LITERATURE REVIEW
(INCLUDES COMMENTS WITH REGARDS TO MY IPR and RENT PROTECTION PAPER)

IPR AND RENT PROTECTION IN THE GLOBAL ECONOMY, Working Paper

1. Source:

Grossman and Helpman, 1991, Innovation and Growth in the Global Economy, Chapter 11

Structure: A model of growth based on product variety expansion
Two cases are considered

Wide Gap: the wage gap between the two regions is large
Narrow Gap: the wage gap between the two regions is small

Notation
m: imitation
g : innovation
Note that both m and g represent aggregate intensity levels

Comments The model is a product variety model; thus, not directly related to my work. In this model, there is no complete product cycle. More specifically, a new variety is discovered in the north and then may move to south under successful imitation. However, it does not go back to North.

Comparative Static Results

Innovation subsidies $\phi_N$ (p.299):

Wide Gap:
$\phi_N \uparrow \Rightarrow$
g unchanged
m ↓
w_s / w_s ↑ (see p. 300 and on for wages)

Narrow Gap:
$\phi_N \uparrow \Rightarrow$
g ↑
m ↑
w_s / w_s ↑

To uncover intuition, see p. 293 where the steady-states are explained.

Imitation subsidies $\phi_S$ (p.299):

Wide Gap:
$\phi_S \uparrow \Rightarrow$
g ↑
m ↑
w_s / w_s ↓

Narrow Gap:
$\phi_S \uparrow \Rightarrow$ g same
m same
w_s/w_S ↓

An increase in L_N

Wide Gap:

L_N↑ ⇒ g same
m ↓
w_s/w_S ↑ (p.304 for wages)

Narrow Gap:

L_N↑ ⇒ g ↓
m ↓
w_s/w_S ↑

An increase in L_S

Wide Gap:

L_S↑ ⇒ g ↑
m ↑
w_s/w_S ↓ (p.304 for wages)

Narrow Gap:

L_S↑ ⇒ g ↓
m ↑
w_s/w_S ↓

A note on comparative steady-state analysis

In the paper, Grossman and Helpman (EJ), it is said that

improvement in innovation a_D ↓ is equivalent to L_N↑
improvement in imitation a_I ↓ is equivalent to L_S↑
Effects of an increase in IPR (Economic Journal, Variety expansion Paper)
Comparison with my work

- A decrease in $\phi_S$
  
  Wide Gap:
  \[ \phi_S \downarrow \Rightarrow g \downarrow \]
  \[ m \downarrow \]
  \[ (w_N/w_S) \uparrow \]
  
  Narrow Gap:
  \[ \phi_S \downarrow \Rightarrow g \text{ same} \]
  \[ m \text{ same} \]
  \[ (w_N/w_S) \uparrow \]

  Comment:
  Wide gap : same as my paper
  Narrow gap : $g$ and $m$ differ, but wage effects are the same.

- A decrease in $L_S$ equivalent to an increase in $a_l$ unit labor requirement in imitation
  
  Wide Gap:
  \[ L_S \downarrow \Rightarrow g \downarrow \]
  \[ m \downarrow \]
  \[ (w_N/w_S) \uparrow \text{ (p.304 for wages)} \]
  
  Narrow Gap:
  \[ L_S \downarrow \Rightarrow g \downarrow \]
  \[ m \downarrow \]
  \[ (w_N/w_S) \uparrow \]

  Comment:
  Wide gap : same as my paper
  Narrow gap : same as my paper
2. Source:

Grossman and Helpman, 1991, Innovation and Growth in the Global Economy, Chapter 12
Economics, Volume 106 (2), 557-586.

Structure: A quality ladders model of innovation and growth

Two cases are considered

**Efficient followers**: both ex-leaders and any other researcher in the North (followers)
are involved in innovation. Nevertheless, ex-leaders are more
productive in their research efforts compared to followers

**Inefficient followers**: only ex-leaders who lost their leadership to the South are
engaged in R&D. The outcome is a pure product cycle model: ex-
leaders strictly target Southern industries. At the balanced growth,
the flow condition dictates that aggregate intensity of imitation
must be equal to aggregate intensity of innovation. This appears to
be an undesirable feature of the model. In that innovation and
imitation always move together in response to an exogenous shock.

