Unilateral trade liberalisation and the spatial distribution of economic activity within a country

Does the promotion of trade intensify or reduce regional disparities inside a country?

- Motivation
- Agglomeration and Dispersion
- The Model
- Simulations
  - Equilibrium characteristics
  - Trade liberalisation

Motivation

- Since Krugman (1991) the so-called “New Economic Geography” has concentrated on the potential effects of trade costs reductions on the localisation of economic activity

- Most of the theoretical and empirical work has considered the case where two or more countries or regions (internally homogeneous) reduce trade costs simultaneously

- Less attention has been devoted to the effects on the regional effects within a country (Hanson, 1994; Krugman and Livas Elizondo, 1996; Monfort and Nicolini, 2000; Paluzie, 2001 and Crozet and Koening-Soubeyran, 2002)

Argentina: population 1947 - 2001

Región	Participación en el total país: cambio anual promedio (%)				
	1970/1947	2001/1970	1980/1970	1991/1980	2001/1991
GBA	0,8%	-0,4%	-0,2%	-0,4%	-0,6%
Pampeana	-0,6%	-0,2%	-0,2%	-0,2%	-0,1%
Cuyo	0,1%	0,2%	0,2%	0,2%	0,4%
Nordeste	-0,3%	0,6%	0,4%	0,7%	0,7%
Noroeste	-0,4%	0,6%	0,6%	0,4%	0,9%
Patagonia	1,2%	1,5%	2,0%	1,9%	0,5%

Manufacture Value Added

Average annual change
(current values)

Region	1968/1961	2001/1991
Buenos Aires	1,3%	0,1%
Ciudad de Buenos Aires	-2,1%	0,7%
Bs.As. + Ciudad Bs.As.	0,2%	0,2%
Resto país (*)	-0,5%	-0,4%

(*) It does not include Salta, Santa Cruz and Tucumán.

Agglomeration and Dispersion Forces

- **Agglomeration**
  - Love for variety (Dixit-Stiglitz utility/production function)
  - and Transports costs
  - and Increasing Returns to Scale
  - and Factor mobility (Krugman, 1991), or
    Vertical Linkages (Krugman and Venables, 1996),
    or Innovation (Baldwin, wet al., 2003)

- **Dispersion**
  - Region-specific demands (Krugman, 1991)
  - Congestion/commuting costs (Kurgman and Livas, 1996)
  - Region-specific-fixed supplies (Helpman, 1998)

The Model

- Regions 1 and 2 (Home Country). Region 3 (ROW)
- Labour is the only production factor
- There are two goods: manufactures and housing
- Inelastic supply of housing and non-tradable among regions.
- Manufactured varieties are produced under IRS using labour.
- Manufactured varieties are tradable among the three regions, and subject to “iceberg” costs
- Market: monopolistic competition.
- $t>1$ is transport costs between domestic regions
- $\tau>t$ is the transport cost on imports from the ROW. Exports to the ROW are freely traded

- ***Consumers' preferences***

$$u_i = h_i^{\beta} d_i^{1-\beta} \qquad 0 < \beta < 1$$

– where:

h_i: consumption of housing

d_i: is a manufactured composite index:

$$d_i = \left[\sum_n c_i^{\alpha} \right]^{\frac{1}{\alpha}} \qquad 0 < \alpha < 1$$

– The composite index d_i means consumption of each variety is:

$$c_i = \frac{\left(p_i^j\right)^{-\varepsilon}}{\left(P_{di}\right)^{1-\varepsilon}} \left(1 - \beta\right) E_i$$

- ***Producers***
  - Each manufactured variety is produced under IRS using only labour.
  - The firm's labour demand is given by:

$$l_i = a + x_i$$

    - where:
      - a>0 is a fixed requirement
      - x_i is the quantity produced by the firm

- ***Producers (cont)***
  - Profit maximisation, free entry and full-employment mean:

$$p_i = \frac{1}{\alpha} w_i = \left(\frac{\varepsilon}{\varepsilon - 1} \right) w_i$$

$$x_i = x = \frac{\alpha a}{1-\alpha} = (\varepsilon - 1) a$$

$$l_i = a\varepsilon$$

$$n_i = \frac{1-\alpha}{a} L_i = \frac{L_i}{a\varepsilon}$$

- ***Solving the model***

  - Since labour is the only factor of production, and firms make zero-profit, in equilibrium firm's revenues in region i must be equal to total labour income:

$$w_1 L_1 = n_1 \left[\frac{p_1^{1-\varepsilon}}{P_{d1}^{1-\varepsilon}} (1-\beta) E_1 + \frac{(tp_1)^{1-\varepsilon}}{P_{d2}^{1-\varepsilon}} (1-\beta) E_2 + \frac{p_1^{1-\varepsilon}}{P_{d3}^{1-\varepsilon}} (1-\beta) E_3 \right]$$

$$w_2 L_2 = n_2 \left[\frac{(tp_2)^{1-\varepsilon}}{P_{d1}^{1-\varepsilon}} (1-\beta) E_1 + \frac{p_2^{1-\varepsilon}}{P_{d2}^{1-\varepsilon}} (1-\beta) E_2 + \frac{p_2^{1-\varepsilon}}{P_{d3}^{1-\varepsilon}} (1-\beta) E_3 \right]$$

