

# IPRs, trade, and technology transfer in the global economy

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*WIPO Expert Forum on International Technology Transfer*

Feb 16-18, 2015

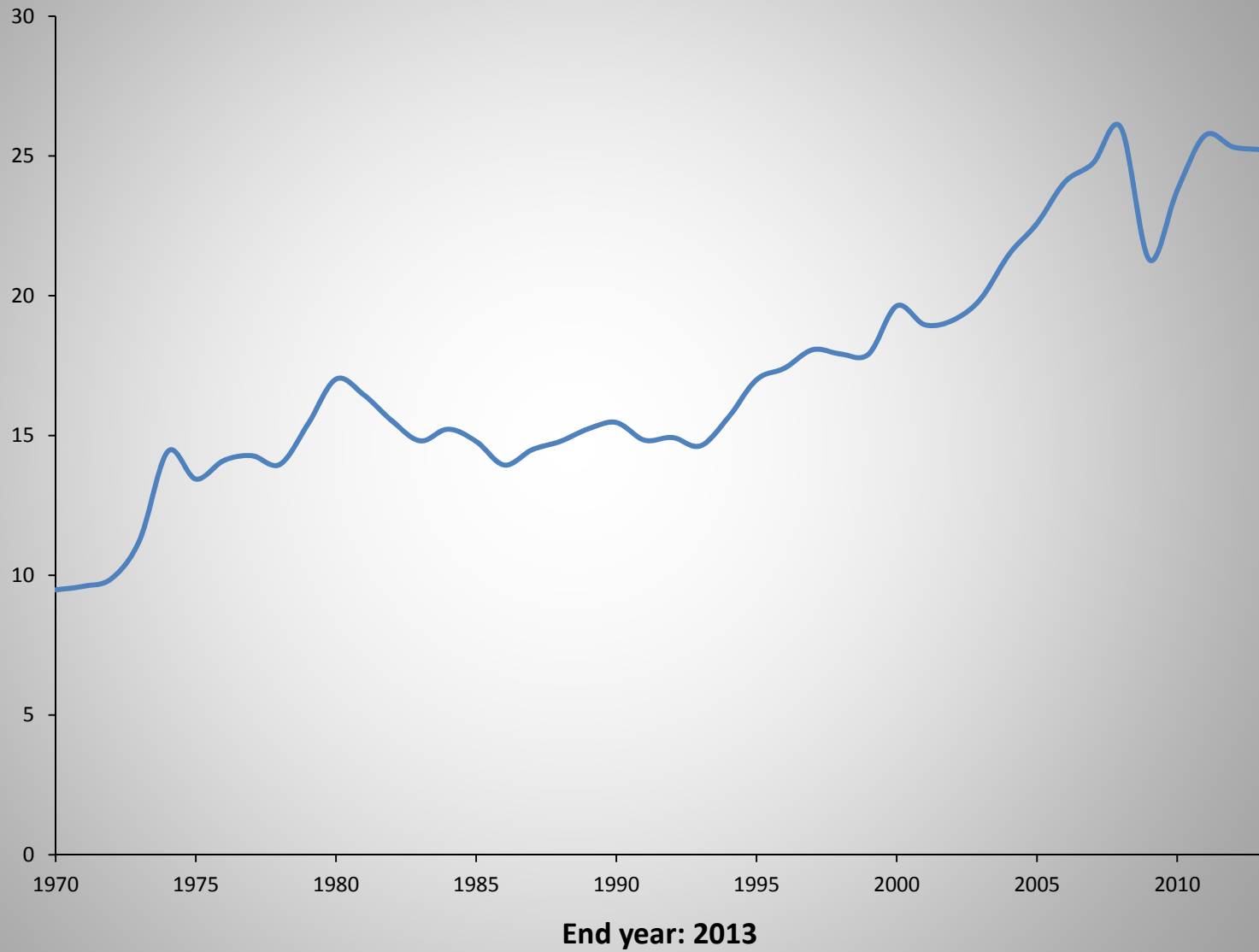
# Why ITT matters

- Cross-country differences in the timing and extent of adoption of new technologies can account for a significant proportion of the observed disparities in per-capita income across countries.
  - Both the **intensive** and **extensive** margin matter. Has a new technology been adopted? How widely has it penetrated?
  - Period of high economic growth in countries (especially in Asia) have tended to coincide with a catch-up in the range of technologies used by them relative to the industrialized countries.
- Knowledge is a **non-rival** good (although adoption maybe costly): as close as we get to a free lunch in economics. Can we do more with less?
- **Cumulative nature** of knowledge: ITT does not eliminate the need for domestic R&D.

