

The Economic Consequences of Abundant Foreign Labour Supply  
School of Economics and Finance, The University of Hong Kong

□ Presented in American Economic Association Meetings, Washington DC, USA

# **THE ECONOMIC CONSEQUENCES OF ABUNDANT FOREIGN LABOUR SUPPLY**

**KOON LAM SHEA AND YUE CHIM RICHARD WONG**

**SCHOOL OF ECONOMICS AND FINANCE  
THE UNIVERSITY OF HONG KONG**

**JANUARY 1995**

□ Presented in American Economic Association Meetings, Washington DC, USA

## **The Economic Consequences of Abundant Foreign Labour Supply**

**Koon-Lam Shea and Yue-Chim Richard Wong**

### **I. Introduction**

Milton Friedman has suggested that we have had two revolutions: one a technological revolution and one a political revolution.<sup>1</sup> The technological revolution started from advances in the area of computers, telecommunications and transportation, and this has made it possible, to a far greater extent than anytime in the world's history, for a company to locate anywhere, to use resources from anywhere to produce a product that can be sold anywhere. A company is no longer constrained to produce one whole product in a single country. The rapid growth of trade in intermediate goods is a consequence of the globalization of world markets and the increasing international division of labour.

In the advanced industrial economies, the technological revolution has meant competition of low-cost labour from elsewhere, which is why low-skilled wages have not advanced greatly. By contrast, the wages of the highly skilled have gone up sharply, so that the wage differential between the highly skilled and the low skilled has widened in almost every major industrial economy (see Juhn, Murphy, and Pierce 1993). At the same time, the wages of labour in those economies, which have been brought into the structure of international production, have been able to rise. This development has made it possible for the economies of East Asia to expand at a rate that has seldom been seen historically (see Lucas 1993).

The effect of this technological revolution has been greatly enhanced by the political revolution. The political revolution consists of the fall of the Berlin Wall and what followed in Central and Eastern Europe and the former Soviet Union. The political revolution is also used here in a loose sense to encompass the developments in China since the 1980s and may be repeated in India and elsewhere. Throughout the world, more than three billion people have now been given the opportunity to develop a new economic relationship with the advanced economies because of these twin revolutions. This offers the world an enormous opportunity to expand trade and investments across borders, the opportunity of a major expansion of the world economy. Friedman claims that this could be the source of a second Industrial Revolution comparable in magnitude to the first one.<sup>2</sup> He also expressed concern that the world may react with protection, of trying to fight off the opportunity.

To take advantage of the opportunity, the structure of many advanced economies have to be transformed as they respond to shifts in global trade and

□ Presented in American Economic Association Meetings, Washington DC, USA

investment flows. These effects can be studied by examining the dramatic economic changes that have taken place in Hong Kong following the opening of China in late 1979. Manufacturers in Hong Kong began to move their operations into China to take advantage of the abundant labour supply across the border. Small factory owners in Hong Kong employing less than 20 workers soon grew into sizable operations employing hundreds or thousands of workers in China. It has been estimated that in 1993 over 50,000 Hong Kong manufacturers have operations in China, employing more workers in China than the entire Hong Kong labour force.

According to figures released by the World Bank, foreign capital inflows into China in 1993 amounted to US\$27 billion, which is about 15% of total capital inflows into developing countries. Again according to World Bank figures, foreign direct investments in China amounted to US\$15 billion in 1993, however, Chinese figures put it at US\$26 billion. The World Bank figures do not provide information on the composition of foreign investments by source of origin, but according to Chinese figures some 44% of foreign direct investments in China were from Hong Kong (see Sung 1994). Hong Kong's share of cumulative foreign investments in China is even larger because Hong Kong entrepreneurs were a step ahead of the rest of the world in entering China. Again according to Chinese figures, the cumulative value of foreign direct investments in China is US\$221 billion of which Hong Kong's share is about 68%.

Hong Kong's role as a gateway to China has also attracted foreign investments into Hong Kong. China has also been investing heavily in Hong Kong and is now the single largest investor in Hong Kong with cumulative foreign direct investment of over US\$12 billion in 1992. The reasons for Chinese investment in Hong Kong are numerous and is discussed in Sung (1991) and Shen (1993).