– Assuming housing is equally owned by all individuals, and a distribution of labour L_1 and L_2:

$$w_1 = \frac{w_1^{1-\varepsilon}\left[(1-\beta)w_1L_1 + \beta\frac{L_1}{L}(w_1L_1 + w_2L_2)\right]}{L_1w_1^{1-\varepsilon} + L_2(tw_2)^{1-\varepsilon} + L_3(\tau w_3)^{1-\varepsilon}}$$

$$+ \frac{(tw_1)^{1-\varepsilon}\left[(1-\beta)w_2L_2 + \beta\frac{L_2}{L}(w_1L_1 + w_2L_2)\right]}{L_1(tw_1)^{1-\varepsilon} + L_2w_2^{1-\varepsilon} + L_3(\tau w_3^{1-\varepsilon})^{1-\varepsilon}}$$

$$+ \frac{w_1^{1-\varepsilon}(w_3L_3)}{L_1w_1^{1-\varepsilon} + L_2w_2^{1-\varepsilon} + L_3w_3^{1-\varepsilon}}$$

$$w_2 = \frac{(tw_2)^{1-\varepsilon}\left[(1-\beta)w_1L_1 + \beta\frac{L_1}{L}(w_1L_1 + w_2L_2)\right]}{L_1w_1^{1-\varepsilon} + L_2(tw_2)^{1-\varepsilon} + L_3(\tau w_3)^{1-\varepsilon}}$$

$$+ \frac{w_2^{1-\varepsilon}\left[(1-\beta)w_2L_2 + \beta\frac{L_2}{L}(w_1L_1 + w_2L_2)\right]}{L_1(tw_1)^{1-\varepsilon} + L_2w_2^{1-\varepsilon} + L_3(\tau w_3)^{1-\varepsilon}}$$

$$+ \frac{w_2^{1-\varepsilon}(w_3L_3)}{L_1w_1^{1-\varepsilon} + L_2w_2^{1-\varepsilon} + L_3w_3^{1-\varepsilon}}$$

– If labour in the home country is mobile between regions 1 and 2, we have that in a dispersed equilibrium real incomes (V_i) must be the same in both regions:

$$\bar{V} = \frac{V_1}{V_2} = \frac{M_1}{M_2}\left(\frac{P_{h2}}{P_{h1}}\right)^{\beta}\left(\frac{P_{d2}}{P_{d1}}\right)^{1-\beta} = 1$$

where:

- $M_i = E_i / L_i$: the per capita nominal income
- P_{hi}: price of housing in region i

Simulations

- As in Helpman (1998) two key parameters are the share of housing consumption in total expenditure (β) and the elasticity of substitution between manufactured varieties (ε)

- A high β means that when deciding where to locate, consumer are mostly attracted to the region where housing is cheaper

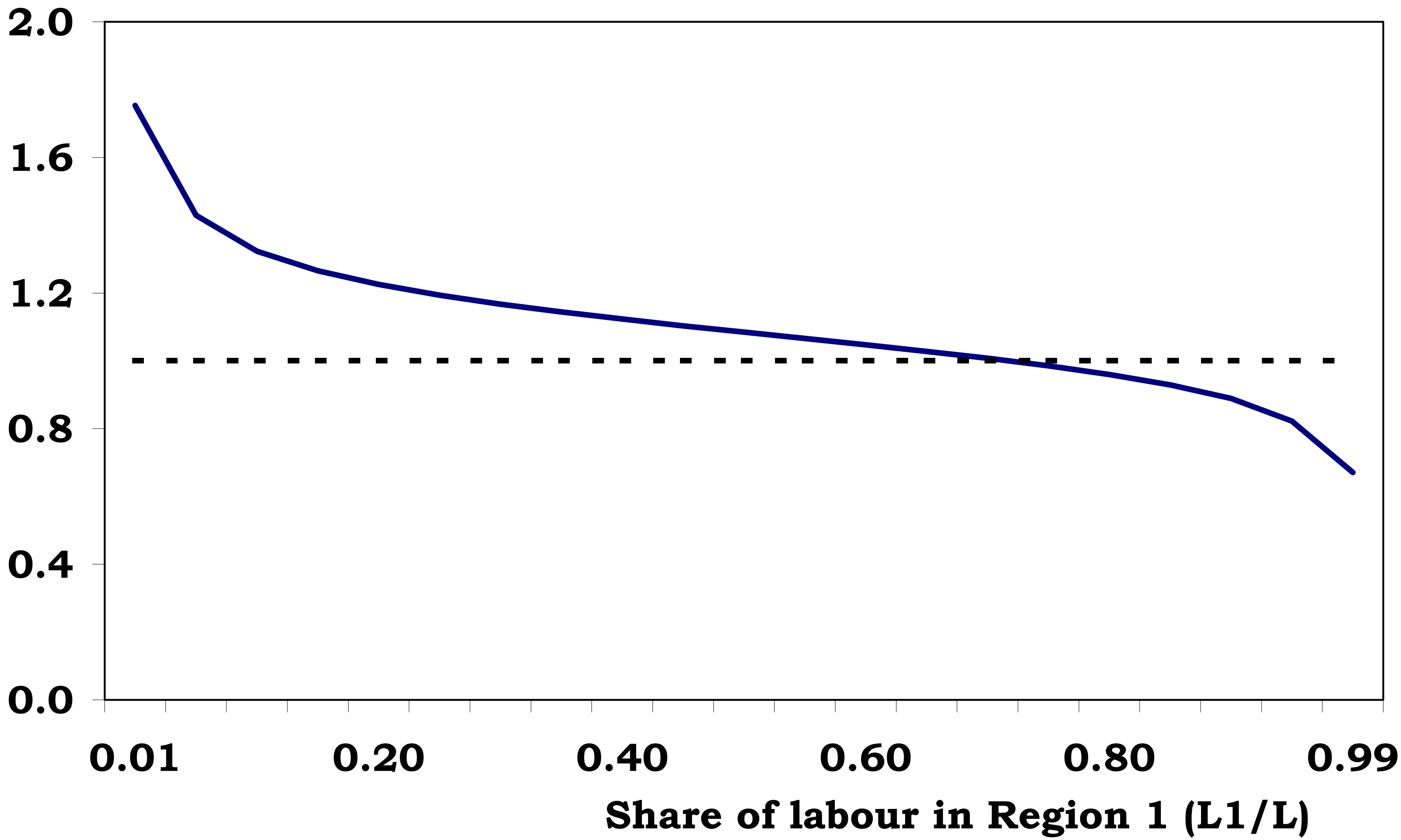
- A high ε means that consumers care less about the available number of manufactured varieties and therefore are not particularly attracted to the larger region, where the number of varieties locally produced is larger

