

Research in Trade, Investment and IP: Main Results and New Directions

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Introduction

Protection of intellectual property matters for a great many international economic issues.

But given the theme of this seminar, the focus of my presentation today is on:

- How important are IPRs, more specifically patent rights, to foreign direct investment, licensing, and other forms of measured cross-border flows?
- How would this change in the increasingly digital world?
- What are some recent important findings related to these questions? What would be interesting directions in which to take this research?

Is there an empirical consensus about IP and cross-border knowledge flows?

Based on carefully done studies, economists could conclude with some confidence:

- High-technology exports from advanced industrial economies to developing economies (particularly, emerging ones) are significantly improved with the introduction of stronger patent protection.
- Inward FDI flows and licensing (both with affiliates and contracts at arm's-length) in higher-technology sectors also go up in those countries with such patent law reforms.
- Local production by multinational affiliates in high-technology sectors also increases, thus increasing the sales, employment, and technological activities of such companies in reforming countries, including exports in new products and/or aimed at new markets.
- Exports of high-tech products (as classified) from emerging economies increase after a time lag (when patent reforms become effective).
- The globalization of R&D networks within and among multinational firms and organizations arises from complex sources but IP protection is an important contributing factor.

Some important caveats to keep in mind

- There is little evidence to date of significant trade or FDI responses to patent/IP reform in poorer developing countries.
- While trade and FDI are important contributors to economic transformation and growth, they are not necessarily indications of overall societal gains.
- Economists still argue about the technical details of such studies, including:
 - what really are the causal mechanisms?
 - how do we measure innovation and technology flows?
 - how do we transform diffusion of technical knowledge into local production?

Do high-technology exports from developed countries to developing emerging economies increase after patent reforms?

- Exports from high technology companies in developed countries could be an important source of knowledge flows
 - Just 9% of US firms own patents but they account for 89% of exports (technical concentration, size, and exports all correlate).
 - Firms holding patents are considerably more likely to export high-technology varieties to countries with stronger patent rights
 - Strengthening patent rights in developing countries expanded US exports of new products in patent-sensitive industries, accounting for virtually all of US export growth to such countries.
 - This suggests both that patent reforms increase access to new technologies and products and that multinational firms pay attention to patent laws in choosing export locations.
 - Thus, there are variety gains for consumers and higher productivity in local firms after patent rights are strengthened.

Does IP protection in developed countries limit high-technology exports from developing countries?

- In “South to North” exports there is a significantly negative interaction:
 - Exports to North from emerging countries with higher technological capacity become more limited as patent protection expands in Southern countries.
 - IP protection blocks potentially infringing imports and this can be a barrier to technology-oriented export growth.
- No such deterrent exists in North to South technology exports.
- This analysis should be considered preliminary and more research is needed. For example, it may not be blocking rules, rather the deterrence could just be the result of differences in comparative advantage.
- But it opens important questions about the roles that *both* North and South IP protection play in determining international trade .

Can TRIPS spur export growth in WTO members, especially developing countries?

- Looking at trade patterns before and after TRIPS was implemented, there is evidence of higher exports of high-IP products in both developed and developing countries, mostly in biopharma and ICT.
- The primary increase in imports of developing countries post-TRIPS was in ICT.
- These results are intriguing but leave much to be explained.
- Luckily, Margaret Kyle, one key author is here with us tomorrow to explain this further to us.

If patent reforms raise exports of emerging and developing countries, does it enhance learning by local firms?

- My own work with a colleague uses three measures of potential learning:
 - Increase in non-resident patent application stocks by sector, over prior 5 years;
 - Increase in the share of country's intra-firm imports in US total imports by sector;
 - Increase in the share of US affiliate employment in total employment by sector.
- Our estimates of patent impacts are positive and large in economic terms, suggesting that technology transfer and diffusion are enhanced by each form of learning.
 - The largest export “spillover” came from increases in foreign patent application stocks.

Do firms in developing countries change their trade behavior in the presence of stronger IP protection?

