

# TNIT

# newsletter

Toulouse Network for Information Technology

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- Essential reading on **intellectual property and development**
- How, Why, When, Who, What ?  
**How Does Information Technology Help Police Reduce Crime?**

# Welcome



*This third issue of the TNIT Newsletter, dated December 2009, will arrive late in your mailbox (the editors will claim a few beers from the guilty party as soon as possible!), but we feel it was worth waiting for.*

*We begin by a very nice interview of Josh Lerner (and, on page 3, you will find a link to a live interview of Josh on the future of venture capital). Gilles Saint Paul has prepared a reading list, on one of the most important topics in current international policy discussions: the consequences of Intellectual Property Rights for growth in developing countries, and finally, Luis Garicano discusses his recent work on how Information Technology improves the efficiency of police work.*

*We are very thankful to our contributors, and we hope that you will enjoy reading what they have to say. As usual, comments and ideas for features or articles are very welcome, as well as the address of other people who would enjoy receiving the letter.*

Jacques Crémer



The Toulouse Network for Information Technology (TNIT) is a research network funded by Microsoft and managed by the Institut d'Economie Industrielle. It aims at stimulating world-class research in the Economics of Information Technology, Intellectual Property, Software Security, Liability, and Related Topics.

All the opinions expressed in this newsletter are the personal opinions of the persons who express them, and do not necessarily reflect the opinions of Microsoft, the IDEI or any other institution.

<http://idei.fr/tnit/index.html>

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# Interview with Josh Lerner

Josh Lerner is Professor at the Harvard Business School, and one of the world's most prominent authorities on innovation and on venture capital. He has been an important participant in the public debate - his book with Adam Jaffe "*Innovation and its Discontents*" has helped reframe the discussion about the US patent system and his books on venture capital are classics and must-read for academics and for practitioners, a prolific academic - in Toulouse, we specially like his work with Jean Tirole on Open Source, patent pools and standard settings organization, and a star teacher in the MBA program at HBS, who has even found the time to author close to one hundred case studies!

Jacques CREMER, *Toulouse School of Economics and IDEI*

*TNIT: You have done such a large amount of research on so many important issues that we are a bit at a loss when choosing where to begin. So let us begin by something totally unfair. In a very big picture way, what do you see as the biggest threats, challenges and hopes for innovation in the next few years?*

**J.L.:** This is a great question. The biggest issue I see is something that has been little explored in economics research, but is nonetheless a very real issue: We are seeing today a cut-back in fundamental research on at least three levels. First, many corporations are shuttering basic research laboratories in favor of more targeted (and in the case of many firms, smaller) divisional research facilities that work on more applied problems.

The Federal government has adopted in recent years a much more focused strategy to their funding, no longer being willing to give open-ended, multi-year grants through agencies such as the Departments of Defense's Advanced Research Projects Agency. And venture capitalists have responded to decreasing returns and falling fund-raising by demanding that their start-up companies have highly focused business strategies. While all these responses are doubtless rational ones, the broad social implications of this from a global perspective are worrisome, since economists have argued for decades that the returns to society of basic research are particularly high. While we are seeing the growth of research activities in developing nations such as China and India, it seems unlikely that either the rate of growth or sophistication of this research will be sufficient to make up for these cut-backs in the United States and elsewhere in the West.

*TNIT: In your work on patents, including your widely cited book with Adam Jaffe, you have argued that the whole patent system should be reformed. Are you more or less optimistic than you*

*were at the time on the possibility that such reforms will take place?*

**J.L.:** There is both bad news and good news as we look at the experience of the U.S. in this regard:

On the one hand, Congress has shown itself incapable of passing fundamental patent reform. Each time a bill appears to have momentum, the press of other business and the inherent conflicts between the pharmaceutical and information technology industries stymie its progress. This is quite discouraging.

At the same time, the Supreme Court has made a series of decisions that have addressed many of the key issues - not, perhaps, in the ways that Adam and I recommended in our book, but reasonably effectively. In the eBay, KSR, and related cases, the Court has raised the bar for patentability and also made it harder for non-practicing patent holders (*also known as "patent trolls"*) to effect their deleterious consequences.

*TNIT: In your introduction on the economics of patents (on your website) you state: "The scope of patentable subject matter has traditionally not included fundamental scientific discoveries. A frequently invoked rationale for this omission is that many scientists care little for monetary rewards, and would consequently have pursued the discoveries in any case." Do you agree with this view? And what are the implications to science?*

**J.L.:** This question is a complex one. I am certainly not comfortable with drawing a line - as has been done in Europe - between technical and non-technical inventions, and only allowing technical inventions to be patented. It seems clear that both classes of inventions (*technical and non-technical*) should be patentable, since in both cases, the need (*long articulated by economists*) for incentives to innovate are important.