- These two properties are summarised by the condition $\beta\varepsilon$ greater or lower than 1

- ***Equilibrium characteristics***

  - When $\beta\varepsilon>1$, transport costs do not affect the stability properties of the equilibrium, with the dispersed equilibrium being always stable, while the two agglomerated equilibriums are unstable: $\partial\bar{V}/\partial(L_1/L)<0$ (Figure 1)

Figure 1
Relative Real Incomes (Region1/Region2)
[$\beta\varepsilon>1$, $H_1/(H_1+H_2)=0.6$]



- If $\beta\varepsilon<1$, the level of transport costs affects which kind of equilibria is stable or unstable:
  - For a low enough level of *t* the results are similar to the case when $\beta\varepsilon>1$, independently of the level of τ
  - For *t* high enough, the dispersed equilibrium is always unstable, independently of τ: $\partial\bar{V}/\partial(L_1/L)>0$ (Figure 2)
  - For intermediate values of *t*, the dispersed equilibrium is stable when τ is low, becoming unstable for τ large enough. For intermediate τ, we have more than one dispersed equilibrium (Figure 3)

Figure 2

Relative Real Incomes (Region1/Region2)

[$\beta\varepsilon<1$, $H_1/(H_1+H_2)=0.6$, high t]

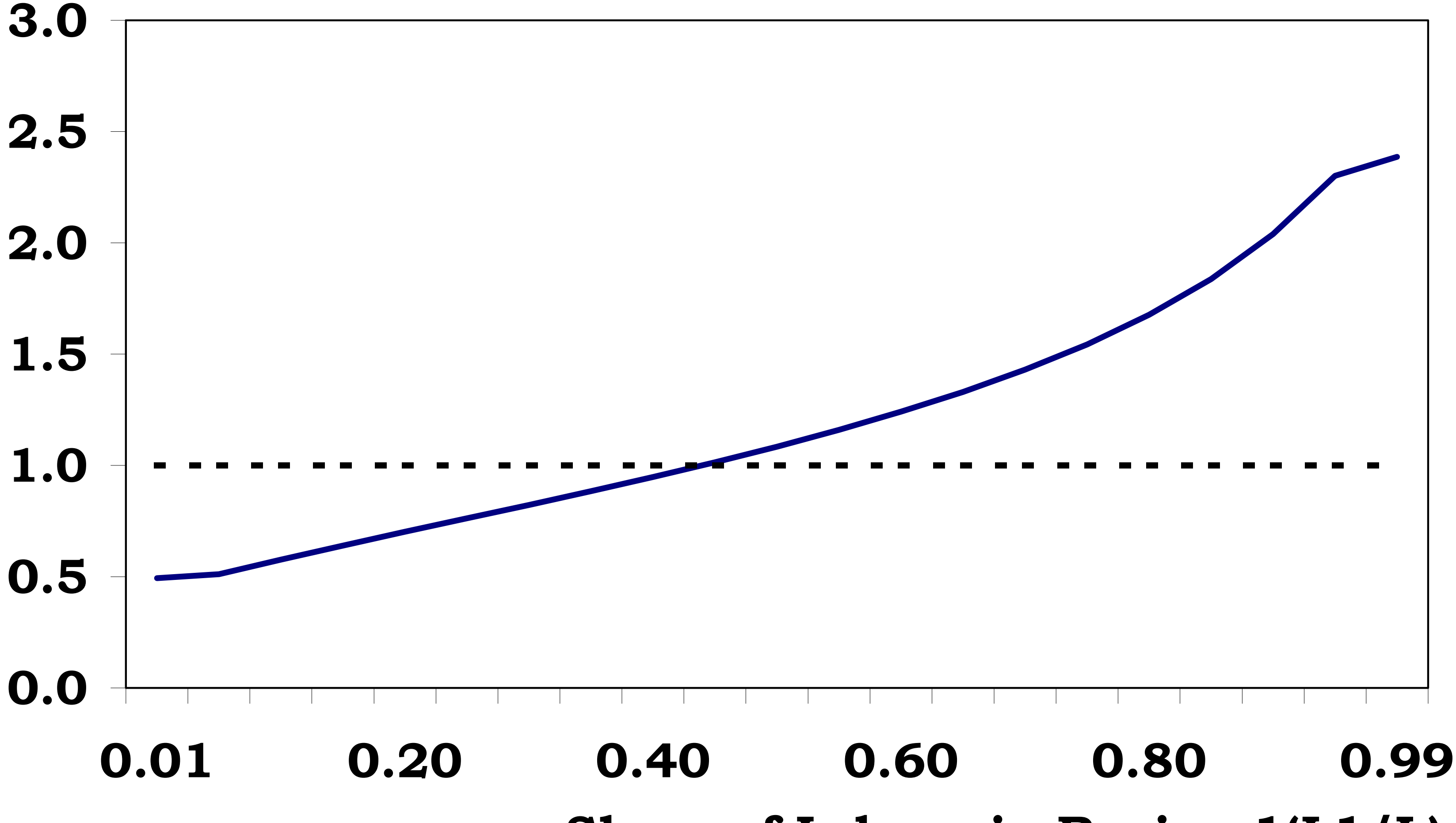
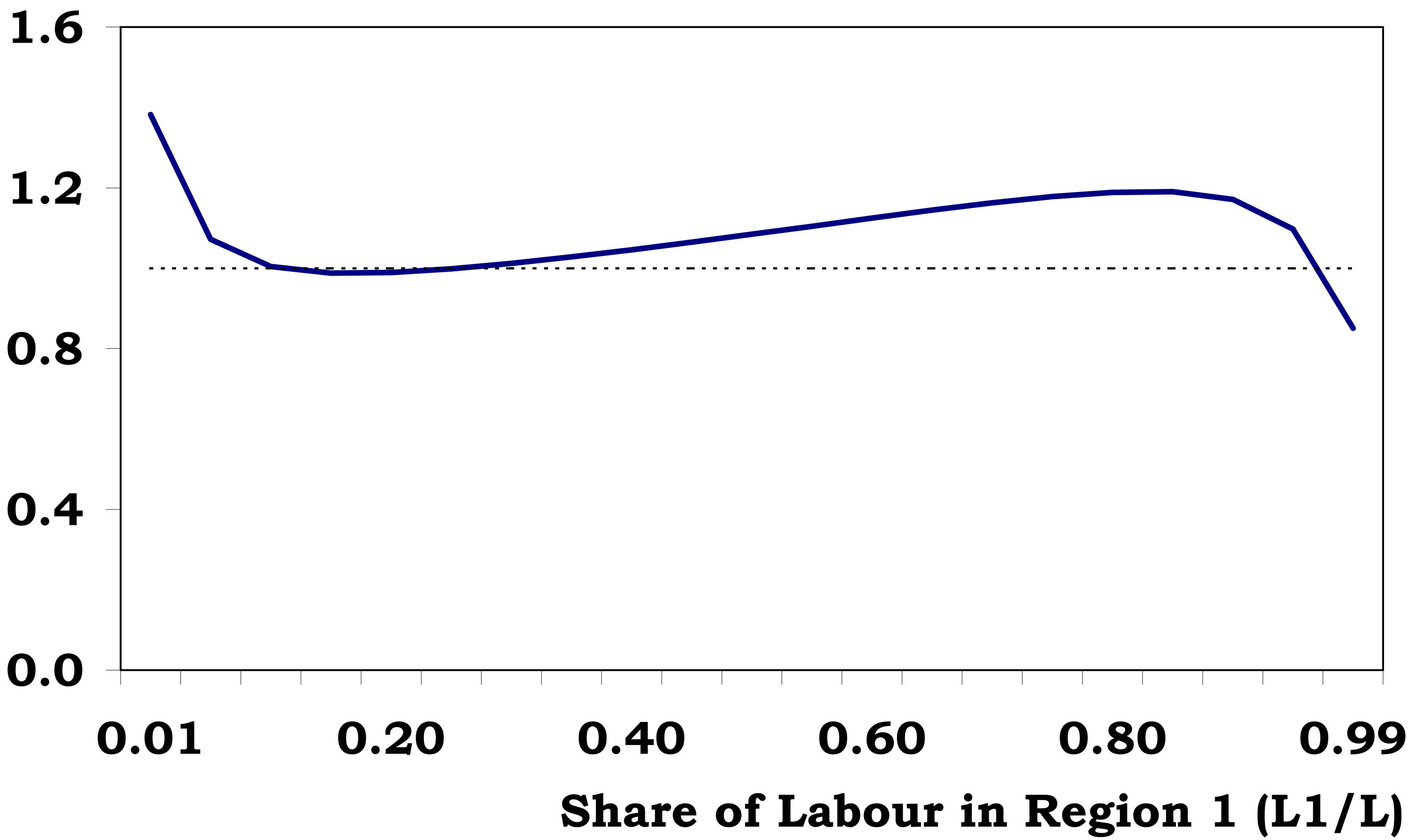


