Trade Policy and Illegal Immigration

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Introduction

Policy Background

- PTAs:
  - Reduction or removal of tariff barrier to trade
  - Not much attention given to movement of labour
- Legal immigration restricted
  - Illegal immigration prevalent
- Policies to mimimize illegal immigration
  - Border patrol
  - Internal surveillance

Approach

Research questions

- How effective is tariff reform in reducing illegal immigration?

Methodology

- Paper is most closely related to
  - Gaytan-Fregoso and Lahiri (2001)

Literature

- Early literature
  - Ethier (AER, 1986a, 1986b)
  - border patrols and internal surveillance
- Extensions
  - Bond and Chen (JIE, 1987), Bandyopadhyay and Bandyopadhyay (JDE, 1998), Djajic (JPopE, 1987, 1999), Gaytan-Fregoso and Lahiri (JDE, 2000) and Levine (JPopE, 1999)
  - either assume away risk or assume risk-neutrality
- Risk
  - Woodland and Yoshida (JDE, 2006)
  - non-neutral risk preferences
- Trade, tariffs and illegal immigration
  - Gaytan-Fregoso and Lahiri (Routledge, 2001)
  - Kahana and Lecker (EconGov, 2005)

This Paper

Features

- Specifies a model with two countries (+ROW)
- Impose tariffs on trade
- Illegal immigration
- Border patrol
- Prospective illegal immigrants are expected utility maximizers

We examine effect of

- Tariff reforms (North, South and Both)

upon

- Level of illegal immigration
- Welfare

Framework and Notation

- Countries: North, South and ROW
- World prices: $(1, \pi)$
- Specific tariffs: T and t
- Domestic prices: $P = \pi + T$ and $p = \pi + t$
- Expenditure functions: $E(P, G, U)$ North citizens

  $\widetilde{e}(P, G, \widetilde{u})$ Illegal immigrants

  $e(p, u)$ South residents
- Revenue functions: $R(P, L, I)$ North

  $r(p, I)$ South
- Labour supplies: $L^{\theta} = L^{G} + L^{B}$

  $L = \overline{L} - L^{\theta}$

  $I = \overline{I} - I$
- Public good production: $G(L^{G})$

Border Protection and Equilibrium Illegal Immigration

- Border detection probability: $g(L^B)$ where $g' > 0$, $g'' < 0$.
- Immigration equilibrium condition

$$(1 - g(L^B))\ \widetilde{u} + g(L^B)\ (u - k) = u$$

- Rewrite as

$$\widetilde{u} = u + hk$$

where $h = h(L^B) = g/(1-g)$ is the odds of detection.

Equilibrium Conditions

$$
\begin{aligned}
E(P,U) &= Y \equiv \left[R(P,L,I) - IR_I(P,L,I) + T'M\right] / \bar{L} && (1)\\
\widetilde{e}(P,\widetilde{u}) &= \widetilde{y} \equiv (1-\alpha)R_I(P,L,I) && (2)\\
e(p,u) &= y \equiv \left[r(p,I) + \alpha IR_I(P,L,I) + t'm\right] / I && (3)\\
\widetilde{u} &= u + hk, && (4)
\end{aligned}
$$

where $h = g/(1-g)$,

$$P = \pi + T,\ p = \pi + t,\ L = \bar{L} - L^B - L^G,\ I = \bar{I} - I$$

import vectors M and m are

$$
\begin{aligned}
M &= \bar{L}E_P + I\widetilde{e}_P - R_P && (5)\\
m &= (\bar{I} - I)e_p - r_p && (6)
\end{aligned}
$$

Comparative Statics Equations

$$
\begin{aligned}
\overline{L}(E_U - T'E_{PU})dU &= -\left[IR_{Il} + T'(R_{Pl} - \widetilde{e}_P)\right] dl \\
&\quad -(R_L - IR_{lL} - T'R_{PL})dL^B \\
&\quad +[T'S_{PP} + I\widetilde{e}'_P - IR_{lP}]dT + IT'\widetilde{e}'_{Pu}d\widetilde{u} \\
\widetilde{e}_u d\widetilde{u} &= (1-\alpha)R_{Il}dl - (1-\alpha)R_{lL}dL^B - R_l d\alpha \\
&\quad +[(1-\alpha)R_{lP} - \widetilde{e}'_P]dT \\
l(e_u - t'e_{pu})du &= \left[e - r_l + \alpha(R_l + IR_{Il}) + t'(r_{pl} - e_p)\right] dl \\
&\quad -\alpha IR_{lL}dL^B + IR_l d\alpha \\
&\quad +t's_{pp}dt + \alpha IR_{lP}dT \\
d\widetilde{u} &= du + \lambda dL^B.
\end{aligned}
$$