# Innovation and channels of ITT

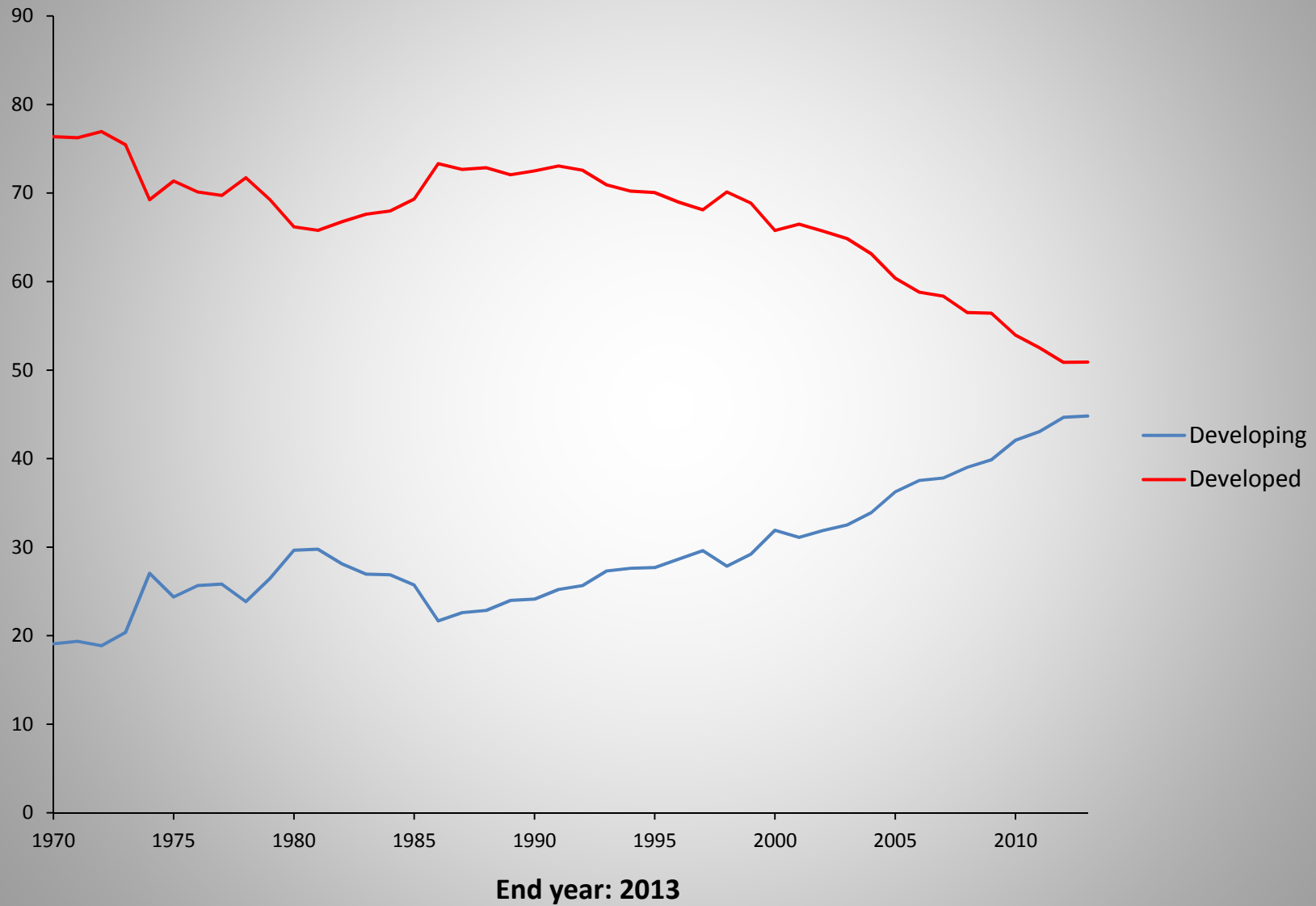
- R&D and innovation is still **concentrated in rich countries** although this has begun to change.
  - But North-South paradigm is in some danger of becoming outdated soon.
- International trade, especially in **capital goods** – i.e. goods such as machinery and transport equipment, computers, etc. that are used to produce consumption goods.
  - Grown steadily over the last 60 years and faster than world output.
  - Production concentrated in a few developed countries.
  - About 30-40% of world trade.
- FDI: via **greenfield investment** as well as **mergers and acquisitions**. Both bring in new technology and know-how. Of first order importance for ITT.
- Movement of people across the world: much more restricted than trade in goods and trade in capital. Crucial in building networks that help facilitate ITT.
- Interest of time, will ignore the third channel as well as other potential channels that exist out there.