The effect of such momentous changes has had a major impact on the Hong Kong economy. Casual observation suggest that there are two major changes: (a) shift in the production mix of domestic output; (b) changes in relative prices between traded and non-traded goods. Although Hong Kong manufacturers grew by leaps and bounds through expanding into China, the domestic economy shifted rapidly towards services. Between 1987 and 1992, the share of manufacturing sector in the GDP of Hong Kong declined from 21% to 12%. On the other hand, between 1987 and 1992, the output deflator for manufacture sector grew at 4.05% and that of the services sector grew at 11.41% indicating that the price of services have increased relative to that of manufacture. Between 1982 and 1992, the share of workers engaged in the manufacturing sector in Hong Kong declined from 37.7% to 23.8%; representing an absolute decline in the number of manufacturing workers from 934,000 to 650,000 when the total labour force increased from 2.47 to 2.74 million. In 1993, Hong Kong became the tenth largest trading entity in the world in terms of the total value of imports and exports due largely to the growing re-export trade with China. Between 1982 and 1992, total trade grew at an average annual rate of 15.18% in real terms. Over the same decade, re-exports grew at 23.85% per year in real terms lifting the share of re-exports in total trade from 16.87% to 36.57%.

- Presented in American Economic Association Meetings, Washington DC, USA

Income dispersion in Hong Kong grew at the same time when rapid growth and structural transformation of the economy took place. Between 1981 and 1991, individual earnings inequality as measured by the Gini coefficient increased from 0.382 to 0.427 (see Suen 1995). Labour unemployment remained low at 2% due to the renowned flexibility of the domestic labour market, but inflation rose as growing demand due to rising economic prosperity kept pressing against limited domestic resources, especially in the non-tradeable service sector. A modest program to import workers into Hong Kong to relieve labour shortage was implemented.

This paper develops a two-sector model of a small open economy with a traded and a non-traded goods sector to investigate the main effects of abundant foreign labour supply on the domestic economy. We will first examine its impact on the product mix and relative prices. A more interesting issue is its impact on factor returns. The two sector model enables us to predict the impact on returns to capital and labour. The traded and non-traded good model was first developed in a series of articles by Meade (1956), Salter (1959), Corden (1960), Swan (1960, 1963) and Salter and Swan (1960, 1963). The prominent role that it enjoys to-day in the literature can be attributed to the work of Dornbusch (1973, 1974, 1975) who showed that the model is very useful in the investigation of devaluation by provided a link between monetary and real effects. The model has also been widely used in the investigation on the Dutch disease. (For a good summary, see Corden (1984).) The model is then applied to interpret the economic developments in Hong Kong and Singapore for the period 1982-1992. Both Hong Kong and Singapore are relatively small open economies that have had the opportunity of taking advantage of the abundant foreign labour supply from neighbouring countries. Their experiences are all the more interesting because the extent of structural transformation is much less in Singapore than in Hong Kong, and therefore one can contrast their experiences. Although Singapore manufacturers have invested abroad to take advantage of abundant foreign labour supply in other countries, their scale of investment is much smaller when compared to Hong Kong. On the other hand, Singapore has been importing workers to a much greater extent than Hong Kong. It has been estimated that imported workers make up at least 14% of the Singapore labour force, whereas the figure for Hong Kong is less than 5%. Both have been major recipients of foreign capital inflows and both operate monetary systems that are variations of the currency board system. By focusing on the similarities and differences between Hong Kong and Singapore we attempt to bring out the consequences of abundant foreign labour supply on the domestic economy in a way that highlights to policy choices that domestic governments face.

In the formal model we first consider the case when labour is immobile between the traded and non-traded goods sector to highlight the short run adjustments. We examine the consequences of allowing (1) investment capital outflows into low wage foreign countries, (2) foreign labour inflows into the domestic country, and (3) domestic capital endowments to increase. The cases when labour is allowed to become partially and fully mobile between the traded and the non-traded sector are also considered to show gradual adjustments towards long run equilibrium. Finally, we examine

□ Presented in American Economic Association Meetings, Washington DC, USA

comparative evidence from Hong Kong and Singapore to illustrate the propositions of the model.

## II. The Sectoral Labour Immobility Model

Consider a small (home) economy producing traded (T) and non-traded goods (N) using capital (K) and labour (L) with constant returns to scale technology. AA in Figure 1 depicts the transformation curve of the economy along which capital and labour are fully employed. Demand conditions are represented by indifference curves and are assumed to be homothetic. Point S is the equilibrium point where demand and supply of both goods are equal and the country achieves both internal and external equilibria. The slope of the transformation curve gives the equilibrium relative prices. Let  $L_N$  and  $L_T$  be the amount of labour employed respectively in the non-traded and the traded goods sector.