More Notation

- The income effects on consumption and Hatta conditions are

$$
\begin{aligned}
C_Y &= E_{PU}/E_U \\
\widetilde{c}_y &= (\widetilde{e}_{Pu}/\widetilde{e}_u) \\
c_y &= e_{Pu}/e_u \\
\widehat{E}_U &\equiv E_U(1 - T'C_Y) > 0 \\
\widehat{e}_u &\equiv e_u(1 - t'c_y) > 0.
\end{aligned}
$$

Comp. Stats Solution

The solution for the change in illegal immigration is

$$dI = -C_I^{-1}\left[C_B\,dL^B + C_A\,d\alpha + C_T\,dT + C_t\,dt\right]. \tag{7}$$

where

$$\begin{aligned}
C_I &= \widetilde{e}_u^{-1}(1-\alpha)R_{II} - I^{-1}\widehat{e}_u^{-1}H && (8)\\
C_B &= -\left\{\lambda + \left(\widetilde{e}_u^{-1}(1-\alpha) - \widehat{e}_u^{-1}\alpha II^{-1}\right)R_{IL}\right\} && (9)\\
C_A &= -\left\{\widetilde{e}_u^{-1} + \widehat{e}_u^{-1}I^{-1}I\right\}R_I < 0 && (10)\\
C_T &= \widetilde{e}_u^{-1}\left[(1-\alpha)R_{IP} - \widetilde{e}'_P\right] - \widehat{e}_u^{-1}\alpha II^{-1}R_{IP} && (11)\\
C_t &= -I^{-1}\widehat{e}_u^{-1}t's_{pp} && (12)
\end{aligned}$$

and Condition A (sufficient for Hicksian stability) is

$$H \equiv e - r_I + \alpha(R_I + IR_{II}) + t'(r_{pI} - e_p) > 0. \tag{13}$$

Tariff Reform by South

- **Proposition 1:** *Assume that Condition A ($H > 0$) holds. Then, a unilateral proportional tariff reduction of the form $dt = -td\kappa$, where $d\kappa > 0$, by South reduces successful illegal immigration. The welfare level of illegal immigrants and residents of South increase equally. If North is a free-trader, Northern citizens suffer a loss in welfare.*

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- Comp. stats:

$$dl = -C_l^{-1} C_t dt = C_l^{-1} l^{-1} \widehat{e}_u^{-1} \quad t' s_{pp} dt$$

Proportional Reform

$$dt = -td\kappa, \text{ where } d\kappa > 0$$

Then

$$dl/d\kappa = -C_l^{-1} l^{-1} \widehat{e}_u^{-1} \quad t' s_{pp} t < 0$$

Welfare Effects of Reform by South

$$
\begin{aligned}
\overline{L}\widehat{E}_U dU/d\kappa &= \left[T'(\widetilde{e}_P - R_{PI}) - IR_{II}\left\{1 - T'\widetilde{c}_y(1-\alpha)\right\}\right] dI/d\kappa \\
\widetilde{e}_u d\widetilde{u}/d\kappa &= (1-\alpha) R_{II}\, dI/d\kappa \\
l\widehat{e}_u du/d\kappa &= H dI/d\kappa - t' s_{pp} t \\
d\widetilde{u}/d\kappa &= du/d\kappa
\end{aligned}
$$

Welfare Effects of Reform by South

- $$\begin{aligned}
\overline{L}\widehat{E}_U dU/d\kappa &= \left[T'(\widetilde{e}_P - R_{Pl}) - lR_{ll}\left\{1 - T'\widetilde{c}_y(1-\alpha)\right\}\right] dl/d\kappa \\
\widetilde{e}_u d\widetilde{u}/d\kappa &= (1-\alpha)R_{ll}\, dl/d\kappa \\
l\widehat{e}_u du/d\kappa &= H dl/d\kappa - t' s_{pp} t \\
d\widetilde{u}/d\kappa &= du/d\kappa
\end{aligned}$$

- North not a free trader?

