II. Role of Patent Rights in Economic and Technological Development

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Outline

A. Innovation and Development
   - Indicators
   - Trends

B. Impact of Patent Rights
   - Theory
   - Evidence
     - Minor Inventions
     - Outward Orientation
   - Lessons

A. Innovation and Development

Real Per capita Gross Domestic Product (GDP)

Country Group:	1995	2009	Growth 1995-2009
Developed economies	27720	33902	*22.3%*
Developing economies	1495	2475	*65.5%*
Developing economies: Africa	893	1188	*33.0%*
Developing economies: America	4217	5290	*25.4%*
Developing economies: Asia	1226	2386	*94.7%*
Developing economies: Oceania	2505	2326	*-7.2%*
Least developed countries	290	483	*66.2%*

Source: UNCTAD.org

(Figures are in constant 2005 U.S. dollars)

Research & Development

Gross Domestic R&D Expenditure

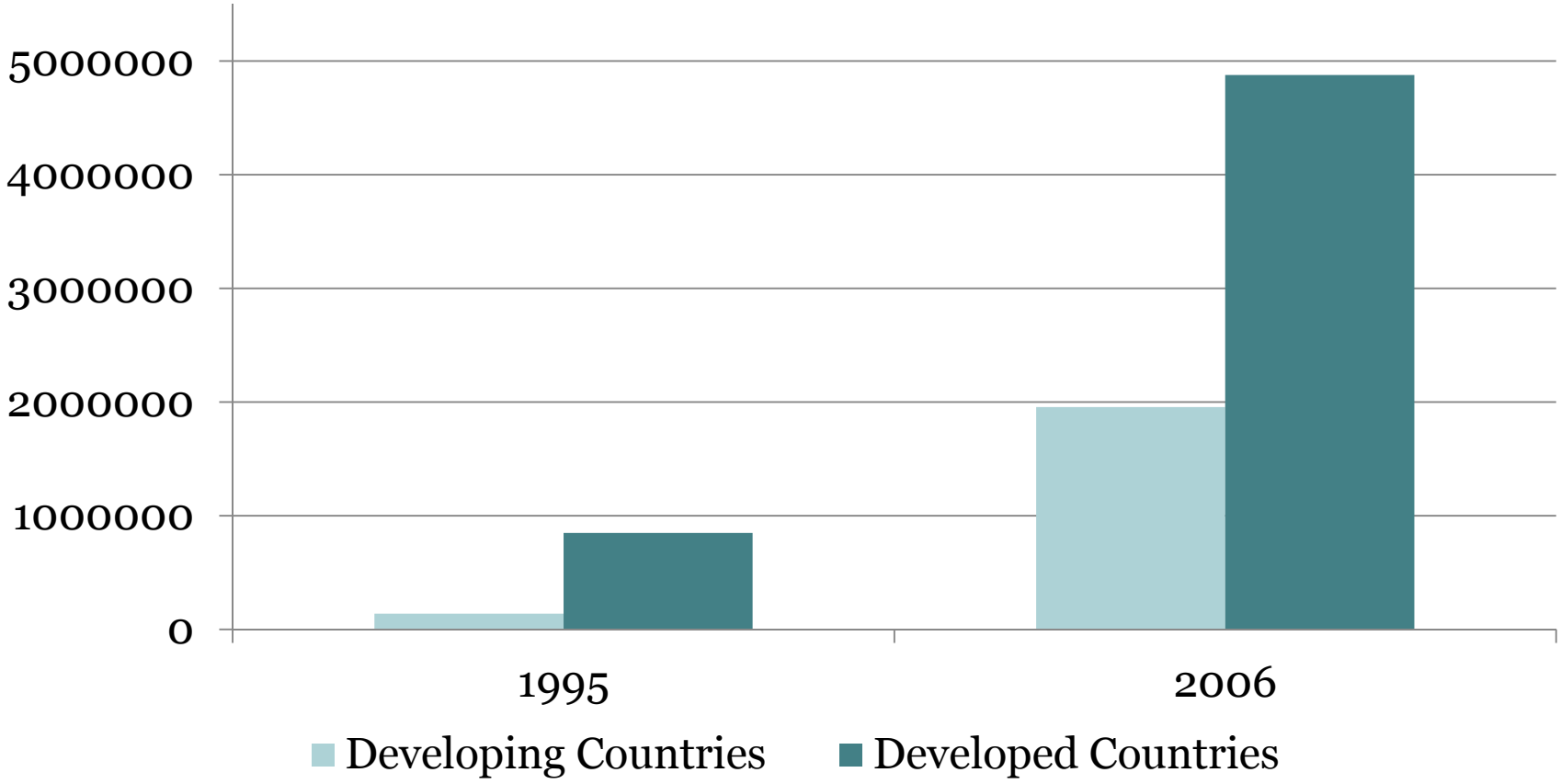
	% of GDP		% share in World R&D		% share of World Researchers	
	2002	2007	2002	2007	2002	2007
World	**1.7%**	**1.7%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**
Developed countries	2.2%	2.3%	82.6%	76.2%	69.7%	62.1%
Developing countries	0.8%	1.0%	17.2%	23.7%	29.8%	37.4%
Less-developed countries	0.2%	0.2%	0.1%	0.1%	0.5%	0.5%