## Evolution of global exports as a share of GDP



End year: 2013

## Share of world exports: the increasing importance of developing countries



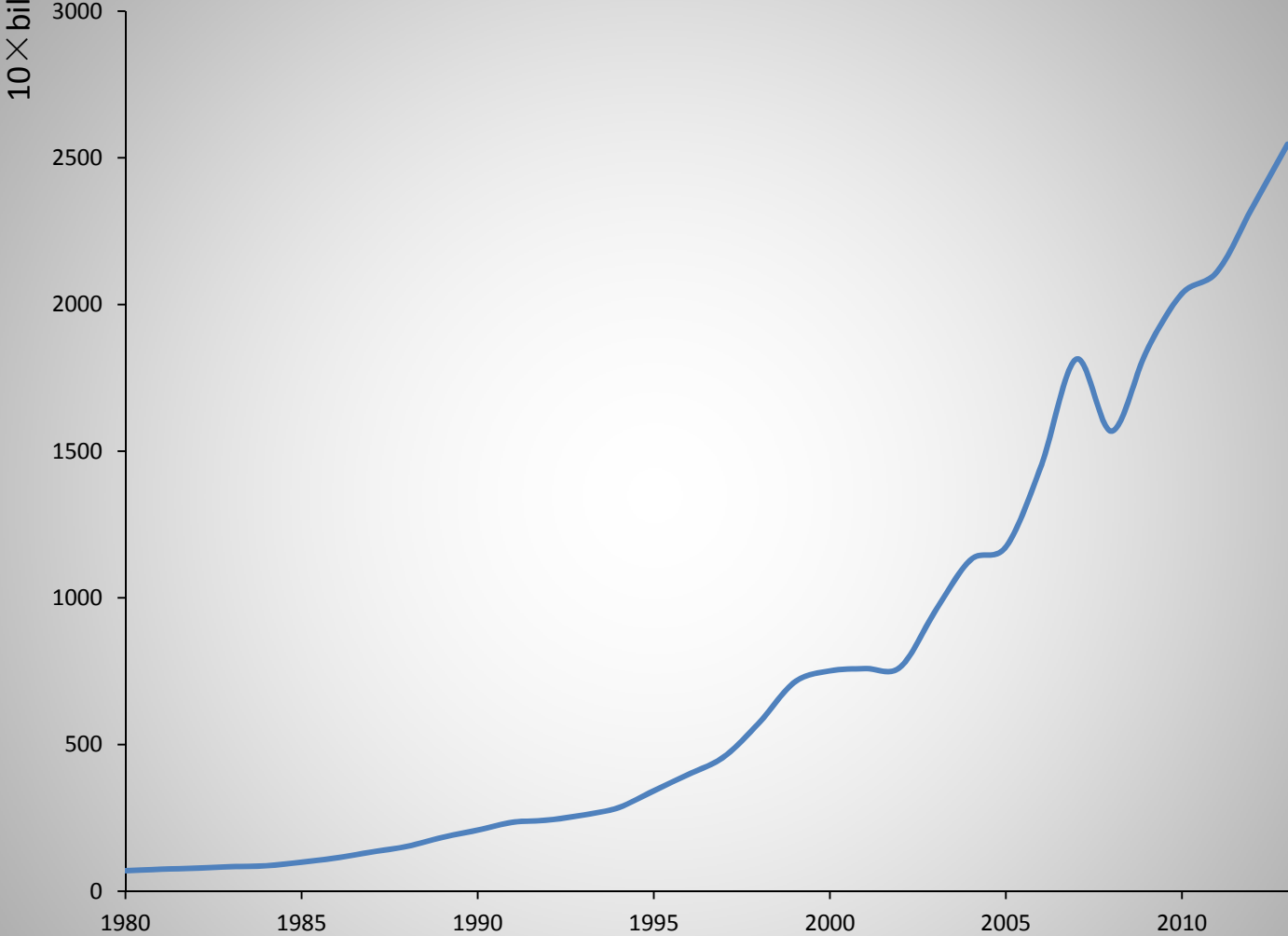
# Trade and innovation

- Fundamentally, increased global integration changes the **scale of the market** facing individuals and businesses.
- Novel ideas have a global market, much bigger than any one nation's market.
- **Bigger scale helps spur innovation**, the root cause of improvements in our standard of living both from an economic and social viewpoint (health and education).
- **Imported capital goods** directly allow countries to update their production technologies.
- **Goods embody ideas** so trade between nations indirectly facilitates exchange of ideas: such knowledge transfer is crucial for developing countries but also important for developed ones.

# Role of FDI and MNCs

- Today, **intra-firm trade** accounts for approximately one-third of total world trade.
- **How firms service markets:** sales of subsidiaries of multinationals exceed worldwide exports of goods and services.
- Developing countries becoming increasingly important **host countries for FDI:**
  - From 1990-2012, share of global stock of FDI residing in developing countries increased from **25% to 33%**.
- Even if FDI occurs via an acquisition, it often brings new **managerial and strategic know-how** as well as superior knowledge about potential export markets.