Notation:

The notation below follows the QJE paper, which is more in line with my paper.

\[ i \] : aggregate innovation rate
\[ \eta \] : aggregate imitation intensity
\[ \mu \] : frequency of imitation per industry

The case of inefficient followers
\[ i = \eta, \text{ thus } \eta \text{ moves with } i \text{ in all cases} \]

A note: on p. 324 \( i \) and \( \eta \) are referred as domestic growth parameters

Comments:

The model differs from mine in the following aspect:

\[ \Rightarrow \text{ it has scale effects; thus, no population growth or RPAs} \]

\[ \Rightarrow \text{ it generates 3 types of markets, } n^{NN} \text{ (North top, North one step below), } n^{NS} \text{ (North}
\text{ top, South one step below), } n^{S} \text{ (North top, South top).} \]

On the contrary in my model, discarded technology becomes common knowledge;
thus, two types of markets emerge \( n^{NS} \text{ and } n^{NN} \). This simplification fixes the
marginal cost of the nearest competitor of the Northern firm to one.

\[ \Rightarrow \text{ it assumes that researchers can differ in their productivity levels. For leaders}
\text{ whose product is imitated by the South, unit labor requirement of R&D is } a_{L},
\text{ whereas for followers who do not have access to the current technology, unit labor}
\text{ requirement is } a_{F}. \]

Contribution of my paper in the light of above:
⇒ eliminates scale effects by introducing RPA
  + theoretically appealing
  + can give a new interpretation to IPR protection, since an increase in IPR is now associated with a reduction in unit labor requirement of RPA, which is more relevant to IPR protection.
  + better results for an increase in the region size. Now with the scale effects removed, comparative results on changes in region size are symmetric. It is the relative size and not the absolute size of the economy that matters.

⇒ a simple model is considered by assuming that discarded technology becomes available to all.
  + the relative wages is now responding to innovation and imitation activity and also to changes in relative region size. One can verify that this is essentially the outcome of the above assumption, because you lose one of the valuation conditions. It should be noted that the rigid relative wage is an outcome of the efficient followers case of G&H (1991). They indeed make the relative wage responsive to more parameters (including the region size) by considering the inefficient followers case.

⇒ the issue of wages
  + as mentioned above the fact that factor prices respond to factor supplies is an empirically relevant feature. Moreover, the results in my model are not ambiguous.

Notes
If one assumes that $\rho = 0$ for the G&H (1991, QJE) model, then some of the comparative steady-state results essentially boil down to zero. This breaks down the robustness of comparative statics results to $\rho = 0$ and otherwise, forcefully argued by Glass and Saggi in a number of papers.

Innovation Subsidy

Case 1: Efficient followers
$$\phi_N \uparrow \Rightarrow i \uparrow$$
$$\eta \downarrow$$
$$\mu \uparrow\downarrow$$
$$w_N/w_s \text{ constant}$$

Case 2: Inefficient Followers, $i = \eta$
$$\phi_N \uparrow \Rightarrow i \uparrow$$
$$\eta \uparrow$$
$$\mu \uparrow$$
$$w_N/w_s \uparrow$$

Imitation Subsidy

Case 1: Efficient followers
$$\phi_s \uparrow \Rightarrow i \downarrow$$
$$\eta \uparrow$$
$$\mu \uparrow\downarrow$$
$$w_s/w_s \text{ constant}$$
Case 2: Inefficient Followers
\[ \phi_s \uparrow \quad \Rightarrow \quad i \uparrow \]
\[ \eta \uparrow \]
\[ \mu \uparrow \downarrow \]
\[ w_n/w_s \downarrow \]

An increase in \( L_N \)

Case 1: Efficient followers
\[ L_N \uparrow \quad \Rightarrow \quad i \uparrow \]
\[ \eta \uparrow \]
\[ \mu \uparrow \]
\[ w_n/w_s \text{ constant} \]