Suppose the small country now has access to low wage foreign labour supply by investing in low wage foreign countries. As a result, capital outflow occurs. To generate the effect of wage differential between sectors as suggested by the data, we assume at this stage that labour is perfectly immobile between sectors. This will be relaxed later on to allow for labour movement between sectors to see how it will modify the results. As labour cannot move between sectors, the amount of labour employed in each sector remains to be  $L_N$  and  $L_T$ .

Suppose foreign real wage rate in terms of the traded good is  $w^*$ . Since home country is small, the amount it invests will have no impact on  $w^*$ . Capital outflow continues until returns to capital are equalized between countries. This happens when the real wage rate in the traded goods sector in the small country equals  $w^*$ , the condition of which is given below<sup>1</sup>.

$$f_T(k_T) - k_T f_T'(k_T) = w^* \quad (1)$$

where  $f_i$  is the per capita production function of good  $i$ ;  $f_i'$  its derivative and  $k_i$  the capital labour ratio of sector  $i$ . Since capital is mobile between sectors in the small country, returns must be equalized between sectors, i.e.

$$f_T'(k_T) = P f_N'(k_N)$$

where  $P (=P_N/P_T)$  denotes the relative price of N. Given that labour is immobile between sector, the amount of capital employed in the non-traded goods sector,  $K_N$ , can be rewritten as  $K - L_T^* k_T - K_f$  where  $K_f$  denotes the amount of capital outflow;  $K$  the capital endowment and  $L_i$  the amount of labour employed in sector  $i$ . The last equation can be rewritten as :

□ Presented in American Economic Association Meetings, Washington DC, USA

$$f'_T(k_T) = pf \left[ \frac{k - L_T * k_T - k_f}{L_N} \right] \quad (2)$$

Internal equilibrium requires that demand and supply of non-traded goods are equal. External equilibrium requires expenditure equals income. The conditions are given below respectively.

$$C_N = X_N \quad (3)$$

$$PC_N + C_T = PX_N + X_T + f'_T(k_T)K_f \quad (4)$$

where  $C_i$  and  $X_i$  denote consumption and production of good  $i$ . The last term in the budget equation represents earnings received from capital invested abroad. The last two equations can be simplified to give

$$C_T = X_T + f'_T(k_T)K_f \quad (5)$$

which says that the country's trade deficit must equal to its foreign earnings. Assuming homothetic preference,

$$C_T/C_N = g(P) \quad g' > 0$$

(5) simplifies to

$$g(P)X_N = X_T + f'_T(k_T)K_f \quad (6)$$

Using the assumption of constant returns to scale, the amount of non-traded goods and traded goods produced are

$$X_N = L_N f_N(k_N) \quad (7)$$

$$X_T = L_T f_T(k_T) \quad (8)$$

Using (7) and (8), (6) can be simplified to

$$g(P)L_N f_N \left( \frac{k - L_T * k_T - k_f}{L_N} \right) = L_T f_T(k_T) + f'_T(k_T)K_f \quad (9)$$

The complete model consists of equations (1), (2) and (9). The endogenous variables are  $k_T$ ,  $P$ ,  $K_f$ . The exogenous variables are  $w^*$ ,  $K$ ,  $L_T$  and  $L_N$ . Given foreign real wages, the capital endowment of the small country and the original distribution of labour between sectors, the model predicts how the availability of low wage foreign

□ Presented in American Economic Association Meetings, Washington DC, USA

labour supply affects relative commodity prices, the amount of capital outflow, and allocation of capital between sectors. The analysis can be further simplified by partitioning the model into two sub- systems. Given  $w^*$ , equation (1) determines the equilibrium  $k_T$ . Once  $k_T$  is known, (2) and (9) can be used to obtain the equilibrium values of  $P$  and  $K_f$ . Such a partition enables us to present the determination of  $P$  and  $K_f$  in a simple diagrammatic way. In Figure 2,  $\pi\pi$  is the equal profit locus denoted by (2) for a given  $k_T$  determined by (1). With  $k_T$  fixed, the marginal product of capital in the production of traded goods is fixed. If  $P$  falls, to maintain equal profits between sectors, the marginal product of capital in terms of non-traded goods must rise, or  $k_N$  must fall.  $k_N$  would fall only if  $K_f$  rises. Thus  $\pi\pi$  is downward sloping. The slope can be obtained by differentiating (2).