Source: UNESCO

	Ratio of R&D to GDP (%)		Share of R&D financed by Business Sector	
	1998 - 2000	2008 - 2010	1998 - 2000	2008 - 2010
USA	2.6	2.8	67%	67%
Canada	1.8	2.0	45%	48%
China	0.65	1.5	60%	72%
Egypt	0.19	0.21	n/a	n/a
India	0.74	0.76	23%	35%
S. Korea	2.3	3.4	70%	73%

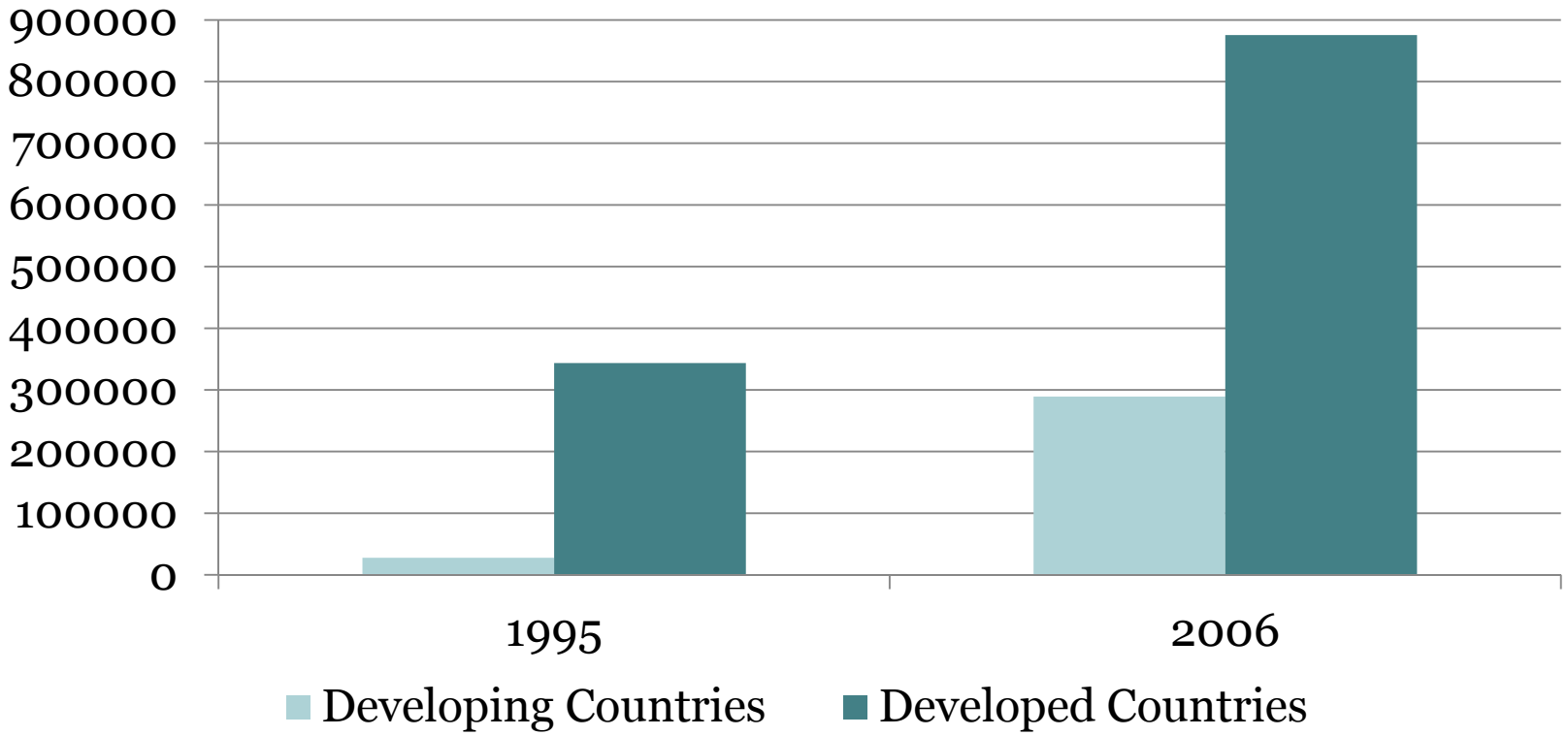
Source: UNESCO

Patent (Priority Filings by Inventor Country)