Case 2: Inefficient Followers
\[ L_N \uparrow \quad \Rightarrow \quad i \uparrow \]
\[ \eta \uparrow \]
\[ \mu \uparrow \downarrow \]
\[ w_n/w_s \uparrow \downarrow \]

An increase in \( L_S \)

Case 1: Efficient followers
\[ L_S \uparrow \quad \Rightarrow \quad i \uparrow \downarrow \]
\[ \eta \uparrow \]
\[ \mu \uparrow \]
\[ w_n/w_s \text{ constant} \]

Case 2: Inefficient Followers
\[ L_S \uparrow \quad \Rightarrow \quad i \uparrow \downarrow \]
\[ \eta \uparrow \]
\[ \mu \uparrow \]
\[ w_n/w_s \uparrow \downarrow \]

Note:

It looks like the effects of labor productivity parameters are missing. I wonder whether or not they are equivalent to changes in labor supply as is the case in the previous paper. I think the wage effects will differ because, productivity parameters in the efficient followers case affect wages and yet region size do not seem to affect this.
Effects of an increase in IPR (the QJE paper, Quality ladders)

Comparison with my work

- A decrease in $\phi_S$

Case 1: Efficient followers

$\phi_S \downarrow \Rightarrow i \uparrow
\eta \downarrow
\mu \uparrow \downarrow$

$(w_N/w_S)$ constant

Comment:
Innovation in the opposite direction
Imitation in the same direction
I don’t have ambiguity with regards to the frequency of innovations
Wages in the same direction.

Case 2: Inefficient Followers

$\phi_S \downarrow \Rightarrow i \downarrow
\eta \downarrow
\mu \uparrow \downarrow$

$(w_N/w_S) \uparrow$

Comment:
Innovation in the same direction
Imitation in the same direction
I don’t have ambiguity with regards to the frequency of innovations
Wages in the same direction.
3. Source:


Structure: A product cycle model based on product variety expansion

\[ \Rightarrow \text{North innovates} \]

\[ \rightarrow \text{innovation is endogenous, since costly to innovate} \]

\[ \Rightarrow \text{North moves production to the South, that is multinationalization} \]

\[ \rightarrow \text{multinationalization is endogenous, via an indifference condition between staying in the North and moving production to the South.} \]

\[ \rightarrow \text{multinationalization does not require resources, but there is trade a trade off. Multinationals enjoy lower costs in the South but they are exposed to imitation as well.} \]

\[ \Rightarrow \text{South imitates multinationals only in the primary structure of the paper;} \]

\[ \rightarrow \text{imitation is exogenous, with two exogenous components} \]

\[ \rightarrow \text{i technology component} \]

\[ \rightarrow \delta \text{ the policy component} \]

Notation

\[ g \]: innovation (endogenous)

\[ i\delta \]: imitation (both components exogenous)

\[ \omega \]: rate of multinationalization (endogenous)

\[ w_s/w_N \]: the Southern relative wage with respect to the North

Note that both \( g \) and \( i\delta \) represent aggregate intensity levels

Comments

The model again is a product variety model; thus, not directly related to my work. In this model, there is no complete product cycle. More specifically, a new variety is discovered in the north and then may move to south under successful imitation. However, it does not go back to North.

In the primary structure of the model, successful imitation can only target MNFs and not the firms who choose to stay in the North.

Comparative Static Results

Case1: South imitates only after successful multinationalization

\[ \text{IPR protection } \uparrow \text{ (i.e. } \delta \downarrow) \]

\[ \Rightarrow \]

\[ g \uparrow \]

\[ \omega \uparrow \]

\[ i\delta \downarrow \]

\[ w_s/w_N \uparrow \]

Case2: South imitates directly from the North, and no multinationalization

\[ \text{IPR protection } \uparrow \text{ (i.e. } \delta \downarrow) \]

\[ \Rightarrow \]

\[ g \downarrow \]
\[ \omega = 0 \]
\[ i \delta \downarrow \]
\[ w_s/w_N \downarrow \]

**Critical Comments:**

Case 2, which is essential to my model is essentially replicating G&H (1991, EJ or Chapter 11). Case 1 is essentially illustrating the role of FDI and thus is worthwhile to mention in passing in the current paper.