It is less clear how one should think about the patentability of fundamental scientific and mathematical discoveries, which have been exempt from patenting in most places of the world (*indeed, in France, this exemption was codified in its very first patent code in 1791*). One can certainly make a plausible case that such awards would fundamentally disrupt the nature of the scientific process, where one researcher tends to build closely on the works of another - indeed, works by Fiona Murray, Scott Stern and Heidi Williams suggests that patent protection in the life sciences has indeed disrupted the flow of scientific progress there. Moreover, scientists have such strong career-related incentives to publish that it can be questioned whether the added incentives of patents are needed.

**TNIT: And can you tell us a bit what your new book, "Boulevard of Broken Dream", is about?**

**J.L.:** Today, there is a keen awareness on the part of many governments of the need for "green shoots," high-potential firms, which will lead to growth after the recession.

Meanwhile, the venture industry in many nations is on "life support," struggling for survival. The industry has struggled to realize good returns from investments since the year 2000. Many traditional investors are questioning whether they should continue to provide capital to these funds. But giving the important role that venture capital has had in spurring innovation, it is natural to wonder whether there is a public role in ensuring the industry's survival. Indeed, governments from London to New Delhi have announced venture initiatives in the past few months.

These steps might seem initially plausible. Entrepreneurship is a business in which there are increasing returns. To put the point another way, it is far easier to found a start-up if there are ten other entrepreneurs nearby. In many respects, founders and venture capitalists benefit from their peers. For instance, if entrepreneurs are already active in the market, investors, employees, intermediaries such as lawyers and data providers, and the wider capital markets are likely to be knowledgeable about the venturing process and what strategies, financing, support, and exit mechanisms it requires.

In the activities associated with entrepreneurship and venture capital, the actions of any one group are likely to have positive spillovers - or, in the language of economics, "externalities" - for their peers. It is in these types of settings that the government can often play a very positive role as a catalyst. Yet, for every successful public intervention spurring entrepreneurial activity, there are many failed efforts, wasting

untold billions in taxpayer dollars. The book explores this relatively uncharted territory, and highlights both what can go wrong and how the public sector can do better.

**TNIT: Some personal and fun questions. At Yale, you majored in physics. Do you ever regret having not pursued a career in science or technology**

**J.L.:** Actually, I had already gotten the policy bug while I was at Yale, so did a major that combined physics with history of technology and lots of other stuff. This was definitely the right choice - they are way too many super-smart people in physics!

**TNIT: Have you ever filed a patent?**

**J.L.:** Not only have I have filed one, it has been awarded (US Patent no. 7,426,488). It took seven years before it issued, but is likely to die a premature death after eighteen months once the Supreme Court issues its decision in the *Bilski* case.

**TNIT: On your web page at the Harvard Business School, there is a picture of you hugging a donkey. Care to tell us more about this?**

**J.L.:** We have seven of them. We bought one, and the rest have shown up on our doorstep. One thing I have learned, though, is that a donkey is a liability, and not an asset!

**TNIT: Just quickly respond to the following opposites: Touch Type or Secretary?**

**J.L.:** Two-fingered hunt and pecking.

**TNIT: Facebook, LinkedIn or address book?**

**J.L.:** Linked In.

**TNIT: JSTOR or paper copies in library**

**J.L.:** JSTOR definitely.

**TNIT: What really would need to be invented if it didn't exist already?**

**J.L.:** BlackBerry.

**TNIT: And what really needs to be invented which does not exist already?**

**J.L.:** If I knew this, I would be rich! My favorite would be a car that drives itself.

**TNIT: Coffee or mineral water?**

**J.L.:** Decaf Earl Grey.

**TNIT: Twitter or not?**

**J.L.:** Yes, but in a desultory manner.

**TNIT: Dream job as a kid: inventor or professor?**

**J.L.:** Cannot really remember, but probably an astronaut!

**TNIT: Thank you very much for this interview.**

## links & news:

For a life picture of one of our members we recommend:

[www.youtube.com/watch?v=KIFa-P5WVtk](http://www.youtube.com/watch?v=KIFa-P5WVtk)

Presenting a short interview with **Josh Lerner** on venture capitalism!

A new forum for academics sponsored by Microsoft has been opened at:

[www.techpolicy.com](http://www.techpolicy.com)

The forums aim is to lead the dialogue on the impact of technological innovations.