Figure 3

Relative Real Incomes (Region1/Region2)

[$\beta\varepsilon<1$, $H_1/(H_1+H_2)=0.6$, intermediate t and τ]



- ***Trade liberalisation***

  - The reduction of τ has two potential effects:

    - Ceteris paribus, as τ is reduced nominal wages fall in both regions

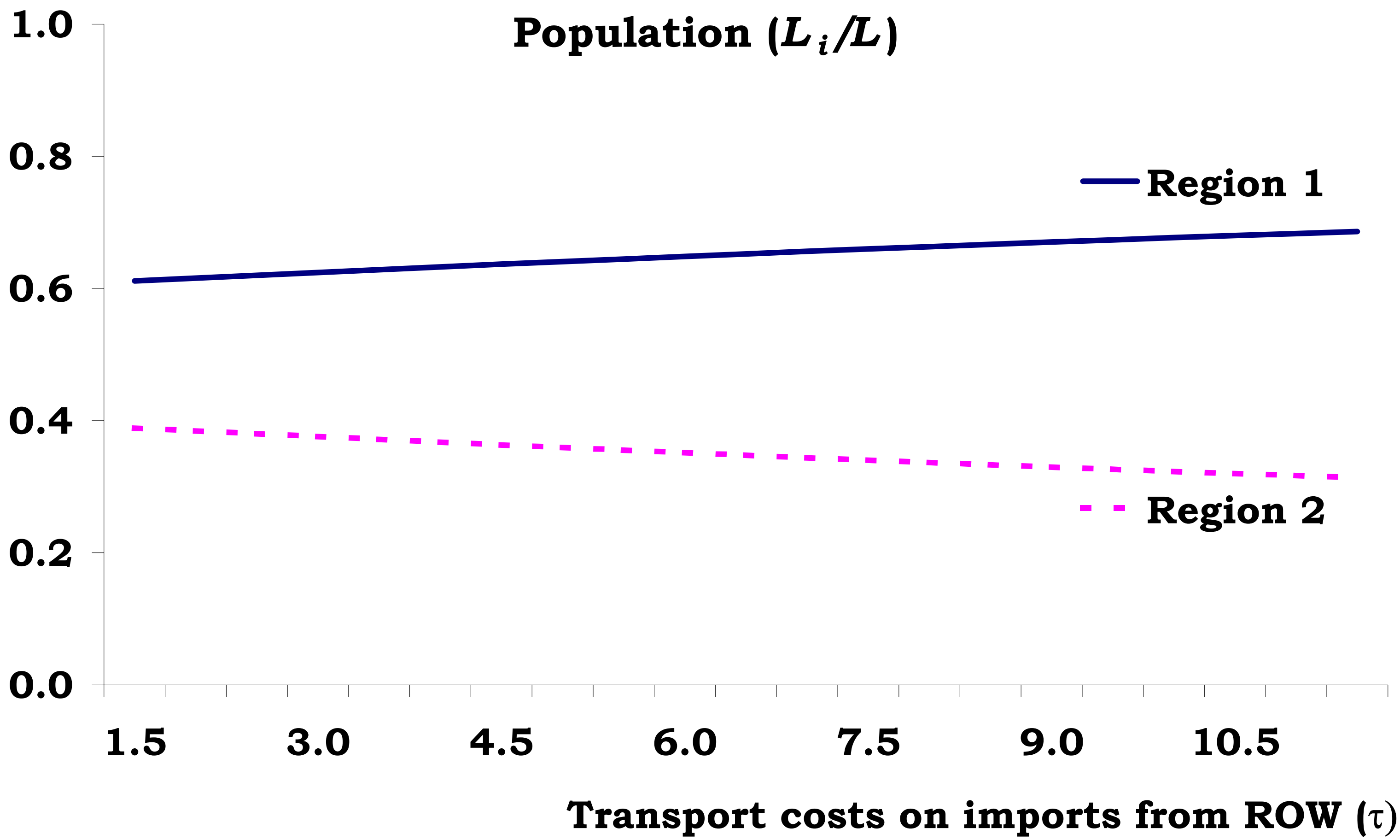
    - As regions' sizes change, wages also change. Ceteris paribus, the region that increases its size experience an increase in its relative nominal wage

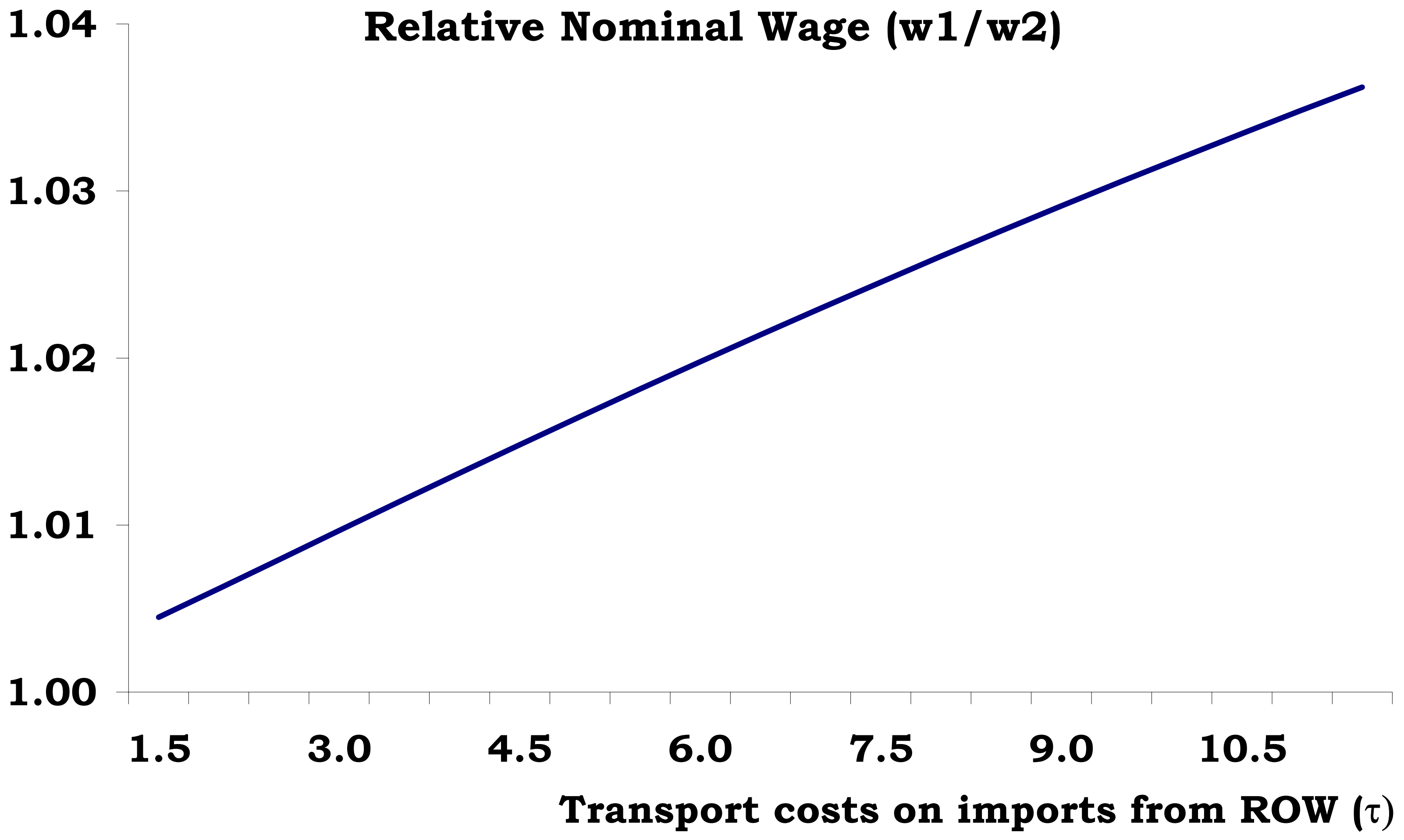
  - These two effects induce further changes in housing and manufactured good prices, such that consumers migrate until real incomes are the same in both regions

