The economic effects of illegal migration under risk preference

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● Previous Work

(1) Ethier (1986) : presented a model of illegal immigration to analyze the effects of enforcement policies designed to reduce the level of this immigration.

(2) Bond & Chen (1987) : extended the works of Ethier on illegal immigration by examining the optimal level of enforcement for the labor-importing country in a two-country model and by considering the effects of allowing capital mobility.

(3) Woodland & Yoshida (2006) : extended the works of Ethier on illegal immigration by distinguishing between the cases of capital immobility and free capital mobility and by considering illegal immigration when there are border patrols by the government and when there are internal enforcement procedures in effect under the assumption of
different attitudes to risk of prospective illegal immigrants.

The Model

The arbitrage condition for the risk-neutral foreign workers to migrate illegally is

\[(1 - g(B))w + g(B)(w^* - c) = w^*\]

The Host firm is assumed to choose whether to hire illegal foreign migrants on the basis of expected utility maximization of profits. The expected utility of profits of Host firm is

\[EU(\pi) = (1 - p(E))U(\pi_1) + p(E)U(\pi_2)\]

where \(\pi_1\) is the profits of host firm if he avoids to be detected, and \(\pi_2 = Kf(\lambda) - w(L + I) - rK\); if not, he earns the profits of \(\pi_2\), where

\[\pi_2 = Kf(\lambda) - w(L + I) - ZI - rK.\]

The first order condition of expected utility maximization yields the following equations

\[f'(\lambda) = w + \frac{U'(\pi_2)pZ}{(1 - p)U'(\pi_1) + pU'(\pi_2)}\]

\[f(\lambda) - f'(\lambda)\lambda = r\]

In the source country, firms choose the levels of capital and labor to maximize profits given source wage rate and rental on capitals, \(w^*\) and \(r^*\), respectively. The profit maximization problem yields the following
equations
\[ f^*(\lambda') \square w^* \]
\[ f^*(\lambda') \square f^*(\lambda') \lambda' \square r^* \]

- **Immigration Policies Under Capital Immobility**

The total differentiation of equations of \( \square \), \( \Box \) and \( \Diamond \) is

\[
\begin{bmatrix}
1 - g & -(1 - g) & 0 \\
A_1 & 0 & A_2 \\
0 & -1 & -f''''/K^* \\
\end{bmatrix}
\begin{bmatrix}
dw \\
dw^* \\
dl \\
\end{bmatrix}
\begin{bmatrix}
g'(w - w^* + c) \\
0 \\
0 \\
\end{bmatrix}
\begin{bmatrix}
dB \\
A_3 \\
dE \\
\end{bmatrix}
\]

Where \( f'' = d^2 f / d\lambda^2 < 0 \), \( f'''' = d^2 f^* / d\lambda^2 < 0 \);

\[
\lambda \equiv (L + I) / K, \quad \lambda' \equiv (L - I) / K^*;
\]

\[
A_1 = -\left\{1 + \frac{p(1 - p)Z(L + I)[U'(\pi_2)U^*(\pi_1) - U'(\pi_1)U^*(\pi_2)]}{[(1 - p)U'(\pi_1) + pU'(\pi_2)]^2}\right\}
\]

\[
A_2 = \frac{f''}{K} + \frac{p(1 - p)Z \{p[[U'(\pi_2)]^2 U^*(\pi_1) + (1 - p)[U'(\pi_1)]^2 U^*(\pi_2)]\}}{[(1 - p)U'(\pi_1) + pU'(\pi_2)]^2}
\]

To solve the effects of exogenous variables on ingenious variables, we have the same comparative static results when home firm is risk neutral or risk averse.

- **Immigration Policies Under Capital immobility**

In equilibrium we obtain

\( r = r^* \)
Total differentiation of equations of $\ddot{\theta}$, $\dddot{\theta}$, $\dddot{\theta}$ and $\dddot{\theta}$,

\[
\begin{bmatrix}
1-g & -(1-g) & 0 & 0 \\
A_1 & 0 & A'_2 & \dot{\lambda}f''/(K-k) \\
0 & -1 & -f'''/(K^{*}+k) & -\dot{\lambda}f'''/(K^{*}+k) \\
-\dot{\lambda} & \dot{\lambda}' & A_4 & 0 \\
\end{bmatrix}
\begin{bmatrix}
dw \\
dw' \\
dl \\
dk \\
\end{bmatrix}
= 
\begin{bmatrix}
g'(w-w^*+c) \\
0 \\
0 \\
0 \\
\end{bmatrix}
\begin{bmatrix}
0 \\
A_3 \\
0 \\
A_4 \\
\end{bmatrix}
dB + 
\begin{bmatrix}
0 \\
A_3 \\
0 \\
A_4 \\
\end{bmatrix}
dE
\] (9)

Where $\lambda \equiv (L + I) / (K-k)$ and $\lambda' \equiv (L' - I) / (K^{*}+k)$

\[
A'_2 = \frac{f''}{K-k} + \frac{p(1-p)Z^2[p[U'(\pi_2)]^2U''(\pi_1) + (1-p)[U'(\pi_1)]^2U''(\pi_2)]}{[(1-p)U'(\pi_1) + pU'(\pi_2)]^3} \\
A_4 = \frac{\lambda p(1-p)Z^2[p[U'(\pi_2)]^2U''(\pi_1) + (1-p)[U'(\pi_1)]^2U''(\pi_2)]}{[(1-p)U'(\pi_1) + pU'(\pi_2)]^3} \\
+ [(1-p)U'(\pi_1) + pU'(\pi_2)](L+1)p(1-p)Z[U'(\pi_2)U''(\pi_1) - U'(\pi_1)U''(\pi_2)] \\
A_5 = \frac{\lambda p'ZU'(\pi_1)U'(\pi_2)}{[(1-p)U'(\pi_1) + pU'(\pi_2)]^2 + (L+1)p(1-p)Z[U'(\pi_2)U''(\pi_1) - U'(\pi_1)U''(\pi_2)]}
\]

To solve the effects of exogenous variables on ingenious variables, we have different results according to the ranking of factor intensity between countries.

- **Summarization**

(1) If the host firms are risk-neutral,

$\ddot{\theta}$. The comparative static effects of stricter internal enforcement under capital immobility and free capital mobility are the same in sign as those of Bond and Chen (1987), in which model
potential illegal immigrants are not confronted with the border patrol.

The comparative static effects of stricter border enforcement under capital immobility and free capital mobility are the same in sign as those of Woodland and Yoshida (2006), in their model the individual’s attitudes to risk are considered, but in our model the home firms’ attitude to risk are analyzed..

(2) If the host firms are risk-averse,

If labor is more intensively used in source country, i.e. \( \lambda' > \lambda \), stricter border enforcement causes a higher source wage and a lower rental rate; when capital is more intensively used in source country than in the host country, i.e. \( \lambda' < \lambda \), stricter border enforcement causes a lower source wage and a higher rental rate.

If labor is more intensively used in source country, i.e. \( \lambda' > \lambda \), stricter border enforcement causes a higher domestic wage and a lower rental rate.

If labor is more intensively used in source country, i.e. \( \lambda' > \lambda \), stricter internal enforcement causes a higher wage rate of Host and Source but a lower rental rate of Source. Whereas, if capital is more intensively used in source country than in the host country, i.e. \( \lambda' < \lambda \), stricter internal enforcement causes a lower wage rate of Host and Source and a higher rental rate of Source;
If labor is more intensively used in source country, i.e. \( \lambda' > \lambda \), stricter internal enforcement causes a higher capital outflow and a lower rental rate of capital of Host.