Tariff Reform by North

- **Proposition 2:** *Assume that Condition A ($H > 0$) holds. Then, a unilateral proportional tariff reduction of the form $dT = -Td\kappa$, where $d\kappa > 0$, by North reduces successful illegal immigration if (i) there are no remittances ($\alpha = 0$) and (ii) $[\widetilde{e}'_P - R_{IP}]T < 0$.*

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- **Proposition 3:** *Assume that Condition A ($H > 0$) holds. Then, a unilateral proportional tariff reduction of the form $dT = -Td\kappa$, where $d\kappa > 0$, by North reduces successful illegal immigration if* $[\widetilde{e}'_P - \delta R_{IP}]T < 0$, where
$\delta = \widetilde{e}_u\gamma = \widetilde{e}_u\left\{\partial\widetilde{v}/\partial\widetilde{y}(1-\alpha) - \partial v/\partial y\,(\alpha I/l)\right\}$.

Tariff Reform by North

The effect of a unilateral proportional tariff change by North:

$$\begin{aligned} dI/d\kappa &= -C_I^{-1}\left\{\widehat{e}_u^{-1}\alpha I I^{-1} R_{IP} + \widetilde{e}_u^{-1}\left[\widetilde{e}'_P - (1-\alpha)R_{IP}\right]\right\} T \\ &= -C_I^{-1}\ \widetilde{e}_u^{-1}\ \left[\widetilde{e}'_P - R_{IP}\right] T \quad \text{if } \alpha = 0 \text{ (no remittances)} \\ &= -C_I^{-1}\ \widetilde{e}_u^{-1}\left[\widetilde{e}'_P - \delta R_{IP}\right] T \quad \text{where} \\ \delta &= \widetilde{e}_u \gamma = \widetilde{e}_u\left\{\partial\widetilde{v}/\partial\widetilde{y}(1-\alpha) - \partial v/\partial y\,(\alpha I/I)\right\} \end{aligned}$$

Tariff Reform by North

- **Proposition 4:** *Assume that Condition A ($H > 0$) holds, and that (i) there are no remittances ($\alpha = 0$) and (ii) $[\widetilde{e}'_P - R_{IP}]T < 0$. Then, a unilateral proportional tariff reduction of the form $dT = -Td\kappa$, where $d\kappa > 0$, by North reduces the welfare level of illegal immigrants and residents of South equally. The effect upon the welfare of North citizens is ambiguous.*

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- **Proposition 5:** *Assume that Condition A ($H > 0$) holds, and that (i) $[\widetilde{e}'_P - \delta R_{IP}]T < 0$* and (ii) *$R_{IP}T > 0$. Then, a unilateral proportional tariff reduction of the form $dT = -Td\kappa$, where $d\kappa > 0$, by North reduces the welfare level of illegal immigrants and residents of South equally. The effect upon the welfare of North citizens is ambiguous.*

Tariff Reform by North - Welfare Effects

The welfare effects of the reform $dT = -Td\kappa$, where $d\kappa > 0$, are as follows:

$$\begin{aligned}
\overline{L}\widehat{E}_U dU/d\kappa &= \left[T'(\widetilde{e}_P - R_{PI}) + IT'\widetilde{c}_y(1-\alpha)R_{II} - IR_{II}\right] dI/d\kappa \\
&\quad -\left[T'S_{PP} + IT'\widetilde{c}_y(1-\alpha)R_{IP}\right. \\
&\quad \left.+I(1-T'\widetilde{c}_y)\widetilde{e}'_P - T'R_{PI}\right]T \\
\widetilde{e}_u d\widetilde{u}/d\kappa &= (1-\alpha)R_{II}dI/d\kappa + \left[\widetilde{e}'_P - (1-\alpha)R_{IP}\right]T \\
l\widehat{e}_u du/d\kappa &= HdI/d\kappa - \alpha IR_{IP}T \\
d\widetilde{u}/d\kappa &= du/d\kappa.
\end{aligned}$$