- As before, the values of β and ε, through the condition $\beta\varepsilon$ larger or smaller than one, play a key role

- For $\beta\varepsilon<1$, as τ is reduced, regions' size converge as well as nominal wages (Figure 4). This result is independent of the level of t

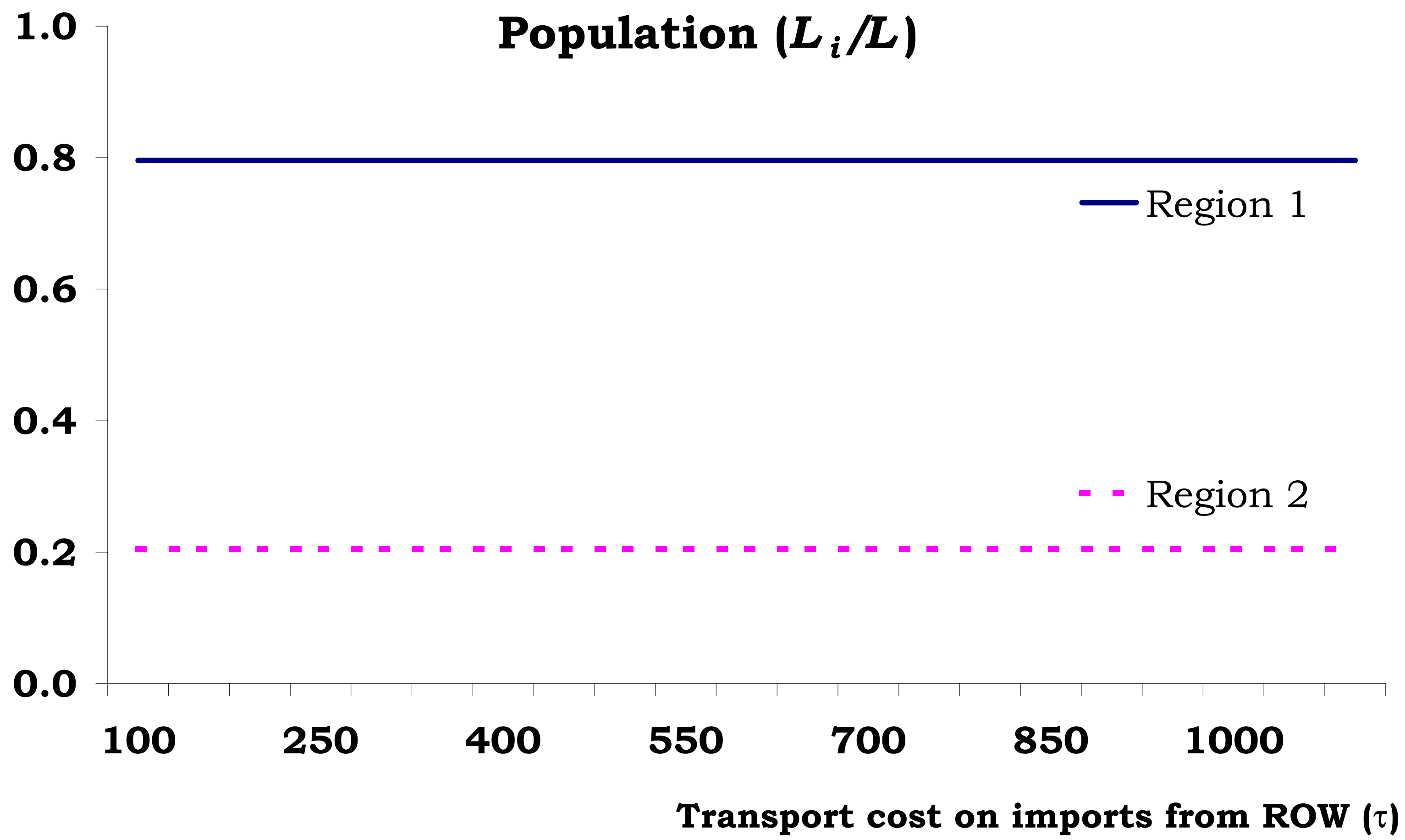
Figure 4
Effects of Trade Liberalisation
[$\beta\varepsilon<1$, $H_1/(H_1+H_2)=0.6$]




Relative Nominal Wage (w1/w2)
1.04
1.03
1.02
1.01
1.00
1.5
3.0
4.5
6.0
7.5
9.0
10.5
Transport costs on imports from ROW (τ)

- When $\beta\varepsilon>1$ we have three alternative scenarios:
  - If t is high enough, changes in τ has almost no effect on regions' size, neither on relative nominal wages (Figure 5)
  - If t is low enough, changes in τ have similar effects to those when $\beta\varepsilon<1$: size and wage convergence
  - If t takes intermediate values, a reduction in τ means a convergence in regions' size, but with a dispersion of nominal wages (Figure 6). This last outcome may be reversed as τ approaches t

Figure 5
Effects of Trade Liberalisation
[$\beta\varepsilon > 1$, $H_1/(H_1+H_2)=0.6$, high t]