$$\frac{dP}{dk_f} = \frac{pf_N''}{L_N f_N'} < 0$$

Line  $NN$  in Figure 2 depicts the internal and external equilibria locus for a given  $k_T$  determined by (1). With a given  $k_T$ , marginal product of capital in terms of traded goods is fixed and an increase in capital outflow will increase income. Given that preference is homothetic, this will bit up  $P$ . Thus  $NN$  is upward sloping. The slope of the  $NN$  curve can be obtained by differentiating (9).

$$\frac{dP}{dk_f} = \frac{f_T' + gf_N'}{g' L_N f_N'} > 0$$

The intersection of the  $\pi\pi$  and  $NN$  curves then gives the equilibrium values of  $K_f$  and  $P$  for the given value of  $k_T$  determined in (1).

### III. Comparative Statics

In this section, we investigate the impact of changes in the exogenous variables on the economy. The analysis is done by splitting the model into the two sub-systems as explained above. We will first find the impact of changes of the exogenous variables on  $k_T$  through (1). Then we use (2) and (9) to find the impact of  $k_T$  on the endogenous variables.

#### (i) Changes in $w^*$

Differentiating (1), we have

$$\frac{dk_T}{dw^*} = -\frac{1}{k_T f_T''} > 0$$

Differentiating (2) and (9) with respect to  $k_T$  and using Cramer's rule, we have

$$\frac{dk_f}{dk_T} = \frac{f_N' (L_T f_T' + L_T g f_N' + f_T'' k_f) - g' f_N' (L_N f_T'' + p f_N'' L_T)}{\Delta}$$

□ Presented in American Economic Association Meetings, Washington DC, USA

$$\frac{dp}{dk_T} = \frac{-f_T''(gf_N' + f_T') + \frac{pf_N''}{LN} f_T'' k_g}{\Delta} < 0$$

where  $\Delta$  denotes  $-f_N'(gf_N' + f_T') + pf_N'' g' f_N' < 0$ . When  $K_f$  is zero,  $\frac{dk_f}{dk_T} < 0$  is negative.

When  $K_f$  is positive, for reasonable values of the parameters (see appendix), the numerator of  $\frac{dk_f}{dk_T}$  is positive and hence  $\frac{dk_f}{dk_T} < 0$  is negative. Using the result of  $dk_T/dw^*$ , we have

$$\frac{dk_f}{dw^*} < 0 \qquad \frac{dP}{dw^*} < 0$$

Thus a fall in foreign wages will increase capital outflow and the relative price of the non-traded good. By assuming that foreign wages to begin with is the same as that of the small country and then it falls, our result shows that the availability of low wage foreign labour supply will induce a capital outflow and increase the relative price of the non-traded good which is consistent with the experience of some small countries. Notice that the result is independent of the relative factor intensities of the goods produced.

Who benefits from the availability of the low wage foreign labour supply? It is obvious that workers in the traded goods sector are hurt. But the effects on workers in the non-traded goods sector and capital owners are less certain.

The effect on the returns to labour and capital associated with the traded goods sector is straight forward.

$$\frac{dMP_{LT}}{dw^*} = \frac{dMP_{LT}}{dk_T} \frac{dk_T}{dw^*} > 0$$

$$\frac{dMP_{KT}}{dw^*} = \frac{dMP_{KT}}{dk_T} \frac{dk_T}{dw^*} < 0$$

A reduction in foreign wages will reduce the real returns to labour and increase the real returns to capital associated with the traded goods sector. Since the relative price of the non-traded good has increased, returns to labour in the traded goods sector falls in terms of both goods. Thus the availability of low wage foreign labour supply hurts workers in the traded goods sector. Although the returns to capital in terms of the traded good increases, returns in terms of the non-traded good need not because the price of the non-traded good has also increased.