# The globalization of business (FDI stock index)



**Source:** UNCTADstat  
FDI stock in 1980: \$700 billion  
**End year: 2013**



# Multinational Firms and R&D

- R&D spending of some large MNCs exceeds that of many developing countries, even large ones.
  - In 2009 Toyota invested more in R&D than India.
  - Similarly, over 20 MNCs invest more in R&D than Turkey.
- Estimates vary but in a typical year over **80% of global royalty payments** for ITT are **intra-firm** (i.e. occur between subsidiaries and parent firms).
- Developing countries becoming increasingly **important source of technology revenue for MNCs**: from 1990 to 2009 the share of developing countries in global technology payments doubled to 26%.
- MNCs **shifting more of their R&D activities** to the developing world.
  - For example, Japanese multinationals allocated 38% of their R&D activities abroad to developing countries, a significant increase from 6% in 1993.
  - One aspect of the emergence of **Global Innovation Networks**.

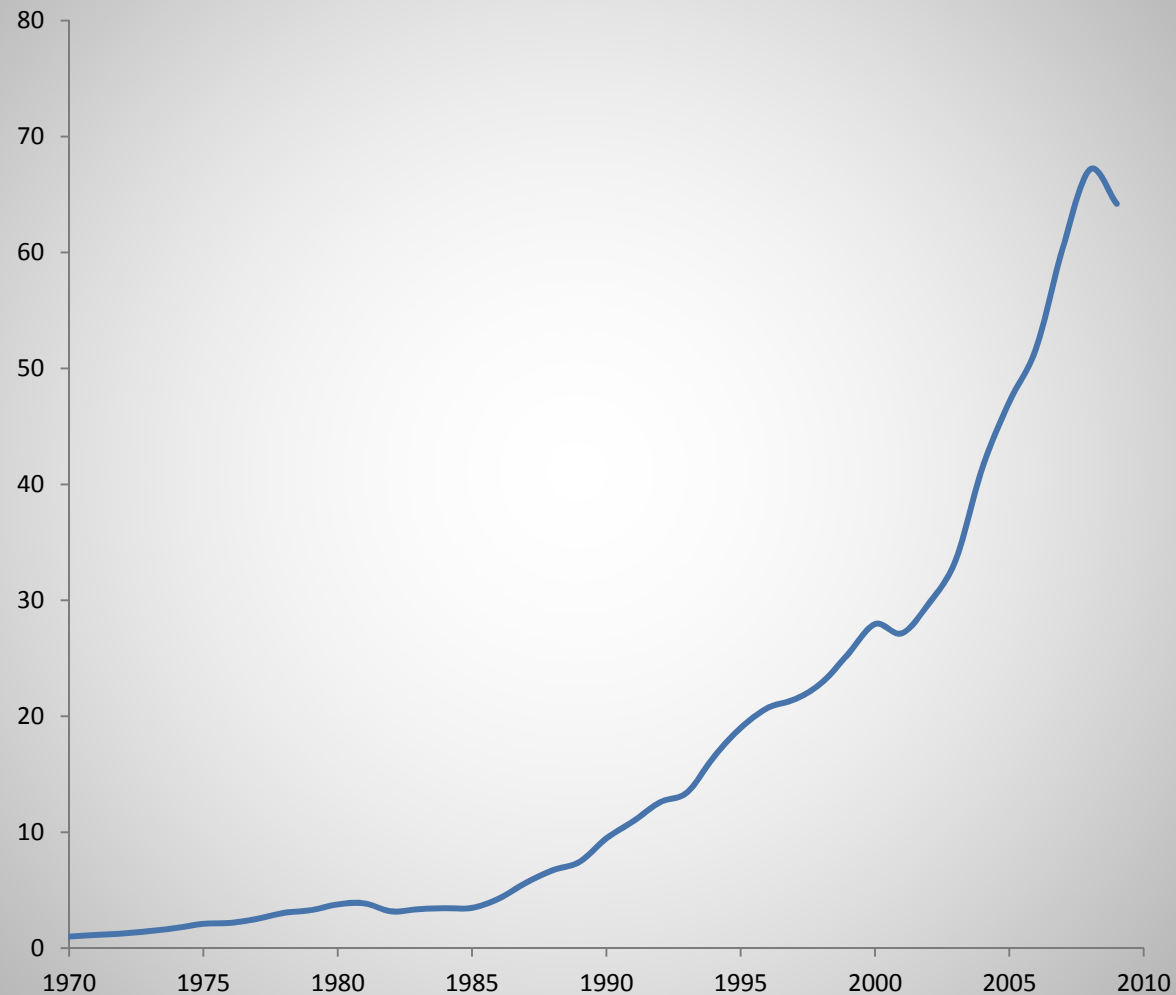
# MNC and productivity

- Well documented that **MNCs pay higher wages** than local competitors.
- MNC subsidiaries are typically **more productive** than local competitors: labor productivity as well as TFP measures.
- Both facts suggest that **MNCs bring in new technologies and/or management that raises local productivity.**
- An alternative possibility: MNCs hire away the best local workers from competitors?

