How do international economic activities between two countries impact a nation's innovation over time?

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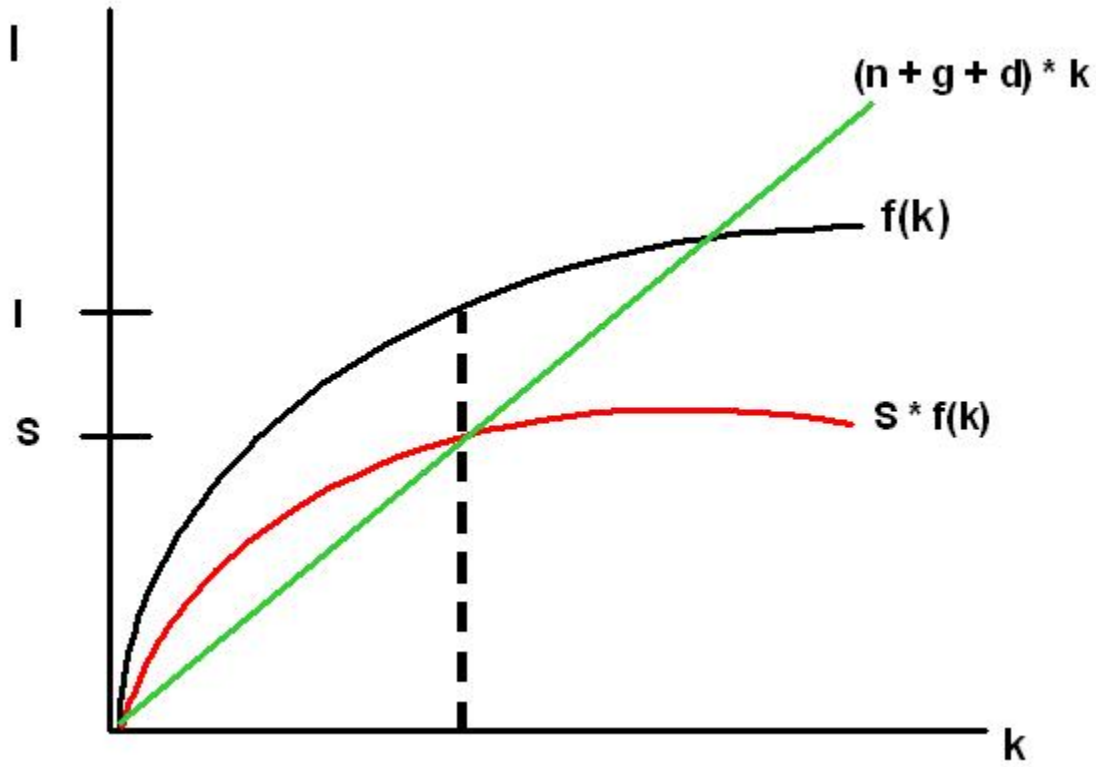
- National Innovation level before and after joining WTO?
- Heterogeneous impacts on emerging innovator nation and leading innovator nation?
- More trade and FDI lead to more innovation?