To find the effect of a reduction in foreign wages on the returns to factors in the non-traded goods sector, we need to determine the effect of  $k_T$  on  $k_N$ . Direct differentiation shows that

□ Presented in American Economic Association Meetings, Washington DC, USA

$$\frac{dk_N}{dk_T} = \frac{f_T'' D}{L_N \Delta}$$

where D is  $g' L_N f_N - f_N' k_g$ .

$$\frac{dMP_{LN}}{dk_N} = \frac{dMP_{LN}}{dk_N} \frac{dk_N}{dk_T} \frac{dk_T}{dw^*} \begin{matrix} >0 \\ <0 \end{matrix} \quad \text{iff} \quad \begin{matrix} D > 0 \\ < 0 \end{matrix}$$

$$\frac{dMP_{kN}}{dw^*} = \frac{dMP_{FN}}{dk_N} \frac{dk_N}{dk_T} \frac{dk_T}{dw^*} \begin{matrix} >0 \\ <0 \end{matrix} \quad \text{iff} \quad \begin{matrix} D > 0 \\ < 0 \end{matrix}$$

Thus depending on the sign of D, a reduction in foreign wages has an ambiguous effect on the returns to capital in terms of the non-traded good and the real returns to labour in the non-traded goods sector.

$$\begin{aligned} \frac{dP \cdot MP_{LN}}{dw^*} &= \frac{d(P \cdot MP_{LN})}{dk_T} \frac{dk_T}{dw^*} \\ &= \left[ MP_{LN} \frac{dP}{dk_T} + P \frac{dMP_{LN}}{dk_T} \right] \frac{dk_T}{dw^*} \\ &= \left[ MP_{LN} \frac{dP}{dk_T} - P k_N f_N'' \frac{dk_N}{dk_T} \right] \frac{dk_T}{dw^*} \\ &= \left[ MP_{LN} \frac{dP}{dk_T} - \frac{P k_N f_N'' f_T'' (g' L_N f_N - f_N' k_g)}{L w \Delta} \right] \frac{dk_T}{dw^*} \end{aligned}$$

Since the elasticity of substitution between the traded and the non-traded good is small, we assume that  $g'$  is small so that  $\frac{dP \cdot MP_{LN}}{dw^*}$  is negative.<sup>3</sup> Table 1 summarizes the result.

**Table 1: Effect of a Fall in Foreign Wages**

|       | $k_f$ | P | $r_n$ | $W_{NN}$ | $W_{NT}$ | $W_{TT}$ | $W_{TN}$ | $X_N$ | $X_T$ |
|-------|-------|---|-------|----------|----------|----------|----------|-------|-------|
| D < 0 | ↑     | ↑ | ↓     | ↑        | ↑        | ↓        | ↓        | ↑     | ↓     |
| D > 0 | ↑     | ↑ | ↑     | ↑        | ↓        | ↓        | ↓        | ↓     | ↓     |

where  $w_{ij}$  denotes real wages of labour in sector  $i$  in terms of good  $j$ ,  $r_i$  denotes the returns to capital in terms of good  $i$ . The information in the last two columns is obtained by using the relationship between factor intensities and factor returns. To summarize, a reduction in foreign wages will always lead to a capital outflow; a reduction in the

□ Presented in American Economic Association Meetings, Washington DC, USA

output of the traded good; an increase in the relative price of the non-traded good; a reduction in the returns to labour in the traded goods sector in term of both goods; an increase in the real returns to labour in the non-traded goods sector and real returns to capital in terms of the traded good. Depending on the value of  $D$ , the returns to labour in the non-traded goods sector and returns to capital in terms of the non-traded good can either increase or decrease and the output of the non-traded good will either rise or fall. Note that the output of the traded goods sector must fall because of capital outflow. However, we show that it may even reduce the size of the non-traded goods sector. This can happen if the elasticity of substitution between the traded good and the non-traded good is large so that people spend more of their income on the traded good which can be obtained at fixed prices from the rest of the world.

**(ii) Changes in  $L_N$**

Suppose there is an increase in the labour force associated with the non-traded goods sector. For example, this may happen when the government allows workers to immigrate into the country to work in the non-traded goods sector, to meet the rising demand and to moderate the increase in the relative price of the non-traded good. Differentiating (2) and (9) with respect to  $L_N$  and using Cramer's rule, we have

$$\frac{dP}{dL_N} = \frac{Pf_N''K_N f_T' - Pf_N''L_N g f_N'}{L_N^2 \Delta} < 0$$

$$\frac{dk_f}{dL_N} = \frac{-g f_N' (f_N - k_N f_N') - Pf_N'' k_N g' f_N'}{\Delta} > 0$$