# Spillovers from FDI

- But what about **spillovers** to local firms?
- **Weak evidence of no or negative horizontal spillovers** (i.e. to local competitors).
- **Strong evidence of positive vertical spillovers** (to local suppliers) of MNCs.
- Vertical spillovers often in the interest of MNCs and they often investment in quality upgrading amongst their suppliers.
- Important policy implications: trade today is dominated by global production chains and innovation networks.

# Intra-firm technology transfer: global royalty payments



*Source: World Development Indicators*

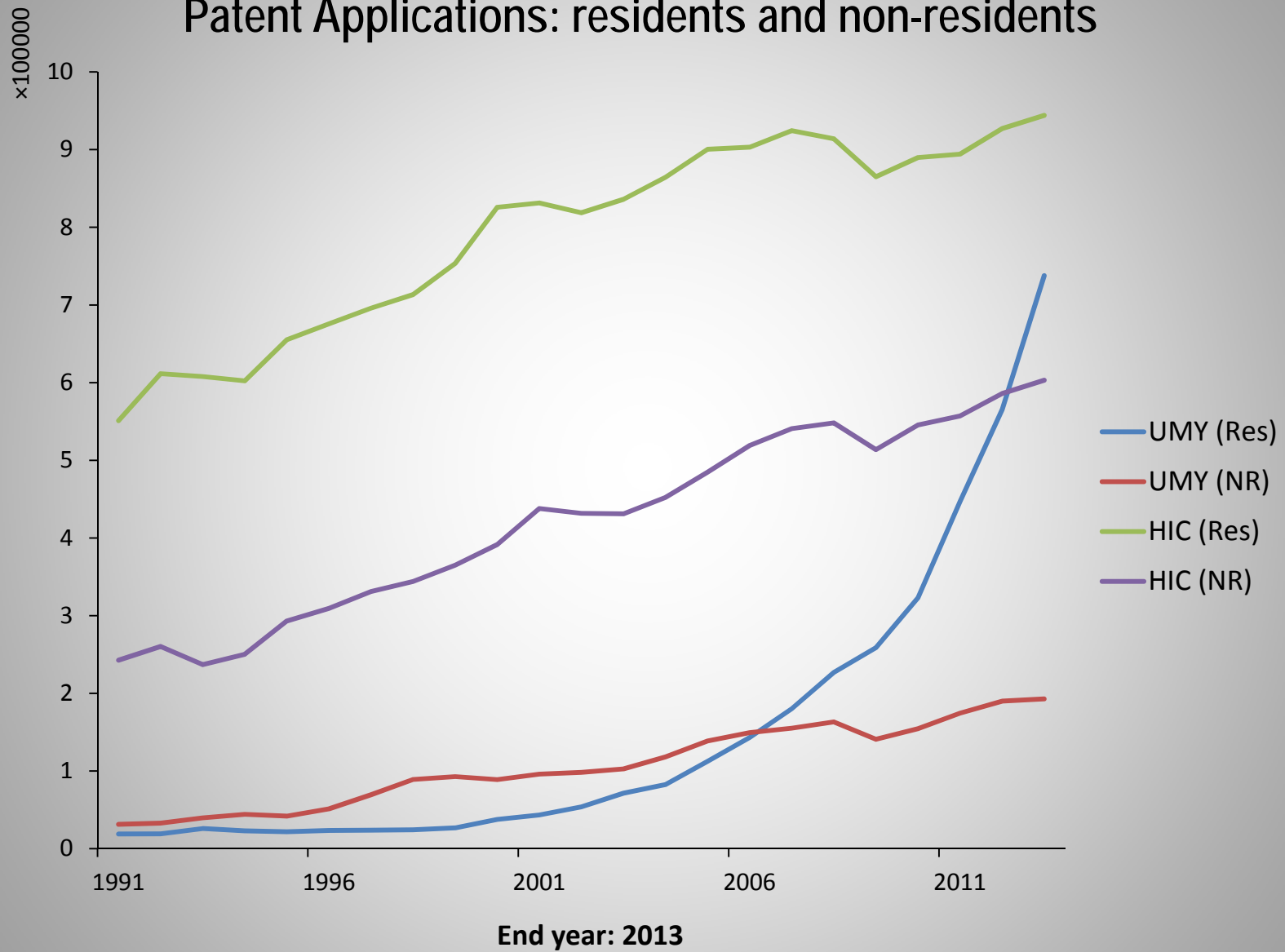
Global royalty payments in 1970: \$2.8 billion