Source: European Patent Office, INPADOC

Trilateral Filings by Inventor Country (USPTO, EPO, & JPO)



Note: Trilateral Filings by Developing Countries are magnified by a factor of 10

Source: European Patent Office, INPADOC

B. Impact of Patent Rights

(on Innovation and Technological Development)

Theoretical Perspectives

- Incentives for Invention
- Incentives for Commercialization
- Disclosure of Inventions

Other considerations

- Sequential and cumulative innovation
  - Bessen and Maskin (2009)
- Optimal Strength varies between North and South
  - Grossman and Lai (2004)
- Threshold Effects
  - Eicher and Penalosa (2008)
- Incremental Innovation and learning-by-doing
  - Suthersanen (2006)

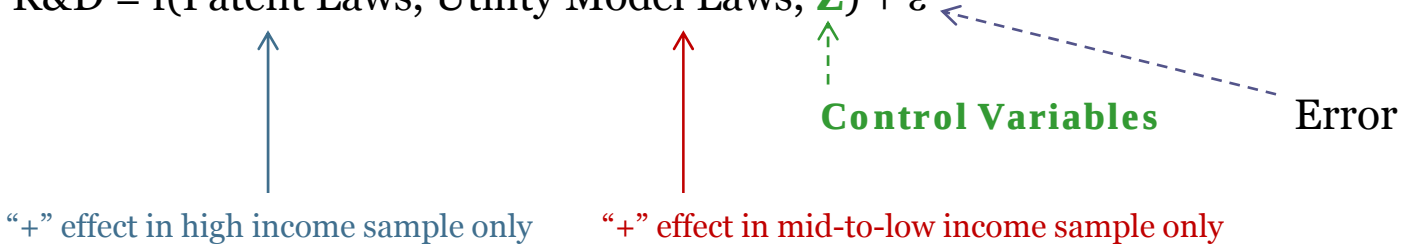
Empirical Evidence

- Effect of Patent Rights on Innovation
  - Significant in Developed Countries
  - Lagged effects in Developing
  - Patent protection effective if indigenous technological capacity is present
    - Minor inventions and utility models act as a stepping stone
    - Reverse causality: Increased technological capacity results in stronger protection for patent rights.
- In the longer run, stronger patent rights are associated with increased outward orientation of firms
  - Increased productivity and incentives to commercialize new innovations
    - Source of exports, outward FDI and licensing receipts

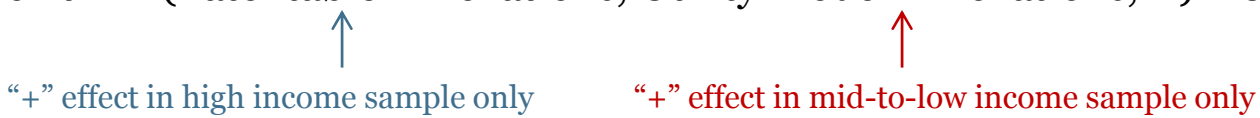
On Innovation: Kim et al. (2011) *Research Policy*

'Role Reversal':

- R&D = f(Patent Laws, Utility Model Laws, **Z**) + ε



- GDP per capita growth = f(Patentable Innovations, Utility Model Innovations, **Z**) + ε