# Readings on intellectual property and development by **Gilles Saint-Paul**

- **Background readings on growth in a North-South context:**

*An important frame of reference is the model of growth with international product cycles, which has been in particular developed by Grossman and Helpman (1992). The cornerstone of this model is that new products are invented in the North but eventually imitated by the South. Helpman (1993) is an important application of that framework to the analysis of the international IP regime, although he does not consider the case of asymmetric intellectual property rights between North and South.*

**Grossman, G. M. and Helpman, E.** (1992), *"Innovation and Growth in the global Economy."* MIT Press - Cambridge.

**Helpman, E.** (1993), *"Innovation, Imitation, and Intellectual Property Rights,"* *Econometrica*, 61(6): 1247-1280.

**Armstrong, M.** (2006), *"Competition in Two-sided Markets,"* *RAND Journal of Economics* 37: 668-91.

- **Market size effects and transfer effects.**

*Poorer countries may face a different trade-off between static efficiency and growth than richer ones if they are less prone to innovate. This may be due to those countries' factor endowments, or the fact that their own innovators may have a smaller market size. In particular, this implies that a uniform regime of international IPR protection will create a transfer of royalties from the non-innovating to the innovating countries. The following papers study this kind of effects, as well as their normative and positive implications for the international landscape of intellectual property.*

**Grossman, G. and E. L. C. Lai** (1989), *"International Protection of Intellectual Property."* *The American Economic Review*, 94(5): 1635-1653.

**Deardorff, A.V** (1992), *"Welfare Effects of Global Patent Protection."* *Economica*, 59:35-51.

**Lai, E. L.-C. and L.D. Qiu** (2003). *"The North's Intellectual Property Rights Standard for the South?"* *Journal of International Economics*, 59(1):183-209.

**Scotchmer, S.** (2004). *"The Political Economy of Intellectual Property Treaties."* *Journal of Law, Economics and Organization*, 20(2): 415-437.

- **Specificity arguments:**

*A strand of the literature studies the effect of IPR on innovation and welfare in the South when, for technological or preference*

*related reasons, there are specific products that it needs to consume. The general argument is that the more specific those products, the more harmful is lower enforcement of IPRs in the South. This is because it would reinforce the bias of innovation in favor of the needs of the North.*

**Acemoglu, D. and F. Zilibotti** (2001). *"Productivity Differences"*. *Quarterly Journal of Economics*, 116(2): 563-606.

**Thoenig, M. and T. Verdier** (2003). *"A Theory of Defensive Skill-Biased Innovation and Globalization."* *American Economic Review*, 93(3): 709-728.

**Diwan, I. and D. Rodrik** (1991). *"Patents, appropriate technology, and North-South trade."* *Journal of International Economics*, 30:27-47.

**Gancia, G. and A. Bonfiglioli** (2008). *"North-South trade and directed technical change."* *Journal of International Economics*, 76(2): 276-295.

**Gilles, S.-P.** (2008). *"Welfare Effects of Intellectual Property in a North-South Model of Endogenous Growth with Comparative Advantage."* *E-conomics*, 2008-5

- **Arguments based on non-homothetic preferences.**

*A general line of research explores the view that poorer people (and therefore poorer countries) benefit less from innovation because such benefits (e.g., those coming from product variety) may be lower if one is poorer. This depends on (i) the nature of preferences (they must be such that the gains from variety depend on income, which is not true in standard formulations) and on (ii) the nature of innovation (while horizontal innovation yields greater product variety, vertical innovation raises the physical quantity of output being produced and presumably benefits the poor). Most of the literature derives the implications of those observations for the mutual interactions between growth and the distribution of income. Some papers focus on the consequences for the design of intellectual property rights.*

**Gilles, S.-P.** (2004). *"Are Intellectual Property Rights Unfair?"* *Labour Economics*, 11(1): 129-144.

**Föllmi, R. and J. Zweimüller** (2006). *"Income distribution and demand-induced innovations."* *Review of Economic Studies*, 73(4): 941-960.



## Readings on intellectual property and development by **Gilles Saint-Paul**

**Kiedaisch, C.** (2008). *"Patent Policy and Income Distribution."* Toulouse School of Economics.

**Murphy, K.M., A. Shleifer and R. Vishny** (1989). *"Income Distribution, Market Size, and Industrialization."* Quarterly Journal of Economics, 104: 537-564.

### • Empirical studies

*An empirical literature correlates the IPR regime in a given country with a variety of performance indicators such as GDP growth, foreign direct investment, the structure of exports and imports, licensing, and so forth. I also include some studies that perform different exercises but are relevant to the overall debate.*

**Smarczynska, B.** (2002). *"The Composition of Foreign Direct Investment and Protection of Intellectual Property Rights: Evidence from Transition Economies"* World Bank Working Paper.

**Smith, P.** (1999). *"Are weak patent rights a barrier to US exports?"* Journal of International Economics, 48: 151-177.

**McCalman, P.** (2001). *"Reaping What You Sow: An Empirical Analysis of International Patent Harmonization"* Journal of International Economics, 55(1): 161- 185.

**Lee, J-Y, and E. Mansfield** (1996). *"Intellectual Property rights protection and US foreign direct investment."* Review of Economics and Statistics, 78: 181-186.