**End year: 2010**

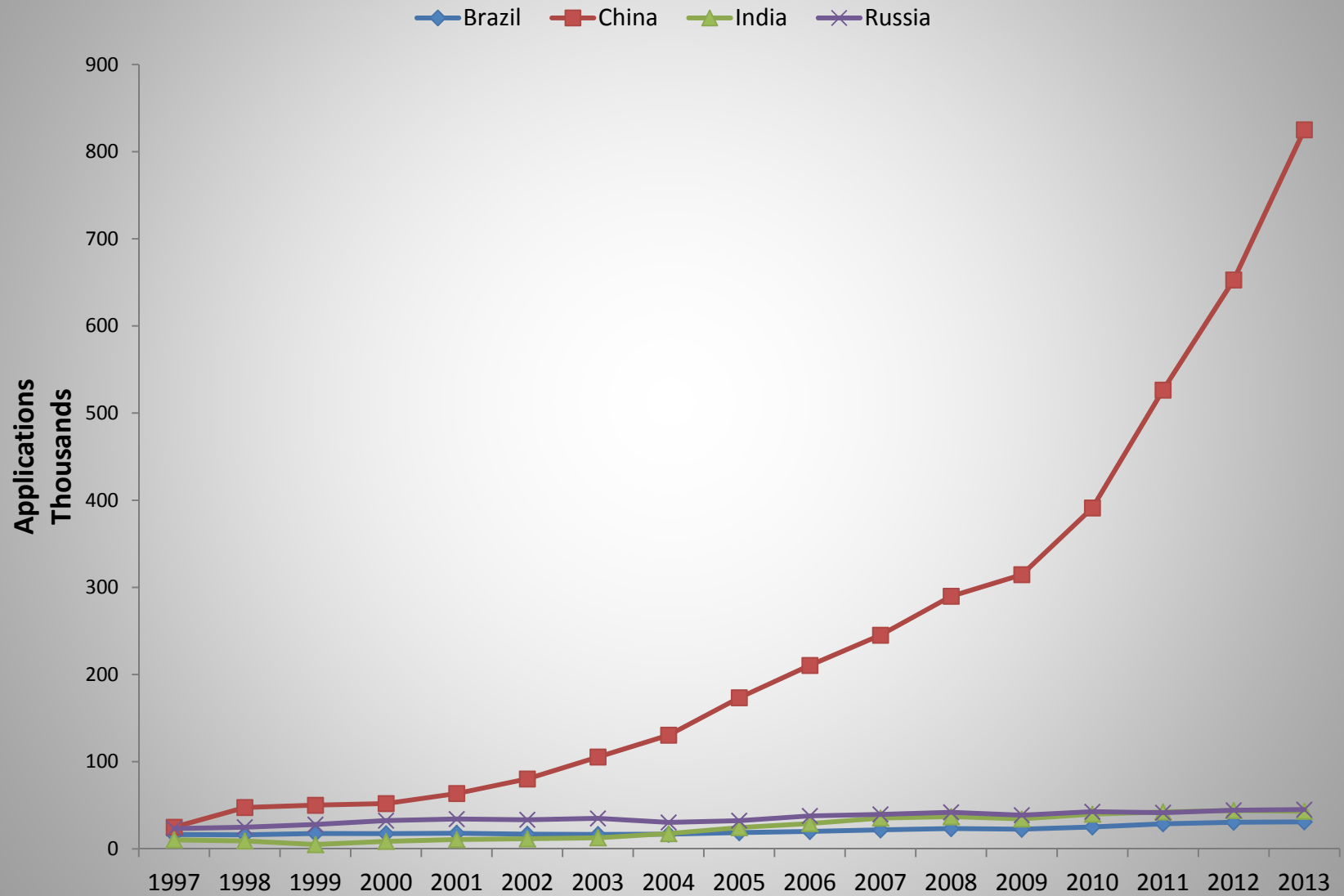
# Where does TRIPS fit in?

- How does the strengthening of IPR protection by developing countries affect them?
- FDI and production by local firms? Overall technology transfer?
- Effect on innovation? Prices? Wages?
- Questions hotly debated before, during, and after the negotiations that led to the ratification of the TRIPS Agreement in 1995.
- **Developing country concerns:** potential adverse impact on (a) local consumers and (b) the ability to adopt and assimilate foreign technologies to help develop local industries.
- Local innovation not a big concern for many.
- **TRIPS proponents:** stronger IPR regimes will increase global incentives for innovation and FDI. This will lift all boats.