Background

Solow Growth Model

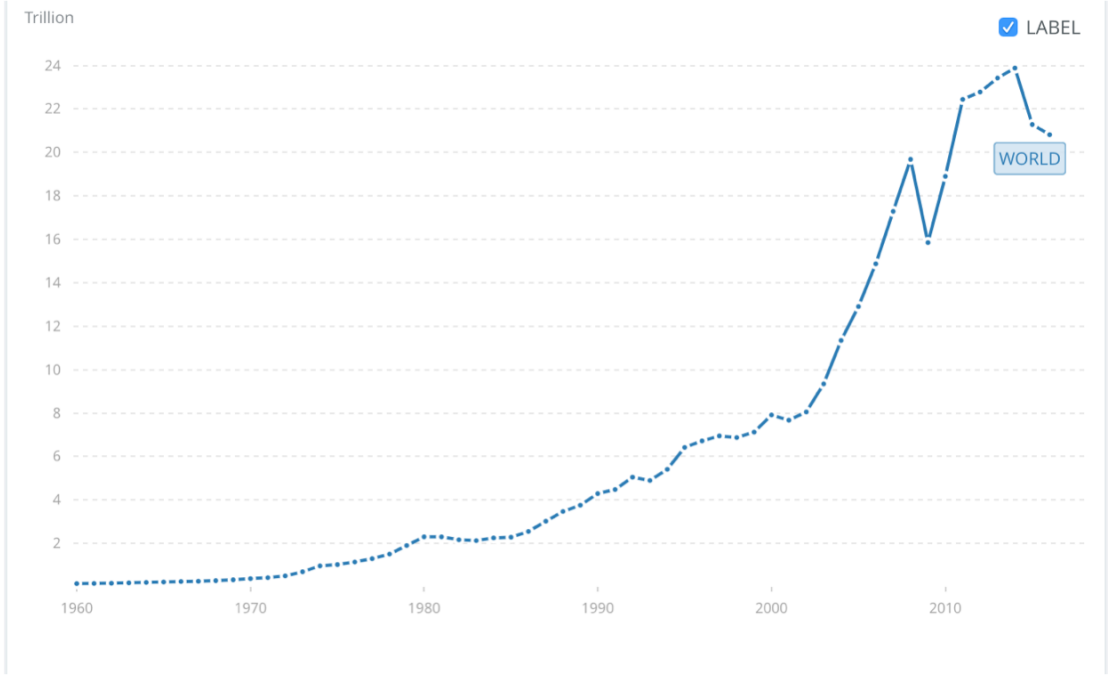


Previous literature on drivers of innovation process

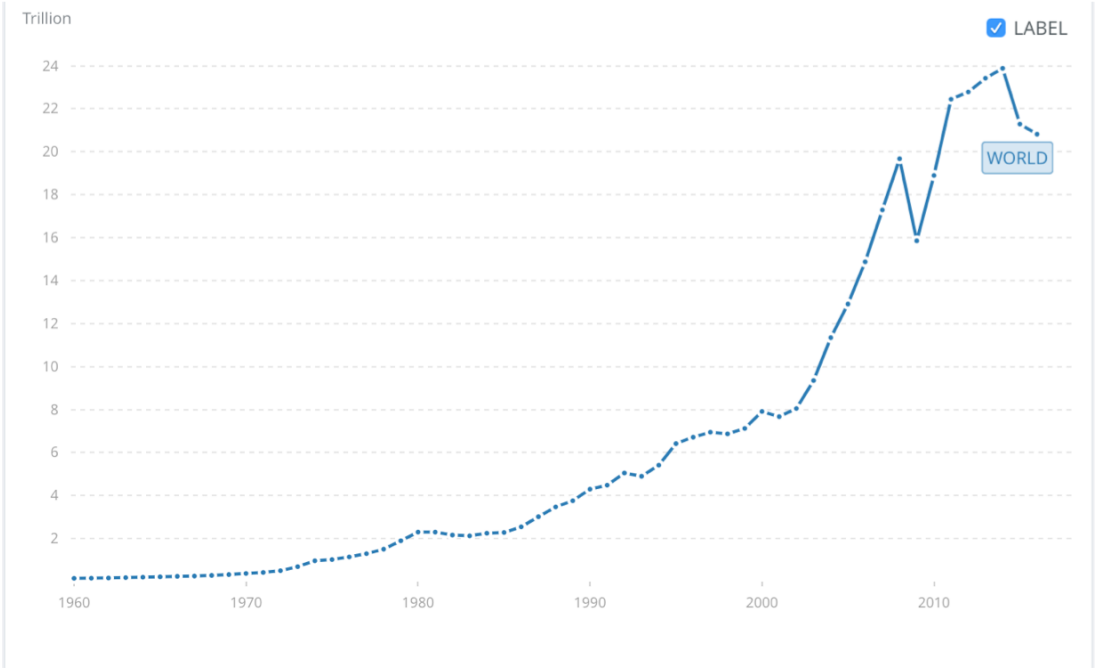
- National investments
- Other factors play a role:
  - Intensity of a nation's financial resources
  - Human capital to innovation activities
  - Accumulated technological capital
  - Supportive innovation environment in a nation's industrial clusters
  - …….

From closed economy to open economy

International Trade Flows (US$)



Foreign Direct Investment, net inflows (US$)



Model by Furman & Hayes

$$\bar{A}_{j,t} = (X_{j,t}^{INF}, Y_{j,t}^{CLUS}, Z_{j,t}^{LINK}) H_{j,t} A_{j,t}$$

Determinants of national innovative capacity:

(a) Common innovation infrastructure
(e.g. Patent Stock, GDP, Education expenditure)
(b) Cluster-specific innovation environment
(c) Quality linkage between the two above

Variables of Interest:

$\bar{A}$: Flow of innovations
X: Level of resource commitments and policy choices that constitute the innovation structure
Y: Environments for innovation in a country‘s industrial clusters
Z: Strength of linkages between common infrastructure and nation’s industrial clusters
H: Total level of human capital and labor recourses
A: Stock of knowledge

Source: Furman, J. L., & Hayes, R. (2004). Catching up or standing still: National innovative productivity among ‘follower’ countries, 1978–1999. Research Policy, 33(9), 1329–1354

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New Model

$$\overline{A}_{j,t} = (X_{j,t}^{INF}, Y_{j,t}^{CLUS}, Z_{j,t}^{LINK}) M_{j,t} F_{j,t} H_{j,t} A_{j,t} C_{j,t}$$

New variables to be incorporated:

M: trade flows
F: foreign direct investment
C: control variables

Data and Methods

- **Innovative Output**
  variable:
  Patent Granted for each country each year
  source:
  WIPO

- **Quality of innovation**
  variable:
  GDP, National education expenditure, number of educational institutions…..
  source:
  WDI

- **Cluster-specific innovation environment**
  variable:
  R&D expenditure by private industry
  source:
  OECD

- **Quality of linkage**
  variable:
  national R&D expenditure(not industry)
  source:
  OECD

- **Trade flows/FDI**
  variable:
  imports/exports of goods and services, high- technology imports and exports, foreign direct investment net inflows
  source:
  WDI
- **Other control variable**

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Methods

- Time Series Method/Autoregression
- PCA
- Neural Networks

Further Discussion and Challenges

- Alternative model
- Better operationalize my model
  - Variable to measure innovation output
  - Variable to measure quality of linkage
  - Impacts of trade flows
  - Control variables