The major shortcoming of the paper is that it treats imitation as exogenous. This is in the spirit of Helpman (1993), which also treats imitation as an exogenous variable. The contribution of Lai is that it highlights the role of MNFs. Helpman also considers FDI, but when he considers FDI, he treats innovation exogenous. Lai (1998) treats innovation as exogenous across the board.
Effects of an increase in IPR (Lai, JDE)
Comparison with my work

**Case 1:** South imitates only after successful multinationalization

- IPR protection ↑ (i.e. δ↓)
  - ⇒ g ↑ (innovation)
  - ω ↑ (multinationalization)
  - iδ ↓ (imitation)
  - w_S/w_N ↑

**Comments:**
- Innovation in the opposite direction
- Imitation declines (which is not surprising, because it is an exogenous variable and a strengthening of IPR protection negatively affects imitation by construction)
- Wages are in the opposite direction

**Case 2:** South imitates directly from the North, and no multinationalization

- IPR protection ↑ (i.e. δ↓)
  - ⇒ g ↓
    - ω = 0
    - iδ ↓
    - w_S/w_N ↓

**Comments:**
- Innovation in the same direction
- Imitation declines (which is not surprising, because it is an exogenous variable and a strengthening of IPR protection negatively affects imitation by construction)
- Wages are in the same direction
4. Source:


Structure: A product cycle model based on product variety expansion
⇒ North innovates
→ innovation is endogenous, since costly to innovate
⇒ South imitates
→ imitation is exogenous, with two exogenous components

Notation:
g : innovation (endogenous)
m : imitation (exogenous)
n^N : fraction of good manufactured in the North

Note that both g and m represent aggregate intensity levels

Comments: The model again is a product variety model; thus, not directly related to my work. In this model, there is no complete product cycle. More specifically, a new variety is discovered in the north and then may move to south under successful imitation. However, it does not go back to North.

Comparative Static Results

Case 1: innovation and imitation are both exogenous.

IPR protection ↑ (i.e. m↓)
Steady-State results ⇒ g unchanged
m ↓
n^N ↑

Transition path results ⇒ also considered.

Case 2: innovation endogenous and imitation is exogenous.

IPR protection ↑ (i.e. m↓)
Steady-State results ⇒ g ↓
m ↓
n^N ↑

Transition path results ⇒ g jumps up, increases for a while and then gradually declines

Case 3: innovation and imitation are exogenous, multinationals endogenous

Multinationals move to the South to take advantage of low cost opportunities. The result is that equilibrium wages between the two regions are equalized.
IPR protection ↑ (i.e. m↓)
Steady-State results ⇒ g constant
m ↓
n↑
fraction of goods produced by MNFs ↑

Critical comments:

This paper's main contribution is that it looks at transition paths in a rather rigid model where imitation and in some instances, innovation is treated as exogenous. Nevertheless, the paper is very well written and embodies a carefully executed transitional dynamics analysis.
5. Source:


Structure: A product cycle model based on quality ladders
⇒ North → innovation and FDI, both costly activities that involve uncertainty → innovation only targets Southern markets (inefficient followers, i.e. only ex-leaders are engaged in active research) → FDI takes the form of shifting production to the South Motive for FDI is lower production costs in the South (but still higher than domestic firm’s production costs). Risk of FDI is that probability of a MNF’s being imitated is higher compared to a firm located in the North,
⇒ South → imitation

Notation
ι : aggregate innovation
μ : aggregate imitation
ϕ : aggregate FDI

Note that both ι and μ represent aggregate intensity levels

Comments
The model is quality ladders model; nevertheless, it introduces FDI which is absent in my models. It is not one hundred percent relevant right now for comparison of results; but, it may be relevant later on.