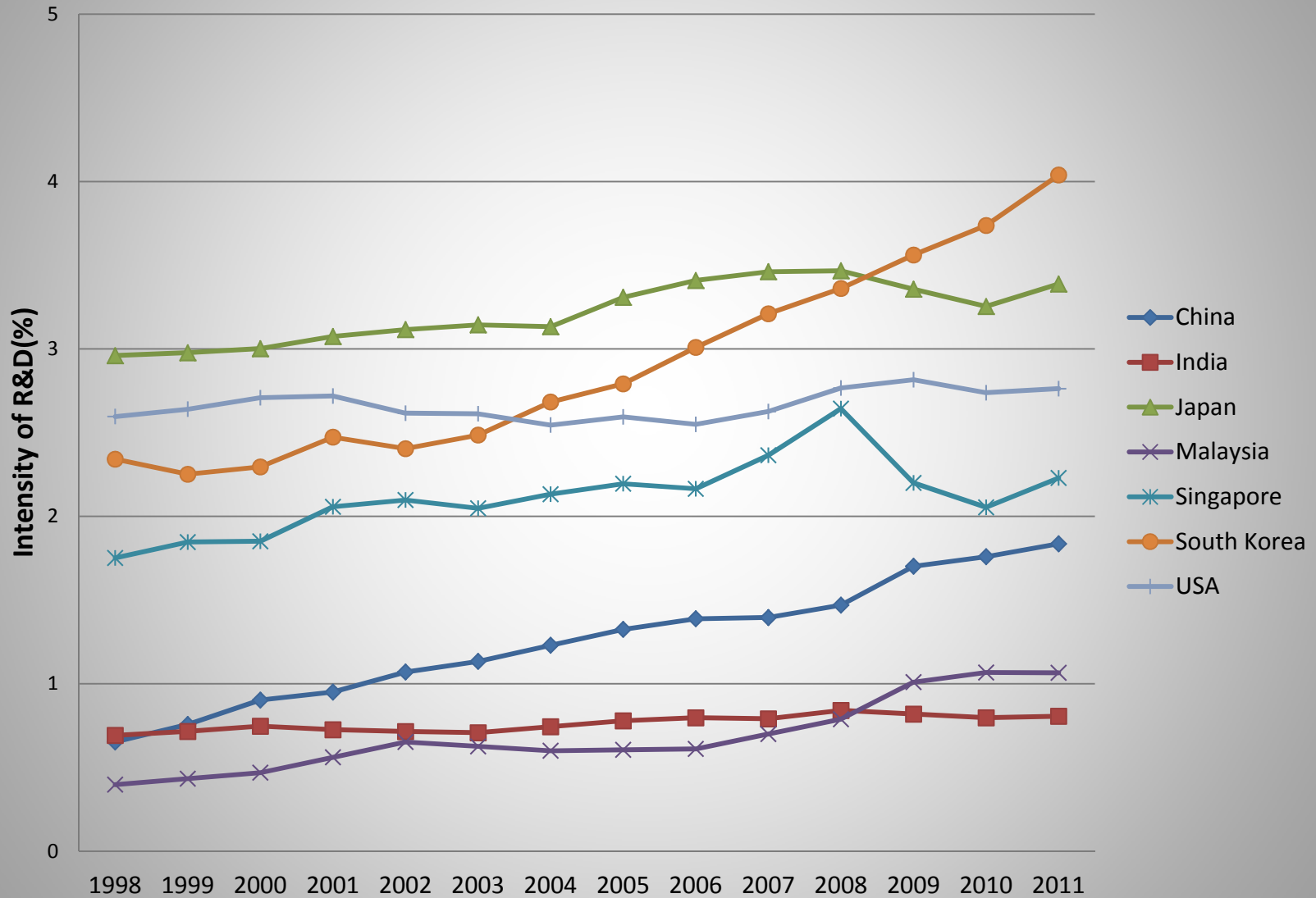
# Patent Applications: residents and non-residents



# Patent applications in BRICs



## Intensity of R&D in Asian countries





## Lessons from firm-level evidence?

- A prominent example: Branstetter et. al. (QJE, 2005).
- **Does IPR reform lead to more technology transfer?**
- Examine how technology transfer within U. S. multinational firms changes in response to a series of IPR reforms undertaken by sixteen countries over the 1982--1999 period. Regressions include a fairly long list of controls.
- Their detailed firm-level data show that:
  - royalty payments for technology transferred to affiliates increase at the time of reforms, as do affiliate R&D expenditures and total levels of foreign patent applications.
  - increases in royalty payments and R&D expenditures concentrated among affiliates of parent companies that use U. S. patents extensively (over 30% increase).

## How to interpret such findings?

- What does the increase in royalty payments measure?
- Could this not just be a reflection of more monopoly power for innovators?
- **Data are on intra-firm technology transfer:** not clear that there should be a large price effect. MNCs do not want to distort incentives for affiliates.
- **R&D spending by affiliates of MNCs - complementary to technology imports** from the parent - increases after IPR reform.
- **Second, the level and the growth rate of nonresident patenting** increases post-reform.
- This evidence indicates that at least some of the observable increase in royalty flows was associated with the introduction of new technologies to developing countries.

