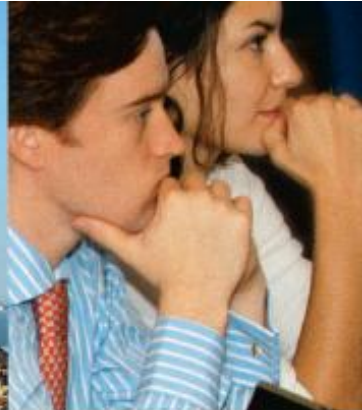


Pittsburgh, USA



Lisbon, PORTUGAL



Innovation and the Global Economy

A Progress Report

March 2011

Carnegie Mellon

UNIVERSIDADE
CATÓLICA
PORTUGUESA



FACULDADE DE
CIÊNCIAS
ECONÓMICAS E
EMPRESARIAIS



INSTITUTO SUPERIOR TÉCNICO
Universidade Técnica de Lisboa

Innovation and the Global Economy

◆ PIs & Co-PIs

- CMU: Lee Branstetter
- Portugal: Fernando Branco (UCP); Francisco Lima (IST)

◆ Other Researchers

- Rahul Telang (CMU); Mike Smith (CMU), Serguey Braguinsky (CMU), David Greenstreet (CMU), Pedro Faria (IST), Andrei Villaroel (UCP)

◆ Partner Firms: Outsystems

◆ Ph.D. Students involved

- Andreia Rafael; Ali Shams; Liangbin Yang [2011] + 1 [2011]

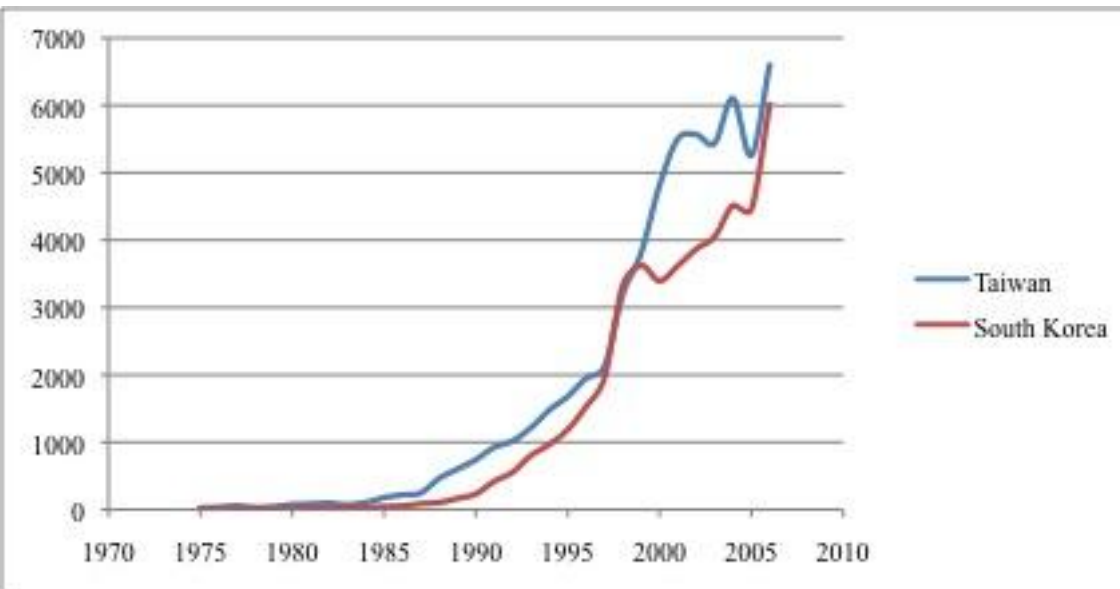
◆ Research Topic

- Investigating critical challenges for Intellectual Property, Strategy and Policy in IT and Beyond at both regional and global levels
 - » The rise of international patenting in emerging markets
 - » The impact of emerging market competition on patenting in IT
 - » The globalization of R&D
 - » Re-examining the impact of academic science on industrial innovation in IT