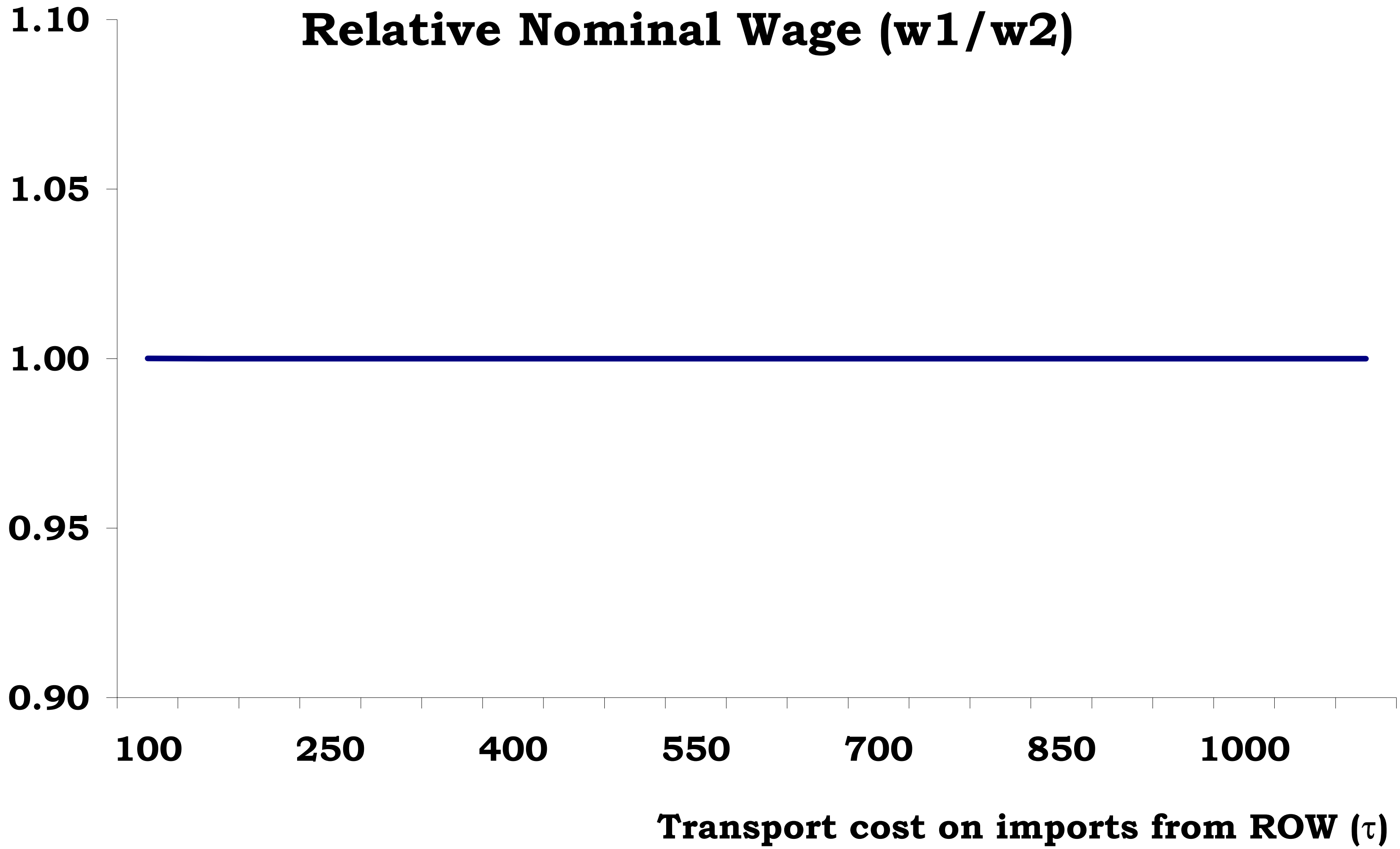
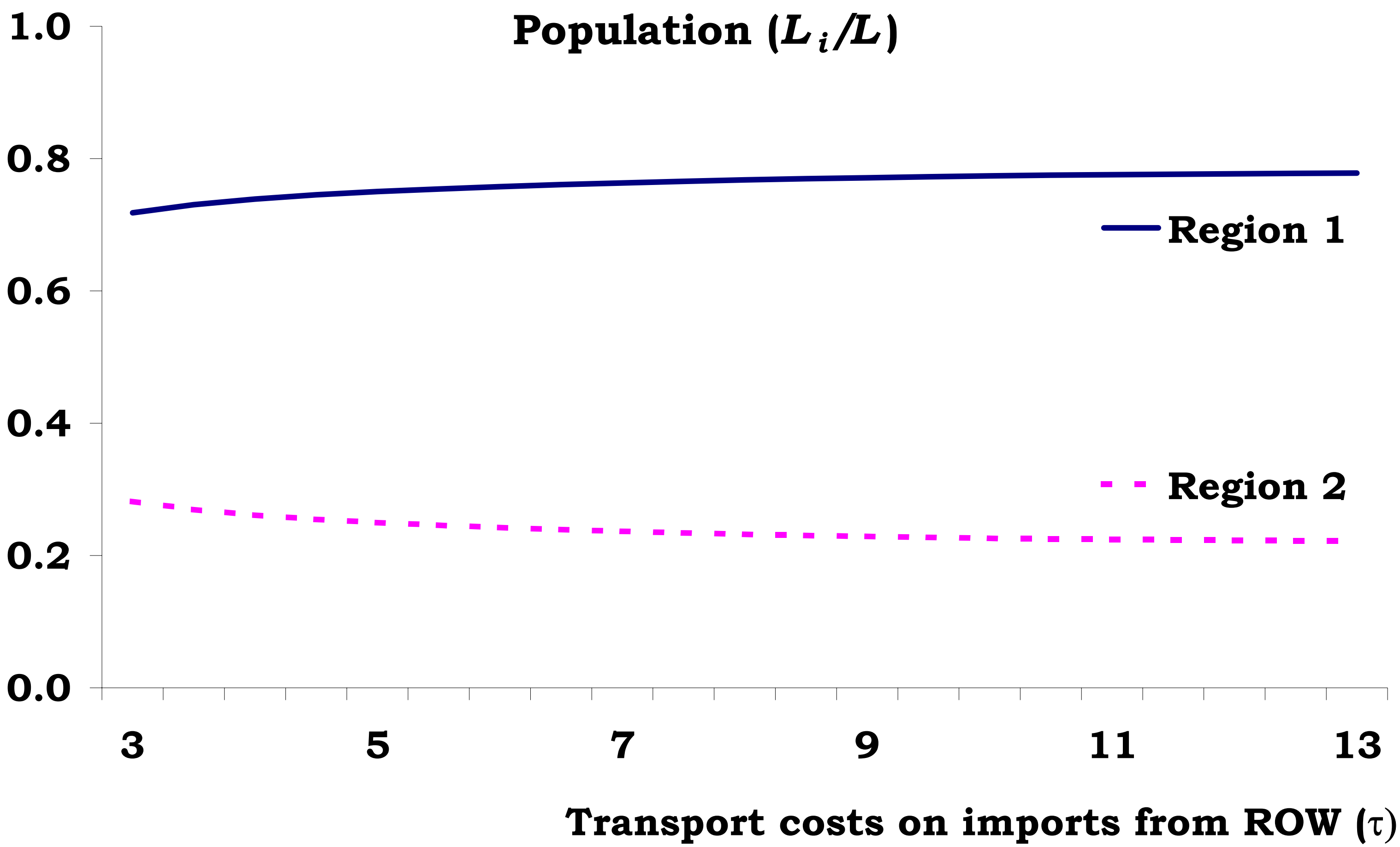
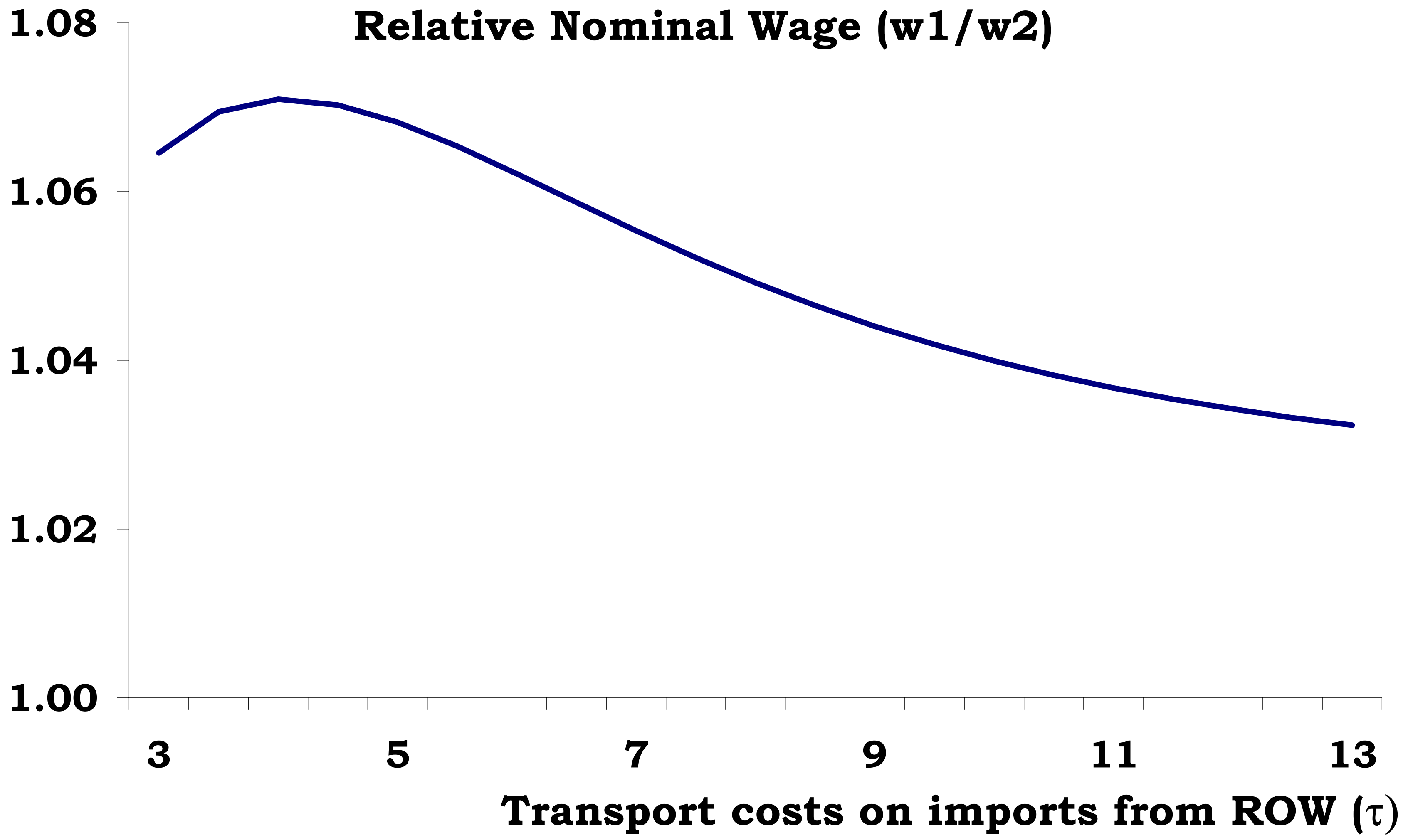

Relative Nominal Wage (w1/w2)
1.10
1.05
1.00
0.95
0.90
100
250
400
550
700
850
1000
Transport cost on imports from ROW (τ)

Figure 6
Effects of Trade Liberalisation
[$\beta\varepsilon>1$, $H_1/(H_1+H_2)=0.6$, intermediate t]




Relative Nominal Wage (w1/w2)
1.08
1.06
1.04
1.02
1.00
3
5
7
9
11
13
Transport costs on imports from ROW (τ)