In my work done with Chinese colleagues, we develop a theoretical model with these predictions:

- Stronger IP will push low-productivity firms out of the market.
- Stronger IP will increase the number of exporting firms and raise average export volumes.
- Stronger IP will increase the number of firms that both export and develop new products.

The empirical results strongly support these predictions: firms in China's provinces with relatively higher increases in IP enforcement are (1) more likely to enter exports; (2) start importing capital goods; and (3) introduce new products.

And firms in provinces with higher enforcement levels have higher export volumes and greater volumes of capital-goods imports.

To what extent are GVCs a source of learning and technical change?

- Does participation in global value chains raise innovation?
- Knowledge spillovers into domestic patenting appear to be significant: a standardized expansion of GVC links raises the average country's patenting by 5% per year, both developed and emerging.
- These spillovers are larger where domestic absorptive capacity is better.
- And it is remarkable that these GVC-based knowledge spillovers are larger than those gained through gross trade or intermediate-input imports.
- We will hear more about this at this seminar from Stela Rubinoval and Travis Lybbert.

What are the roles of MNCs in developing and sharing knowledge in R&D networks?

- R&D and innovation have become increasingly globalized through the development of international research teams. This is true in both basic (university) research and R&D by multinational companies (MNCs).
- R&D success requires the existence of deep and complementary sets of human capital skills. These are largely absent in many developing countries and this is perhaps the most significant deterrent in connecting to such networks and learning.
- There was almost no internationally shared innovation involving developing or emerging countries before the ICT revolution and the global proliferation of research teams is quite recent.
- MNCs play a dominant role in sharing R&D work across locations.
- Within high-tech industries (IT, pharma, agriculture, and others) the share of foreign inventors listed on patents has grown over time and accelerated in recent years.

All of this seems to be evidence that international collaboration in R&D is becoming an increasingly important mechanism for sharing specific knowledge with R&D facilities in developing countries over time.

We will hear more about this from José Guimon at this seminar.

What is the interplay between financial development and patent protection in encouraging R&D?

With other colleagues, I tried to understand why there are positive trade, FDI and innovation effects after IP reforms.

Point of departure: the form of financing matters for encouraging R&D where financial markets are limited.

We found that stronger patent rights increase R&D spending by more in patent-intensive sectors where financial markets are less developed regarding bank lending and stock-market capitalization.

Interestingly, the most prominent boost in this patent/R&D relationship comes from FDI financing, at all levels of financial development.

Do PTAs impact high-technology trade?-1

There has been a major increase in PTAs with strong expectations regarding IP protection.

Primary result in one study: PTAs with enforceable IP chapters raise high-IP imports with a lag.