The rise of international patenting in emerging markets

Andreia Rafael

Annual Patent grants by the USPTO



Andreia Rafael: an introduction

- ◆ Citizen of Portugal; admitted to TCE program in 2007
- ◆ Undergraduate degree in Business, Universidade Catolica, Lisbon, 2005
- ◆ Advisors: Fernando Branco (Catolica) Lee Branstetter (CMU), Serguey Braguinsky (CMU)
- ◆ Research Topics: (1) The rise of patenting and innovation in East Asia; (2) the impact of Asian competition on patenting in the U.S. IT industry

Micro characterization of patent evolution

- ◆ The starting point of our research is the sharp increase in patenting in the electronics, software, and IT industries.
- ◆ An initial analysis of the data on patents in the US shows that the increase in patenting was not equally felt in all subsectors.
- ◆ Andreia is currently looking at the micro structure of the data which should lead to the characterization of several groups of subsectors with different patterns, aiming to identify key elements that explain the sectorial variation.

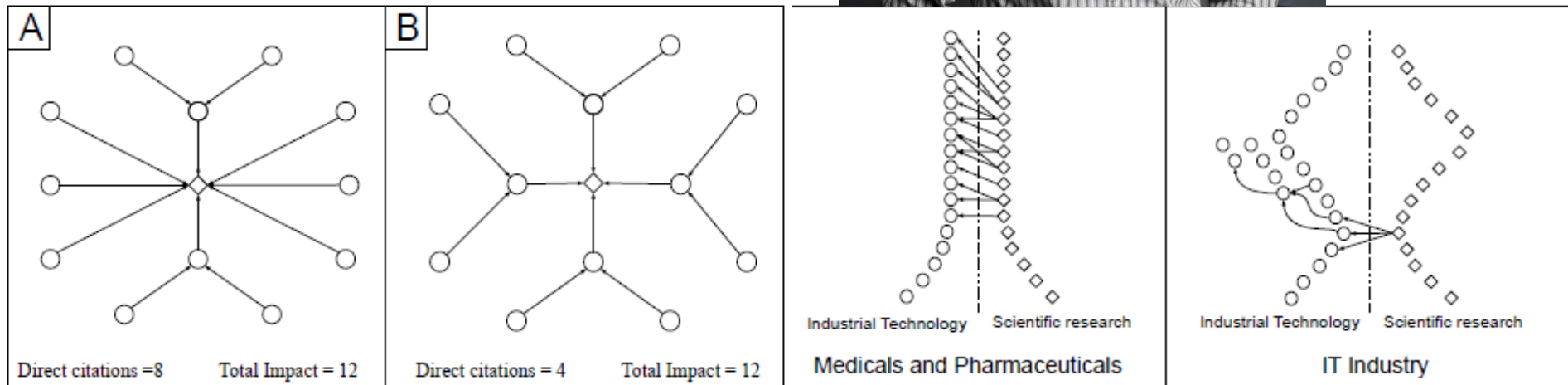
International competition and IT innovation

- ◆ To explain the main phenomenon, we conjecture that as industries grow and firms become major competitors, innovators find it necessary to start protecting their intellectual property, which leads to a surge in patents;
- ◆ Andreia uses data on East Asian firms in ICT and related industries to empirically investigate and support this theory
- ◆ She is currently developing the elements of a simple theoretical model that may help us understand the micro foundations of these effects.