Thus an increase in  $L_N$  will reduce the price of the non-traded good. Its effect on capital outflow is ambiguous. The effects on factor returns can be obtained by noting that  $w^*$  is unchanged.  $k_T$  will therefore remain the same. Output of the traded good will be the same because labour in the traded goods sector remains unchanged. The returns to labour and capital in the traded goods sector will be unaffected. Their returns in terms of the non-traded good will increase because the relative price of the non-traded good has fallen. The returns to labour in the non-traded goods sector can be obtained by differentiating the equal profit equation (2) to yield

$$\frac{dk_N}{dL_N} = -\frac{f_N'}{f_N'' P} \frac{dP}{dL_N} < 0$$

Using the constant returns to scale properties, we have

$$\frac{dMP_{LN}}{dL_N} < 0 \qquad \frac{dMP_{KN}}{dL_N} > 0$$

Since the relative price of the non-traded good has fallen, the real returns to labour in the non-traded goods sector will fall in terms of both goods. The effect on the output of the non-traded good can be obtained by differentiating  $L_N f_N(k_N)$  to give  $\frac{dX_N}{dL_N} > 0$  The

results are summarized in Table 2 below.

□ Presented in American Economic Association Meetings, Washington DC, USA

**Table 2: Effect of an Increase in  $L_N$  when there is Abundant Low Wage Foreign Labour Supply**

|                      |              |            |       |              |              |          |            |            |       |
|----------------------|--------------|------------|-------|--------------|--------------|----------|------------|------------|-------|
| $K_f$                | $P$          | $r_N$      | $r_T$ | $W_{NN}$     | $W_{NT}$     | $W_{TT}$ | $W_{TN}$   | $X_N$      | $X_T$ |
| $\uparrow\downarrow$ | $\downarrow$ | $\uparrow$ | 0     | $\downarrow$ | $\downarrow$ | 0        | $\uparrow$ | $\uparrow$ | 0     |

To summarize, an increase in the labour force in the non-traded goods sector: reduces the price and increases the output of the non-traded good; can either increase or decrease capital outflow; reduces the returns to labour in the non-traded goods sector in terms of both goods; benefits capital owners and workers in the traded goods sector because their returns increase in terms of the non-traded good although they remain constant in terms of the traded good; and has no impact on the output of the traded good.

**(iii) Changes in capital endowment**

Suppose the amount of capital stock increases. How does it affect the economy? Differentiating (2) and (9) with respect to  $K$  and using Cramer's rule, we have

$$\frac{dP}{dK} = \frac{Pf_N''f_t'}{\Delta L_N} > 0$$

$$\frac{dk_f}{dk} = \frac{-g(f_N')^2 + Pf_N''g'f_N}{\Delta} > 0$$

Thus increases in capital stock increases the relative price of the non-traded good and the amount of capital outflow.

The returns to capital and labour in the traded goods sector remains the same because  $k_T$  is unchanged. Their returns in terms of the non-traded good falls because the price of the non-traded good has increased. Labour and capital employed in the traded goods sector remains unaffected. Therefore all of the increase in capital goes into the production of the non-traded good.

Differentiating the equal profit constraint (2), we have

$$\frac{dk_N}{dk} = -\frac{f_N'}{pf_N''} \frac{dP}{dk} > 0$$

The returns to labour in the non-traded goods sector will increase in terms of both goods because the relative price of the non-traded good has increased. The result is summarized in Table 3 below.

□ Presented in American Economic Association Meetings, Washington DC, USA

**Table 3: Effect of an Increase in K when there is Abundant Low Wage Foreign Labour Supply**

|       |     |       |       |          |          |          |          |       |       |
|-------|-----|-------|-------|----------|----------|----------|----------|-------|-------|
| $k_f$ | $P$ | $r_N$ | $r_T$ | $W_{NN}$ | $W_{NT}$ | $W_{TT}$ | $W_{TN}$ | $X_N$ | $X_T$ |
| ↑     | ↑   | ↓     | 0     | ↑        | ↑        | 0        | ↓        | ↑     | 0     |

To summarize, an increase in the capital endowment increases the price of the non-traded good and the amount of capital outflow; increases the output of the non-traded goods sector, but has no effect on the output of the traded good; increases the returns to labour in the non-traded goods sector in terms of both goods; harms capital owners and workers in the traded goods sector because their returns are reduced in terms of the non-traded good, but the returns in terms of the traded good remain the same.