# What about FDI?

- Using affiliate level BEA data for US MNCs from 1982-99, Branstetter e. al. (2010) analyze response of US MNCs to IPR reforms by sixteen countries in the 1980s and 1990s.
- Find that **US MNCs expanded the scale of their activities** (as measured by levels of assets, net property, plant, and equipment, and employment compensation in reforming countries).
- Order of magnitude: 10-15% increase.
- **Larger increase for affiliates of technology-intensive parents: around 20%.**

# Indigenous production versus FDI

- Using UNIDO industry-level data from reforming countries, they also show that **industry-level value added increases after reforms**, particularly in those industries that are technology-intensive and where U.S. FDI is concentrated.
- Also construct for each reforming country an annual product level count of "initial export episodes" -- the number of 10-digit commodities for which U.S. imports from a given country exceed zero for the first time.
- Rough indicator of net international reallocation of production.
- Initial export episodes increase after IPR reform: suggests that the **decline in indigenous innovation offset by an expanded range of goods produced by multinationals.**

## Its not all rosy for TRIPS...

- Chaudhuri, Goldberg, and Jia (2006): patent enforcement under TRIPS will force local producers to exit. This will **reduce variety and competition** implying welfare losses for consumers.
- **Counter-factual analysis** based on estimated demand and supply parameters.
- Using detailed product-level data from India (1999-2000), they estimate that even if prices are fixed at pre-TRIPS level, the withdrawal of the four domestic antibiotics in the flouroquinolone sub-segment in India (implied by TRIPS compliance) would result in a **consumer welfare loss** that is 65% of the sales of the entire antibiotic market in India in 2000.

## Other problems...

- McCalman (2001): also a **counter-factual analysis**; asks what TRIPS implementation (no excluded sectors and perfect enforcement) would do to the values of patents held by countries in 1988.
- Estimates **substantial rent transfers** from developing to developed countries -- a net increase in the present value of patent rights of U.S. firms of about \$4.5 billion (in 1988 dollars) on the patents applied for in 1988.
- Analysis takes number of patents (and innovation) as fixed.
- Park (2008): evidence on responsiveness of FDI to IPR protection is weak or missing for other countries. For the US, evidence is fairly strong but this is not the case for all countries.

## What about the structure of TRIPS?

- Grossman and Lai (2004): **harmonization of patent policies is neither necessary nor sufficient for achieving efficiency** in a global economy comprised of asymmetric countries.
- In other words, even if TRIPS does increase innovation, technology transfer, and FDI it does not mean that its structure is optimal.
- **But what is the alternative? Different standards for all?**
- **Harmonization under TRIPs was never intended to be perfect.** Major exceptions for developing and least developed countries.
- **Important enforcement concerns remain.**
- TRIPS also allows for some **important flexibilities.**

# TRIPS flexibilities

- Two major flexibilities: (1) Choice of **exhaustion regimes** and (2) **compulsory licensing**.
- Both of primary importance in the area of **access to medicines**.
- Article 6 says that countries are free to pick exhaustion regimes of their choice.
- **What type of international spillovers are generated by the freedom to choose exhaustion policies?**
- **Does this freedom make sense? Why or why not?**



# Compulsory licensing

- Not a TRIPS innovation: Paris Convention also had rules regarding CL (non-working of patent).
- Fairly strict list of conditions that have to be followed (a) Effort at securing VL (b) Adequate compensation (c) non-exclusive in nature and (d) output should be sold locally or in third market that lacks the ability to produce the good itself – 2003 waiver.
- **Are these rules sensible? Optimal? Anything needs to be changed? Weakened? Strengthened?**

# Mandating technology transfer via FDI

- Holmes et al. (2013) find that:
  - China continues using **forced technology transfer** (quid pro quo policy)
  - China captured more technology and productivity for its local firms.
  - China's domestic welfare rose.
  - Profits lowered for multinationals.
- Can other developing countries do this? Should they try?

## Newer elements of ITT

- Emergence of global innovation networks (GINs) within the globalization of R&D (Maskus and Saggi)
- Increasing numbers of cross-border basic research collaborations among universities, government laboratories, and foundations.
- Emerging focus of private enterprises on open innovation.
- Does the emergence of GINs call for a newer set of policies?

# Enhancing ITT through newer channels

- Improve the chances of meaningful engagement with **research networks and open innovation**.
- Expand GATS to encourage **greater temporary mobility of skilled and entrepreneurial workers**.
- Long-term proposal for an international Treaty on Access to Basic Science and Technology (ABST).
- Several structural issues: scope; nature of liberalization; balanced by safeguard clauses.