Re-examining the role of academic science in industrial R&D in IT



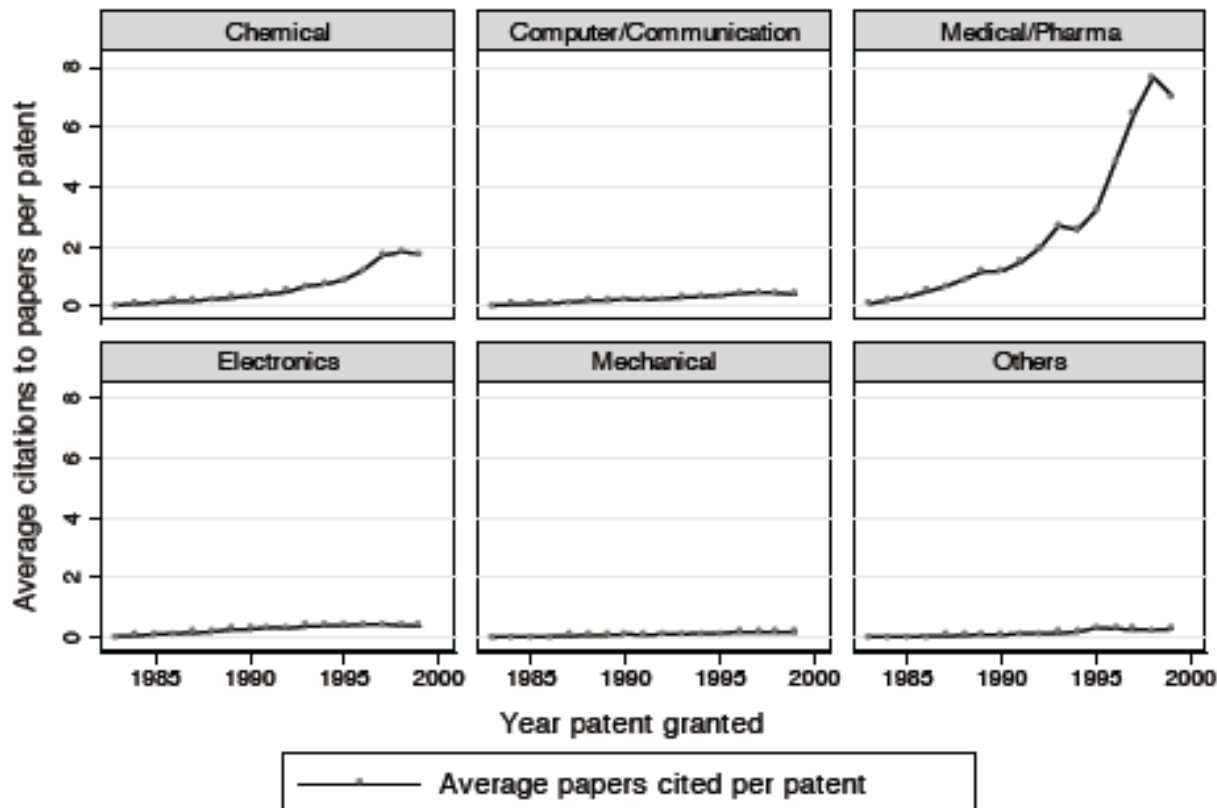
Ali
Shams



Ali Shams: an introduction

- ◆ Citizen of Iran; admitted to TCE Program in 2008
- ◆ B.S. in Industrial Engineering, Sharif University of Technology, Teheran, 2006
- ◆ M.S. in Entrepreneurship, University of Teheran, 2008
- ◆ Advisors: Lee Branstetter (CMU), Serguey Braguinsky (CMU), David Greenstreet (CMU), Francisco Lima (IST)
- ◆ Research Topic: Quantifying the impact of academic science on industrial research and development in IT

Does science drive innovation in IT? (1)



Note: Aggregate technology classes from Hall, Jaffe and Trajtenberg (2000)

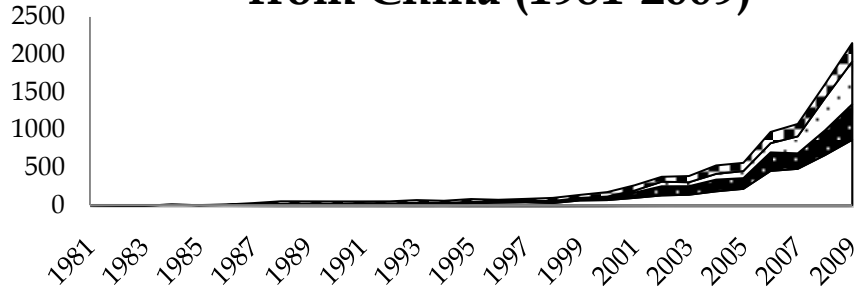
- ◆ Patent citations to academic papers have been a popular tool for measuring the impact of academic science on industrial innovation
- ◆ Prior research suggests that the connection is strong in medical innovation, but relatively weak in IT

