogut et al. (2007), Hochberg et al. (2011)). I find that VC-proximity as measured by either, portfolio-, syndication- or indirect-linkages, increases the likelihood of a citation between patents, even after controlling for observable similarities between filing companies. Also, the estimated effect of VC-proximity is statistically the same when measured by portfolio-, syndication-, or indirect- linkages. This last result suggests that the VC-proximity effect may not be entirely driven by selection.

Next, I delve deeper into the relation between competition for financial resources and the convergence of innovative activity among companies in the same VC-network. While it is true that companies that share a common VC are in competition for the firm's financial resources, such competition is, however, likely to be stronger between pairs of companies in the same technological areas or that are in the same geography. To test whether the competition effect is muffled in the basic estimations, I explore the relation between the interaction of VC-proximity with technological- and geographical proximity, and the citation likelihood. Interestingly, I find that portfolio- and syndication-links increase the citation likelihood between patents whose filing companies are technologically dissimilar and geographically distant. In contrast, for patents whose filing companies are technologically or geographically close, sharing a portfolio- or a syndication-link decreases the probability of a citation. In other words, portfolio- and syndication-linkages appear to be substitutes for technological and geographical-proximity.

Finally, I examine potential mechanisms through which VC-proximity affects the likelihood of citations. The findings suggest that the effect is driven by turnover of executives (CEOs, Vice-president etc.) among close VC-backed companies. This result is consistent with Hellmann and Puri (2002), who show that VCs help companies hire personnel for executive positions. These results are also consistent with VC-proximity facilitating convergence of innovation between companies that are technologically distant. Executive skills are more easily transferred across companies in different technological fields in contrast to inventor skills which are likely to be technology specific. Overall, the findings suggest that companies who are competing for the same financial resources prefer to differentiate, and focus on distinct lines of research. VC-proximity deters convergence of innovative activity for similar companies, and induces companies to seek different areas of specialization. This divergence in the direction of innovation is also convenient for VCs, as it reduces their overall technology-specific risk. In contrast, for companies who are not in direct competition for VCs' financial resources, such as companies that have an indirect-link or such as companies that share a portfolio-link but that work in different technology areas, VC proximity provides a platform of interaction that facilitates the diffusion of tacit knowledge and generates interdisciplinary knowledge spillovers. For non competing companies, VC-proximity acts as a bridge for knowledge diffusion, and pushes companies towards working in similar or complementary lines of research.

The third chapter in this dissertation contributes to the literature on competition and innovation. I show that the competition for financial resources affects innovative activity. In contrast, most of the existing studies in this area focus on the impact of product market competition on innovation (e.g., Aghion et al. (2001), Aghion et al. (2005)).

The third chapter also relates to the literature on intercompany governance and innovation (e.g., Seru (2007), Schoar (2002), Belenzon and Berkovitz (2010), Belenzon et al. (2013)). While most of this literature has focused on the interaction among companies within conglomerates and business-groups, I show that the interaction among companies within VC portfolios also affects

innovation.

Finally, this chapter is also related to the literature on the non financial effects of VCs on their investments. Prior research has shown that VCs add value to their companies by helping them find and hire adequate personnel in their own networks (Hellmann and Puri (2002)). I find that executive turnover inside VC networks is a mechanism for knowledge diffusion. More broadly, this finding is also consistent with other papers in the innovation literature that find evidence of knowledge diffusion across companies through worker turnover (e.g., Kim and Marschke (2005), Agrawal and Singh (2011) and Stoyanov and Zubanov (2012)).

In conclusion, this dissertation explores different channels through which venture capital affects innovation. I find that the role of VC on innovation extends beyond financing the innovation of their portfolio companies. There are many directions this future research could take. Some interesting follow-up questions include examining the role of VC on patent trade and the role of CEO turnover across companies within VC networks on financial success, as well as on the innovation strategy of portfolio companies.

References

Aghion, Philippe, Harris, Christopher, Howitt, Peter and John Vickers, 2001, Competition, Imitation and Growth with Step-by-Step Innovation, *Review of Economic Studies*, 41, 771-782.

Aghion, Philippe., Bloom, Nick, Blundell, Richard, Griffith, Rachel, and Peter Howitt, 2005, Competition and Innovation: An inverted U Relationship?, *Quarterly Journal of Economics*, 120(2), 701-728.

Aghion,Philippe, Dewatripont, Mathias and Jeremy Stein, 2008, Academic Freedom, Private-Sector Focus and the Process of Innovation, *RAND Journal of Economics* 39(3), 617-635.

Aghion, Philippe, Van Reenen, John. and Luigi Zingales, 2009, Innovation and Institutional Ownership, NBER Working Paper, No. 16484.

Agrawal, Ajay and Jasgit Singh, 2011, Recruiting for Ideas: How Firms Exploit the Prior Inventions of New Hires, *Management Science* 57(1), 129-150.

Almeida, Heitor, Hsu, Po-Hsuan, and Dongmei Li, 2013, When Less is More: Financial Constraints and Innovative Efficiency, Working Paper, University of California, San Diego, Available at SSRN: http://ssrn.com/abstract=1831786.

Belenzon, Sharon and Tomer Berkovitz, 2010, Innovation in Business Groups, *Management Science* 56 (3), 519-535.

Belenzon, Sharon, Bolton, Patrick and Ulya Tsolmon, 2013, The Organization of Innovation Across Countries and Industries, Unpublished Working Paper, Duke University.