**(iv) Changes in  $L_T$**

Differentiating (2) and (9) with respect to  $L_T$  and using Cramer's rule, we have

$$\frac{dP}{dL_T} = \frac{Pf_N''(f_T - k_T f_T')}{L_N \Delta} > 0$$

$$\frac{dk_f}{dL_T} = \frac{f_N'(gf_N' k_T + f_T) - g' f_N Pf_N'' k_T}{\Delta} < 0$$

Increasing labour in the traded goods sector raises the price of the non-traded good and reduces capital outflow.

The returns to capital and labour in the traded goods sector is unchanged because  $k_T$  remains the same. Their returns in terms of the non-traded good falls because the price of the non-traded good has increased. The amount of capital used in the traded goods sector will increase in the same proportion as that of labour causing an increase in the output of the traded good.

Differentiating the equal profit equation (2), we have

$$\frac{dk_N}{dL_T} = -\frac{f_N'}{pf_N''} \frac{dp}{dL_T} > 0$$

The returns to labour in the non-traded goods sector will increase in terms of both goods because the relative price of the non-traded good has increased. The output of the non-traded good increases because  $k_N$  has increased and the amount of labour used in the non-traded goods sector remains the same. The result is summarized in Table 4 below.

□ Presented in American Economic Association Meetings, Washington DC, USA

**Table 4: Effect of an Increase in  $L_T$  when there is Abundant Low Wage Foreign Labour Supply**

|       |     |       |       |          |          |          |          |       |       |
|-------|-----|-------|-------|----------|----------|----------|----------|-------|-------|
| $k_f$ | $P$ | $r_N$ | $r_T$ | $W_{NN}$ | $W_{NT}$ | $W_{TT}$ | $W_{TN}$ | $X_N$ | $X_T$ |
| ↓     | ↑   | ↓     | 0     | ↑        | ↑        | 0        | ↓        | ↑     | ↑     |

To summarize, an increase in  $L_T$  increases the price of the non-traded good; reduces the amount of capital outflow; increases the returns to labour in the non-traded goods sector in terms of both goods; harms capital owners and workers in the traded goods sector because their returns are reduced in terms of the non-traded good, but they remain the same in terms of the traded good; and increases the output of both types of goods.

**(v) Shifting of labour force from the traded to the non-traded goods sector**

In the above analysis, we have assumed that labour is perfectly immobile between sector. A more realistic assumption is that there is limited labour mobility between the two sectors even in the short run. After the small country has access to the low wage foreign labour supply, workers in the non-traded goods sector will have a higher wage. Suppose there is limited amount of labour movement from the traded goods sector into the non-traded goods sector so that wages are not equalized. How will this modify the various effects of abundant foreign labour supply given in Table 1. The effects can be obtained by using the results in (ii) and (iv).

$$\frac{dP}{dL_N} - \frac{dP}{dL_T} < 0$$

$$\frac{dk_f}{dL_N} - \frac{dk_f}{dL_T} > 0$$

When labour shifts from the traded goods sector to the non-traded goods sector, the relative price of the non-traded good falls and the amount of capital outflow can either increase or decrease. Similarly, we can obtain the effects on factor returns. The results are summarized below.

**Table 5: Effect of Labour Mobility between Sectors when there is Abundant Low Wage Foreign Labour Supply**

|       |     |       |       |          |          |          |          |       |       |
|-------|-----|-------|-------|----------|----------|----------|----------|-------|-------|
| $k_f$ | $P$ | $r_N$ | $r_T$ | $W_{NN}$ | $W_{NT}$ | $W_{TT}$ | $W_{TN}$ | $X_N$ | $X_T$ |
| ↑↓    | ↓   | ↑     | 0     | ↓        | ↓        | 0        | ↑        | ↓↑    | ↓     |

Thus when labour moves from the traded goods sector to the non-traded goods sector, it reduces the price of the non-traded good and its effect on capital outflow can either be positive or negative; reduces the output of the traded good and the effect on the non-traded good can either be positive or negative; reduces the returns to labour in the non-traded goods sector in terms of both goods; benefits capital owners and workers in

- Presented in American Economic Association Meetings, Washington DC, USA

the traded goods sector because their returns are increased in terms of the non-traded good, but they remain the same in terms of the traded good.

We are now able to see how limited labour movement between sectors affects the results in Table 1 where it is assumed that sectoral labour movement is not allowed. In particular, the price of the non-traded good will increase by a lesser extent; the returns to labour in the traded goods sector will be harmed to a lesser extent; and workers in the non-traded goods sector will benefit less, but capital owners will benefit more.