Does science drive innovation in IT? (2)

- ◆ We show that this inference is incorrect – and suggests an alternative measurement approach that shows a strong relationship...
- ◆ The key insight: in IT, “translational patents” bring new academic discoveries into industrial practice; inventors build on these patents, not the original papers
- ◆ This allows us to rank science organizations in terms of their industrial impact
- ◆ Next step: does the generation of translational patents lead to a stronger market position for the generating firms?

The Globalization of R&D

The rise of co-invented and MNC sponsored US patenting from China (1981-2009)



- Co-invented
- Purely Chinese Invented & Assigned to MNCs
- Purely Chinese Invented & Assigned to Indigenous Firms
- Purely Chinese Invented & Assigned to Other Entities

Prof. Lee Branstetter, CMU

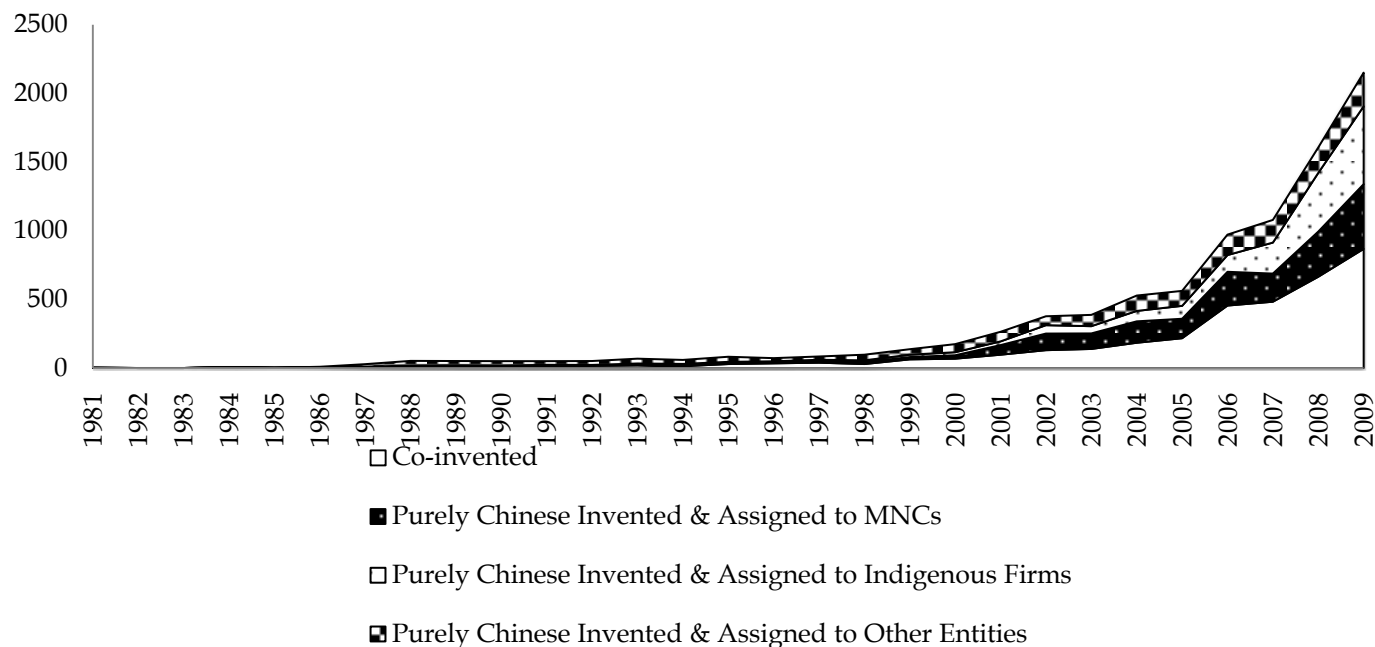


Prof. Francisco Veloso,
CMU and UCP



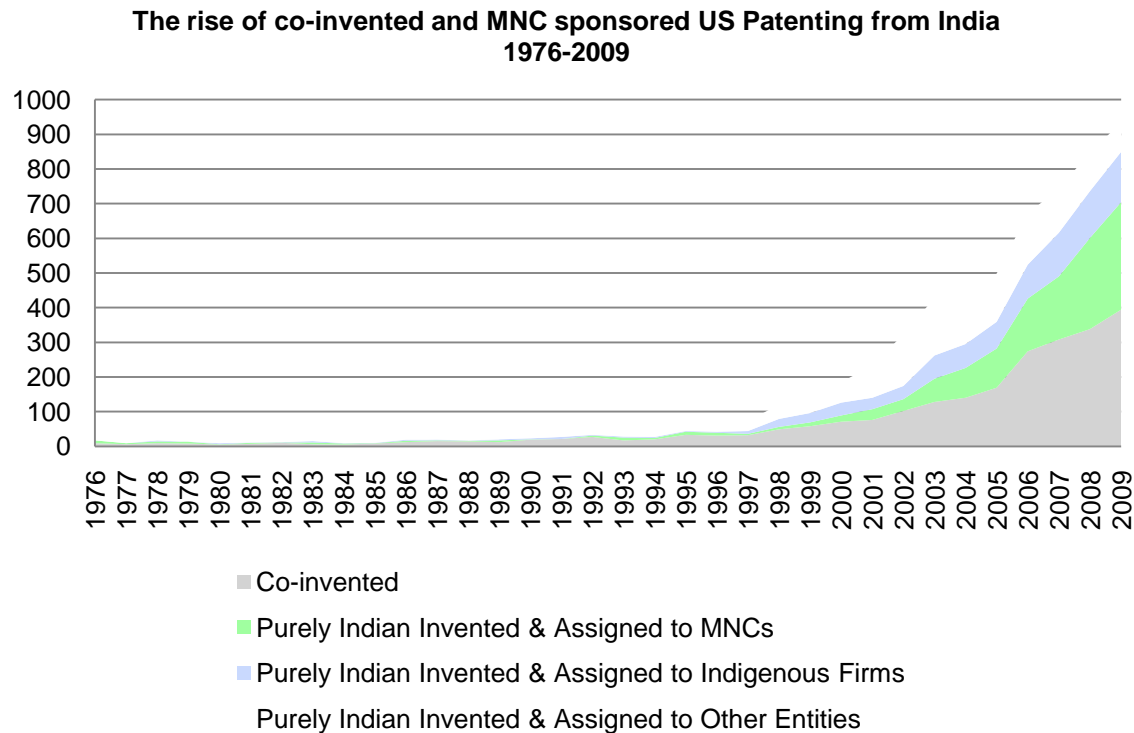
MNCs are driving a surge in patenting in China...

- ◆ There is rapid growth in the number of patents granted by the USPTO to inventors based in China...
- ◆ But the majority of these patents are owned by Western multinationals, not indigenous Chinese firms
- ◆ And many of them are generated by intellectual inputs from Western and Chinese inventors



And with similar trends in India...

- ◆ India's patent explosion is also driven by Western multinationals
- ◆ An international R&D division of labor is opening up...
- ◆ Mobilizing Asian talent to develop global products through the efforts of Western multinationals



Next steps for this research agenda...

- ◆ What factors enable a nation to attract multinational R&D investment?
- ◆ To what extent does R&D labor in developing countries substitute for R&D labor in the developed countries?
- ◆ Will indigenous Chinese and Indian firms be able to close the technology gap with Western multinationals by hiring away the multinationals' local engineers?