Bernstein, Shai, 2012, Does Going Public Affect Innovation? Unpublished Working Paper, Available at SSRN: http://ssrn.com/abstract=2061441.

Caselli, Stefano, Gatti Stefano and Francesso Perrini, 2009, Are Venture Capitalists a Catalyst for Innovation? *European Financial Management* 5(1) 92–111.

Chemmanur, Thomas. and Xuan Tian, 2012, Do Anti-takeover Provisions Spur Corporate Innovation? Working paper, Boston College and Indiana University, Available at SSRN:

http://ssrn.com/abstract=1572219.

Engel, Dirk and Max Keilbach, 2007, Firm Level Implications of Early Stage Venture Capital Investment - An Empirical Investigation, *Journal of Empirical Finance* 14(2), 150-167.

Gans, Joshua, Murray, Fiona and Scott Stern, 2010, Contracting Over the Disclosure of Scientific Knowledge: Intellectual Property and Academic Publication, MIT Working Paper, Available at: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1559871.

Gans, Joshua and Fiona Murray, 2012, Funding Scientific Knowledge: Selection, Disclosure and the Public-Private Portfolio in Joshua Lerner and Scott Stern ed.: T*he Rate & Direction of Inventive Activity Revisited (*University of Chicago Press).

Hall, Bronwyn, Jaffe, Adam B. and Manuel Trajtenberg, 2001, The NBER Patent Citations Data File: Lessons, Insights and Methodological Tools, NBER Working Paper No. 8498.

Hellmann, Thomas and Manju Puri, 2000, The Interaction between Product Market and Financing Strategy: The Role of Venture Capital, *Review of Financial Studies* 13(4), 959-984.

Hellmann, Thomas, 2002, A Theory of Strategic Venture Investing, *Journal of Financial Economics,* 64, 285-314.

Hellmann, Thomas and Manju Puri, 2002, Venture Capital and the Professionalization of Start-Up Firms: Empirical Evidence, *Journal of Finance* 57(1), 69-197.

Hirukawa, Masayuki. and Masako Ueda, 2008, Venture Capital and Industrial Innovation, Available at: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1242693

Hochberg, Yael, Ljungqvist, Alexander and Yang Lu, 2007, Whom you Know Matters: Venture

Capital Networks and Investment Performance, *Journal of Finance* 62(1), 251-301.

Hochberg, Yael, 2011, Venture Capital and Corporate Governance in the Newly Public Firm, *Review of Finance* 0, 1-52.

Hochberg, Yael, Lindsey, Laura A. and Mark M. Westerfield, 2011, The Formation of Inter-firm Economic Ties: Evidence From Venture Capital, Working paper, Northwestern University.

Hochberg, Yael and Joshua Rauh, 2012, Local Overweighting and Underperformance: Evidence from Limited Partner Private Equity Investments, Unpublished Working Paper, Available at SSRN: http://ssrn.com/abstract=1798747

Jaffe, Adam B., 1986, Technological Opportunity and Spillovers of R&D: Evidence from Firms' Patents, Profits and Market Value, *American Economic Review* 76 (5), 984-1001.

Kim, Jinyoung and Gerald Marschke, 2005, Labor Mobility of Scientists, Technological Diffusion, and the Firm's Patenting Decision, *RAND Journal of Economics* 36(2), 298-317.

Kogut, Bruce, Urso, Pietro and Gordon Walker, 2007, Emergent Properties of a New Financial Market: American Venture Capital Syndication, *Management Science* 53 (7), 1181-1198.

Kortum, Samuel and Joshua Lerner (2000) Assessing the Contribution of Venture Capital to Innovation, *RAND Journal of Economics* 31(4), 674-692.

Lerner, Joshua, 1994, The Syndication of Venture Capital Investments, *Financial Management* 23, 16-27.

Lerner, Joshua, Sørensen, Morten. and Per Stromberg, 2011, Private Equity and Long-Run Investment: The Case of Innovation, *Journal of Finance 66* (2), 445-477.

Lindsey, Laura, 2008, Blurring Firm Boundaries: The Role of Venture Capital in Strategic Alliances, *Journal of Finance* 63 (3), 1137-1168.

Mokyr, Joel, 2003, Thinking about Technology and Institutions. *Macalester International*: Vol. 13, Article 8.

Mollica, Marcos A. and Luigi Zingales, 2007, The Impact of Venture Capital on Innovation and the Creation of New Business, Unpublished Working Paper, University of Chicago.

Popov, Alexander and Peter Roosenboom, 2009, Venture Capital and Patented Innovation: Evidence from Europe, *Economic Policy* 27(71), 447-482.

Schoar, Aintoinette, 2002, The Effect of Diversification on Firm Productivity, *Journal of Finance* 62 (6), 2379-2403.

Seru, Amit, 2012, Firm Boundaries Matter:Evidence from Conglomerates and R&D Activity, *Journal of Financial Economics (forthcoming).*

Stoyanov, Andrey and Nikolay Zubanov, 2012, Productivity Spillovers Across Firms through Worker Mobility, *American Economic Journal: Applied Economics* 4(2), 168-198.

Stuck, Bart and Michael Weingarten, 2005, How Venture Capital Thwarts Innovation and IPO Innovation Rankings, IEEE Spectrum, April, 50-55.

Williams, Heidi, 2011, Intellectual Property Rights and Innovation: Evidence from the Human Genome, NBER Working Paper 16213.