**Gould, D. and W. Gruben** (1996). *"The role of intellectual property rights in economic growth."* Journal of Development Economics, 48: 323-350.

**Acemoglu, D. and J. Linn** (2004). *"Market Size in Innovation: Theory and Evidence from the Pharmaceutical Industry"* The Quarterly Journal of Economics, 119(3): 1049-1090.

**Coe, D.T. and E. Helpman** (1995). *"International R&D spillovers"* European Economic Review, 39(5): 859-887.

## Impressions from the past meeting

The yearly TNIT meeting took place September 23, 2009, at Stanford University.

The meeting consisted of presentations by TNIT members and Microsoft. The very lively discussion circled around topics related to: consumer lending, merger policy and the environment and technical change. In connection with the meeting SIEPR organized a two day conference sponsored by Microsoft. The conference was coordinated by Susan Athey (Harvard) and Jon Levin (Stanford). It revolved around four themes: consumer search on-line, field experiments allowed by the internet, the effects of new advertizing technology on the media and finally, the market for search and display advertizing. Most papers are available from the conference website at:

[http://siepr.stanford.edu/siepr\\_ms\\_conference9-2009](http://siepr.stanford.edu/siepr_ms_conference9-2009)



# How, why, when, who, what?

## How Does Information Technology Help Police Reduce Crime?

by Luis Garicano

Is it true in real life, as it is in TV series such as “The Wire” or “CSI”, that Information Technology improves police effectiveness compared to good old fashioned “Police-work”? In a recent paper<sup>(1)</sup> we answer this question. We show that the use of IT by itself has very little impact; on the other hand, IT coupled with appropriate organizational innovations leads to considerable improvement in productivity. This analysis confirms the analyses which have been done on private firms.

Our basic empirical strategy was to compare productivity and organizational practices across departments that adopted differing levels of computing technology. We use two data sources. First, the Law Enforcement Management and Administrative Statistics (LEMAS) series, a triennial survey of law enforcement agencies in the United States covering the years 1987-2003, a period of enormous IT expansion. The broad coverage of the survey makes it possible to identify numerous agencies at multiple points of time, and provides a large amount of information on a wide variety of police operations. Second we matched the surveyed agencies with annual arrest and offence data from the FBI’s Uniform Crime Reports and with demographic data.

Analyzing the relationship between computerization and productivity, we first uncovered a striking puzzle: general IT adoption alone is not associated with an increase in crime clearance rates (i.e. the proportion of crimes solved), and is actually associated with an increase in crime rates (i.e. the number of crimes)! Although some of the increase is spurious, due to better recording of crime, we find no evidence that measurement problems accounts for the lack of success of IT in combating serious crime.

To explain this puzzle, we wondered that this could be due to the fact that many police departments do not adopt the organizational innovations that studies of the private sector have shown to be crucial for making IT productive. In other words: is it true that improvements in IT are useless if not coupled by simultaneous changes in “complementary” organizational practices? Practices that only make sense when IT is introduced?

We uncovered several pieces of evidence which confirmed this complementarity hypothesis. First, IT adoption is generally associated with a variety of organizational changes within a department, including

an expansion of personnel (primarily in technical support roles as opposed to field operations), increased use of special units, and enhanced training and educational requirements. Thus, departments that expanded IT use also modernized in other important ways. We next identified agencies that simultaneously implemented high levels of IT, specialization, and education, which we term “modern” agencies and we showed that agencies implementing this combined set of practices along with increases in IT use experienced statistically significant drops in crime rates.

In the specific context of police work, the complementarity hypothesis has a name: Compstat. This is the bundle of practices which was introduced in the New York Police Department by Police Commissioner William Bratton under Mayor Rudolph Giuliani’s leadership and which has since spread throughout the USA. The program combined real-time geographic information on crime with strong accountability of middle managers through the use of daily group meetings, geographic resource allocation, and data-intensive police techniques. The program has been widely credited by policymakers for playing a substantial role in the recent precipitous drop in crime experienced by some cities. We therefore studied the impact of information technology when it is adopted along with management techniques characteristic of Compstat. We find that crime clearance rates are, on average, 2.2% higher in agencies which implemented computerization together with this integrated set of practices and crime rates are negatively associated with Compstat use. Moreover, these practices have no impact if they are implemented individually. It is only jointly with IT use that they improve the efficiency of police work.

The conclusion is clear. Complementarities between IT and organizational practices are strong enough that the absence of the organizational changes completely negates the effect of the technological improvement on productivity.

(1) “Information Technology, Organization, and Productivity in the Public Sector: Evidence from Police Departments”, joint with Paul Heaton (*Rand Corporation*) forthcoming in the *Journal of Labor Economics*.