Bilateral Tariff Reform

- **Proposition 6:** *Assume that Condition A ($H > 0$) holds, and that $[\widetilde{e}'_P - \delta R_{IP}]T < 0$. Then, a bilateral proportional tariff reduction of the form $dT = -Td\kappa$ and $dt = -td\kappa$, where $d\kappa > 0$, by South and North reduces successful illegal immigration.*

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- Comparative statics:

$$\begin{aligned} dI/d\kappa &= C_I^{-1}(C_t t + C_T T) \\ &= -C_I^{-1}\left[I^{-1}\widehat{e}_u^{-1}t's_{pp}t + T\widehat{e}_u^{-1}\alpha II^{-1}R_{IP}\right. \\ &\quad \left. + \widetilde{e}_u^{-1}[\widetilde{e}'_P - (1-\alpha)R_{IP}]\}\right] \\ &= -C_I^{-1}\left[I^{-1}\widehat{e}_u^{-1}t's_{pp}t + \widetilde{e}_u^{-1}[\widetilde{e}'_P - \delta R_{IP}]T\right]. \end{aligned}$$

A sufficient condition (in addition to Condition A) for the outcome $dI/d\kappa < 0$ is that $[\widetilde{e}'_P - \delta R_{IP}]T < 0$

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A sufficient condition (in addition to Condition A) for the outcome $dI/d\kappa < 0$ is that $[\widetilde{e}'_P - \delta R_{IP}]T < 0$

- - which becomes $[\widetilde{e}'_P - R_{IP}]T < 0$ if $\alpha = 0$.

Bilateral Tariff Reform Welfare Effects

- **Proposition 7:** *Assume that Condition A ($H > 0$) holds, and that $[\widetilde{e}'_P - \delta R_{IP}]T < 0$. Then, a bilateral proportional tariff reduction of the form $dT = -Td\kappa$ and $dt = -td\kappa$, where $d\kappa > 0$, by South and North effects the welfare level of illegal immigrants and residents of South equally, but with ambiguous sign. The effect upon the welfare of North citizens is also ambiguous.*

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- Contrast with Gaytan-Fregoso and Lahiri (2001):
  They get (i) $dI/d\kappa < 0$ if $[\widetilde{e}'_P - R_{IP}]T < 0$ and some matrix is pd
  (ii) North gains if $[\widetilde{e}'_P - R_{IP}]T < 0$, some matrix is nd and some other conditions

Bilateral Tariff Reform Welfare Effects

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  (ii) North gains if $[\widetilde{e}'_P - R_{IP}]T < 0$, some matrix is nd and some other conditions
- We get the condition $[\widetilde{e}'_P - R_{IP}]T < 0$ if $\alpha = 0$.

Bilateral Tariff Reform

The welfare effects of the bilateral reform $dT = -Td\kappa$ and $dt = -td\kappa$, where $d\kappa > 0$, are:

$$\begin{aligned}
\overline{L}\widehat{E}_U dU/d\kappa &= \left[IT'\widetilde{c}_y(1-\alpha)R_{II} + T'(\widetilde{e}_P - R_{PI}) - IR_{II}\right] dI/d\kappa \\
&\quad -\left[T'S_{PP} + IT'\widetilde{c}_y(1-\alpha)R_{IP} - I(1-T'\widetilde{c}_y)\widetilde{e}'_P - T'R_{IP}\right]T \\
\widetilde{e}_u d\widetilde{u}/d\kappa &= (1-\alpha)R_{II}dI/d\kappa + T'\left[\widetilde{e}_P - (1-\alpha)R_{PI}\right] \\
l\widehat{e}_u du/d\kappa &= HdI/d\kappa - t's_{pp}t - \alpha IR_{IP}T \\
d\widetilde{u}/d\kappa &= du/d\kappa.
\end{aligned}$$

Concluding Remarks

Summary

- We have examined
  - several tariff reforms
  - effects on illegal immigration and welfare
- Results are clearer when
  - there are no remittances
  - there is free trade
- Tariffs and remittance create complications
  - especially for welfare of North
- Role of prospective illegal immigrant behaviour
  - Contrast with results of Gaytan-Fregoso and Lahiri (2001)