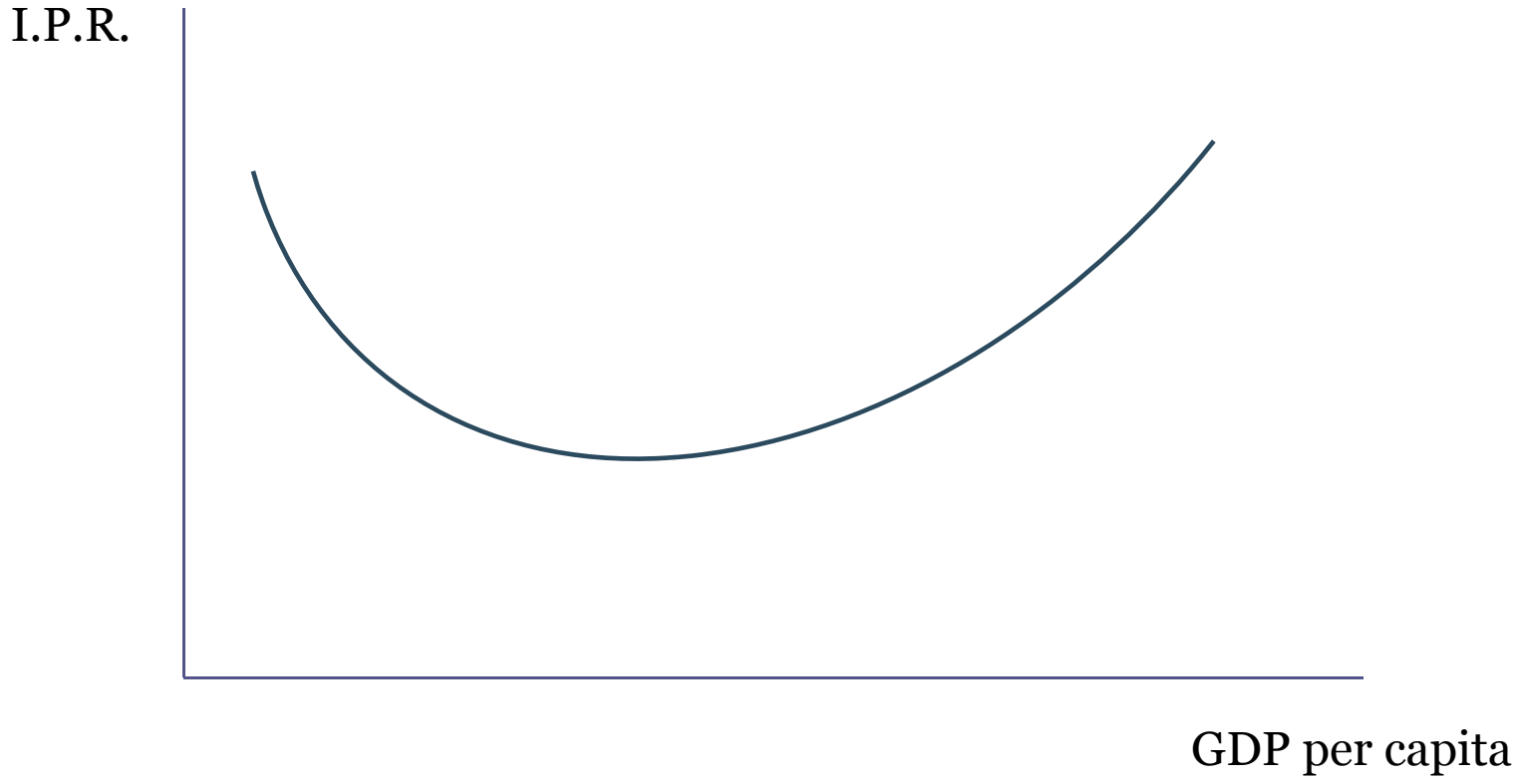


- Patentable Innovations = f(Lagged Utility Model Innovations, **Z**) + ε

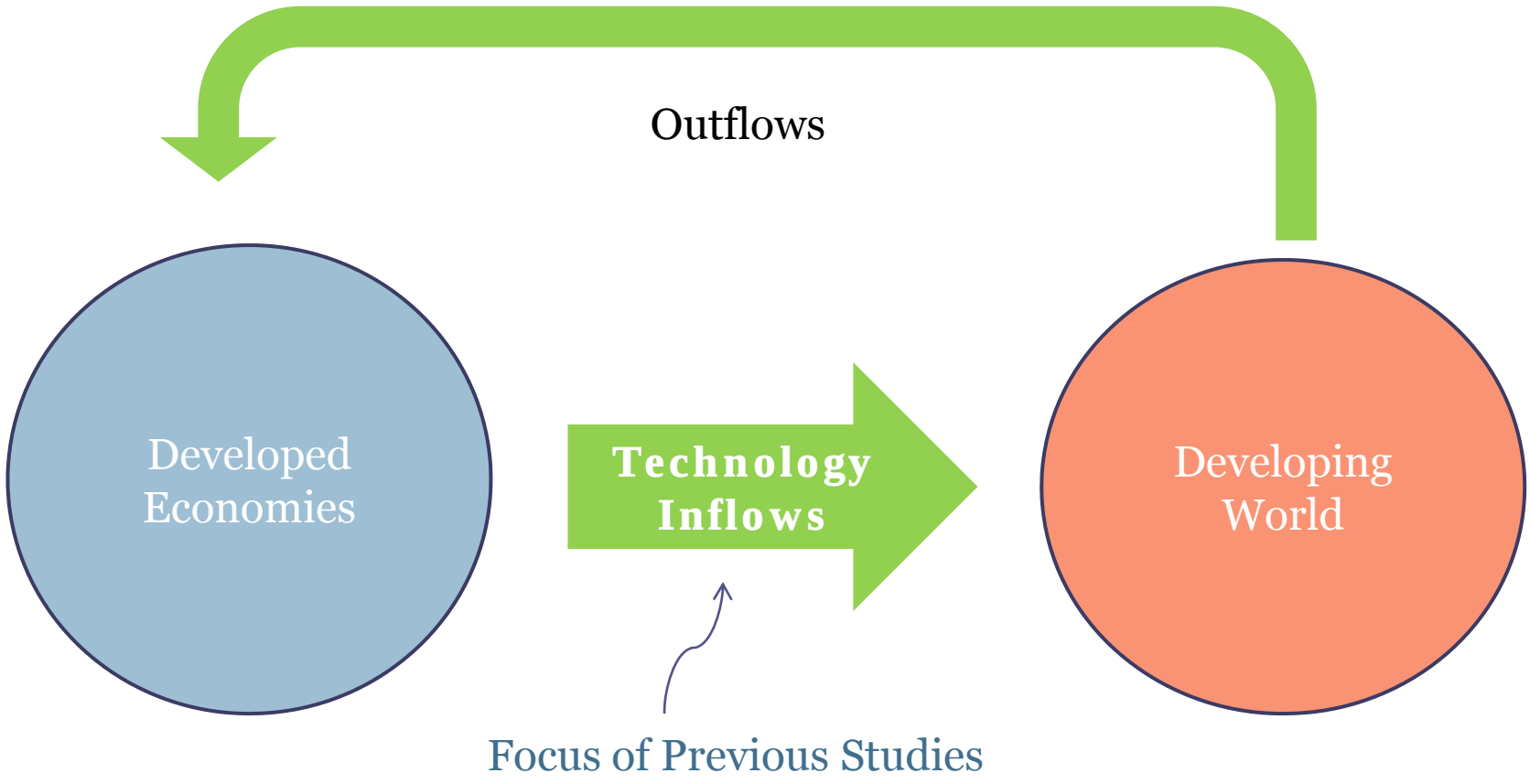
IPR is a nonlinear function of GDP per capita:

"-" "+"

Index of Patent Rights = f(GDPC, $GDPC^2$, **Z**) + ε



On Outward Orientation



Affiliates of U.S. Multinational Firms

Affiliates in Developed Countries	1982	1989	1994	1999	2004
Domestic Sales Only	27.7	27.2	32.1	38.2	32.4
Exports & Domestic Sales	54.3	55.4	49.5	43.8	50.1
Outward Licensing	17.9	17.4	15.1	18.0	17.5

Affiliates in Developing Countries	1982	1989	1994	1999	2004
Domestic Sales Only	40.5	41.4	40.0	38.2	31.0
Exports & Domestic Sales	57.2	54.8	56.0	56.4	63.8
Outward Licensing	2.3	3.8	4.0	5.4	5.2

% of firms with respective activity

Patents Granted at U.S.P.T.O

	Rank 2010	Rank 2004
Japan	1	1
Germany	2	2
S. Korea	3	4
Taiwan	4	3
Canada	5	7
France	6	6
U.K.	7	5
China	8	19
Israel	9	12
Italy	10	8

Briggs & Park (2011)

- Large Micro Dataset of Firms
- Firm Exports and Outward Licensing are a significantly positive function of I.P.R., controlling for other factors, like Productivity.
  - Sample selection bias treated
  - Especially in developing countries
- Sequential Pattern
  - Local sales → Exporting → Licensing
    - due to sunk costs of entering export & licensing market, where sunk costs associated with licensing are higher
- Increased unaffiliated (arm's length) licensing

Key Lessons

- Lagged Effects of Patent Reform on Innovation and Technological Development
  - Weak 'short run' effects
  - Adjustment period
- Minor Inventions can create "learning by doing" and raise potential to conduct major inventions
  - Patent rights as a luxury good: rises with income
- Developing economies still lagging, but have narrowed the gap in technological development
- Eventually, stronger patent protection increases local innovative capacity, productivity, and the commercialization of local innovations
  - via exports and licensing to the rest of the world (ROW)
  - Local products are more attractive to ROW if technological content (or product quality) is higher
  - Patents provide incentive to invest in product quality and to bring products to the marketplace.