Negatives → wages are rigid as observed on page 396, variation in wages crucially depend on the parameters γ and ζ not being equal to one → ι = μ since efficient followers; thus, by construction ι and μ move together. In the appendix though, they show that the same results are obtained even if one allows for innovation to take place over imitation.

Interesting aspect → a strengthening of IPRs does not affect the relative imitation exposure faced by MNFs versus Northern firms; hence, stronger IPR and the resulting decline in imitation exposure increases the profitability of both type of firms in equal proportions, leaving the relative incentives unaffected

Unmentioned result → On page 400, it is shown that ιSN↓, hence ιSF also falls by equation (27)

Comparative Static Results

IPR protection → an increase in k, which is equivalent to an increase in imitation costs.

All product cycles → can be measured by either ι or μ. A cycle can occur via imitating a Northern firm μN or imitating a MNF μF
IPR protection increase ↑

⇒ 1 ↓
⇒ μ ↓
⇒ φ ↓
⇒ wages are fixed by construction
⇒ share of MNFs in the continuum nF ↓
⇒ imitation intensity targeting Northern firms tSN ↓, but aggregate imitation targeting Northern firms μN = tSNnN ↑ (thus nN ↑)
⇒ fraction of cycle that occurs via imitating Northern firms μN /μ increases.

An decrease in L_S

⇒ 1 ↓
⇒ μ ↓
⇒ φ ↓
⇒ wages are fixed by construction
⇒ share of MNFs in the continuum nF ↓
⇒ imitation intensity targeting Northern firms tSN ↓, but aggregate imitation targeting Northern firms μN = tSNnN ↑ (thus nN ↑)
⇒ fraction of cycle that occurs via imitating Northern firms μN /μ increases.

Intuition

⇒ IPR makes imitation more demanding in terms of resources
⇒ this leaves fewer resources for production, causing FDI to contract (resource wasting effect)
⇒ as a result Northern resources are allocated into production, which, in turn, leaves fewer resources for innovation
⇒ in addition, stronger IPR makes imitation more costly and thereby reduces μ (imitation disincentive effect)

Critical comments

⇒ the paper essentially replicates the results of G&H inefficient followers but introduces FDI in this context; the above intuition could have been obtained under G&H 1991 with imitation only.

⇒ IPR contracts production in the South, production moves to the North leaving less resources for innovation. In addition, IPR discourages imitation and hence imitation intensity also falls.

⇒ In the light of the above this paper’s contribution is that it highlights the role of FDI, the fact that stronger IPR reduces FDI flows is a counterintuitive results. This takes place despite a decline in their imitation exposure.

⇒ Interesting result is that stronger IPR implies that imitation targeting North μN increases but φ declines. Note that total product cycles t = μ = μN + φ. Moreover (μN/μ) ↑ but (φ/μ) ↓ in the presence of a decline in μ.
Effects of an increase in IPR (Glass and Saggi)
Comparison with my work

IPR protection increase ↑

IPR protection → an increase in k, which is equivalent to an increase in imitation costs.
All product cycles → can be measured by either ι or µ. A cycle can occur via imitating a
Northern firm µ_N or imitating a MNF µ_F

IPR protection increase ↑
⇒ ι ↓
⇒ µ ↓
⇒ φ ↓
⇒ share of MNFs in the continuum n_F ↓
⇒ imitation intensity targeting Northern firms t_{SN} ↓, but aggregate
imitation targeting Northern firms µ_N = t_{SN} n_F (thus n_F ↑)
⇒ fraction of cycle that occurs via imitating Northern firms µ_N /µ
increases.

An increase in L_S
⇒ ι ↑
⇒ µ ↑
⇒ φ ↑
⇒ wages are fixed by construction
⇒ share of MNFs in the continuum n_F ↑
⇒ imitation intensity targeting Northern firms t_{SN} ↑, but aggregate
imitation targeting Northern firms µ_N = t_{SN} n_F (thus n_F ↓)
⇒ fraction of cycle that occurs via imitating Northern firms µ_N /µ
decreases.

Comments:

Innovation, imitation all in the same direction
Wages are rigid