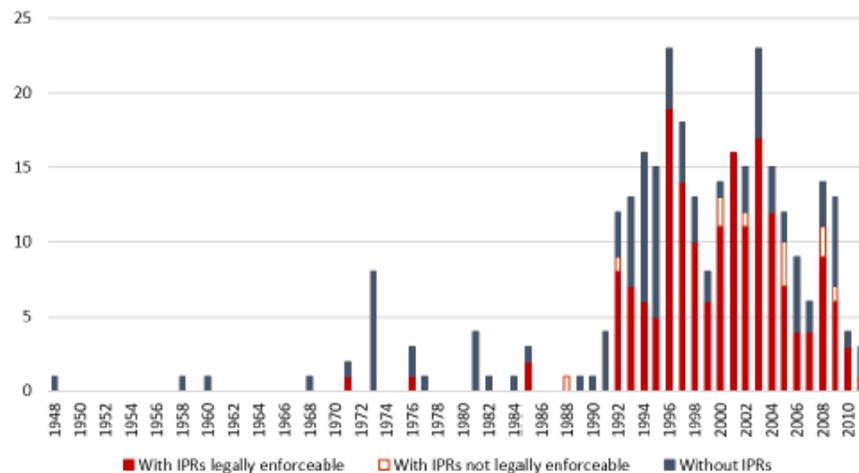


Figure 1: Evolution of the number of signed trade agreements. 1948-2011

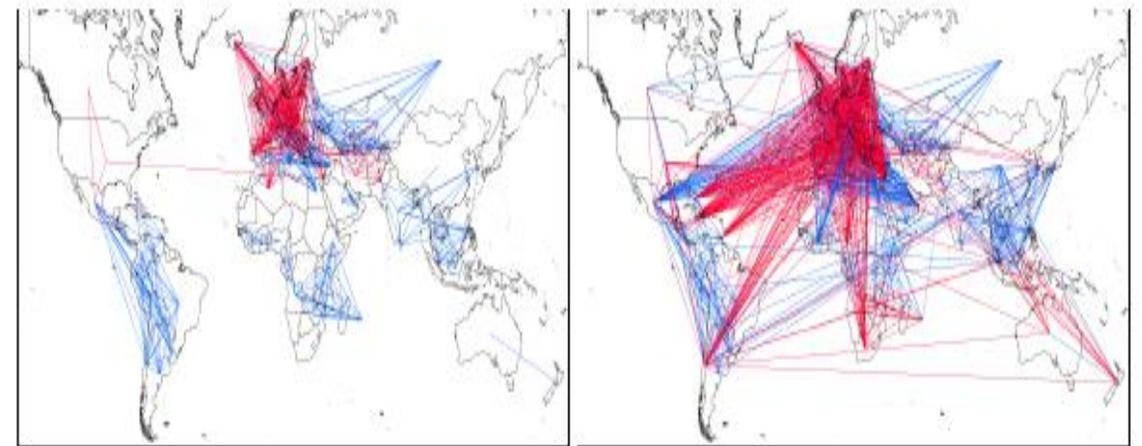


Figure 2: Network of countries with trade agreements. In blue, trade agreements with no IP chapters. In red, trade agreements with IP chapters. 1995 (left) and 2010 (right)

Do FTAs impact high-technology trade?-2

IP-related PTAs expand exports *to third markets (non-PTA partners)* of specific sectors (biopharmaceuticals, analytical instruments, medical devices, production technologies, and other high-IP goods). Result holds for LMI, UMI and HI countries.

Low-IP exports seem to be reduced by adherence to such PTAs.

Imports expand significantly in biopharma, ICT, and medical devices.

Where this analysis should be extended.

With respect to intellectual property rights:

We need more studies linking patents (innovation) to exports from emerging countries. This should focus on both inward patents and patents registered abroad by domestic enterprises.

We also need to link patents from inside and outside PTA partners to trade flows. Are there “IP creation” and “IP diversion” generated by protective IP chapters?

Technology absorption in the digital age

Far more research is necessary to determine the economic conditions and policy frameworks that help maximize domestic technology absorption and learning from inward technology flows.

This question will take on increasing importance as goods, services (especially high-technology business and engineering services), and technologies are traded digitally and IT becomes the essential center of global R&D sharing.

This is a complex and difficult question. But here are a few points to deliberate:

- There are reasons to doubt that *production networks* (GVCs) can continue to proliferate and integrate the poorest countries into global technological flows. Consider the role of artificial intelligence (AI) and robotics-based automation.
- Few developing countries can acquire the full range of technical skills and complementary abilities in knowledge management to compete at the innovation frontier.

Technology success in the digital age

At the same time, digital technologies and AI offer real opportunities:

- Considerably reduced costs of entering foreign markets and selling goods; a form of “inclusive globalization”.
- AI-based learning technologies bear the potential for revolutionizing learning and skill acquisition.
- And it will not be necessary for countries to acquire a full and deep range of skills; local engineers with specific skills can collaborate with global teams.

All of which underlines the importance of getting framework conditions as right as possible.

- Increase investments in “smart” (or specialized) human capital.
- Develop a stable and attractive policy environment for MNCs, including a commitment to openness and transparent IP protection.
- Promote a dynamic technology policy that encourages experimentation and innovation, especially among SMEs.
- Invest in effective and open digital infrastructure and connectivity while reducing physical barriers to trade.

Economists and (especially) policymakers have a great deal of work and thinking ahead of them, as countries work to position themselves well in this new age.