#### IV The Impact When Labour Is Sectoral Mobile

The last section discussed limited labour movement between sectors. In the long run, labour will move between sectors to equalise returns. What will be the impact of low wage foreign labour supply in the long run? The impacts depends on the relative factor intensities of the the traded good and the non-traded good. Consider the case where the traded good are capital intensive. Figure 3 illustrates the case. Before the small country has access to the low wage foreign labour supply, the wage rental ratio, the factor intensities of production and relative prices are given by  $(w/r)^0$ ,  $k_i^0$  and  $P^0$ . When the country has access to the low wage foreign labour supply,  $k_T$  falls. Suppose  $k_T$  falls to  $k_T'$  as depicted in the figure. Relative prices and relative factor returns become  $P'$  and  $(w/r)'$ . Thus in the long run the relative price of the non-traded good falls. Returns to capital increase while returns to labour fall in terms of both goods. Figure 1 depicts the equilibrium production and consumption points. Before capital outflow, S is the equilibrium point. The slope of BB corresponds to the new equilibrium price  $P'$  and factor prices associated with point I are those in the long run. Equilibrium consumption and production occurs at C' and N' where IN' is the Rybczynski line. Thus at final equilibrium, the production of the non-traded good must increase while that of the the traded good must fall.

Similarly, it can be shown that if  $k_N > k_T$ , in the long run, relative price of the non-traded good must rise; returns to capital will increase and returns to labour will fall in terms of both goods. Figure 4 depicts the situation. S is the initial equilibrium point. BB is the country's budget line and relative prices associated with point I are those in the long run. N' and C' are the long run equilibrium production and consumption points and IN' is the Rbyszynski line. The results are summarized below.

□ Presented in American Economic Association Meetings, Washington DC, USA

**Table 6: Long Run Effect of Abundant Low Wage Foreign Labour Supply**

|             | $k_f$ | P | $r_N$ | $r_T$ | $W_N$ | $W_T$ | $X_N$ | $X_T$ |
|-------------|-------|---|-------|-------|-------|-------|-------|-------|
| $k_T > k_N$ | +     | - | +     | +     | -     | -     | +     | -     |
| $k_T < k_N$ | +     | + | +     | +     | -     | -     | +/-   | -     |

The analysis above enables us to see how the economy moves from the short run to the long run. In the short run when labour is immobile between sectors, Table 1 gives the impact of low wage foreign labour supply on the economy. The impact of labour moving from the traded goods sector to the non-traded goods sector in response to the wage differential are given in Table 5. In the long run, wages are equalized between sectors and the impacts of low wage foreign labour supply are given in Table 6. A few remarks are in order. Firstly, it is not surprising to find some variable overshoots in the short run. For example, a comparison of Table 1 and Table 5 shows that relative price of the non-traded good overshoots in the short run. This is easily understandable as labour moving to the non-traded goods sector will release the inflationary pressure on the price the non-traded good. What is more interesting is that we can have short run and long run effect going in opposite directions. This is indeed what happens to the relative price of the non-traded good when  $k_N < k_T$ . In the short run, relative price of the non-traded good increases. As labour move to the non-traded goods sector, the price of the latter starts to fall. At final equilibrium, the relative price of the the non-traded good is even smaller than without capital outflow.

## V Comparing the Hong Kong and Singapore Experiences

Both Hong Kong and Singapore manufacturers had invested abroad to take advantage of low wage foreign labour, but the opening of China in the 1980's provided Hong Kong manufacturers with an unprecedented opportunity to move their operations into China. Hong Kong entrepreneurs were the first to recognize the opportunity and moved quickly. A comparison of sectoral employment figures between the two countries in Table 7 below shows that the share of manufacturing workers in Hong Kong has been declining much faster than in Singapore, especially in the period between 1987 and 1992 when Hong Kong entrepreneurs began to expand into China rapidly.

**Table 7: Percentage Share of Workers in the Labour Force**

|           | Manufacturing |      |      | Non-manufacturing |      |      |
|-----------|---------------|------|------|-------------------|------|------|
|           | 1982          | 1987 | 1992 | 1982              | 1987 | 1992 |
| Hong Kong | 37.2          | 34.2 | 23.8 | 52.1              | 55.7 | 66.4 |
| Singapore | 29.5          | 26.7 | 27.5 | 68.4              | 71.6 | 71.6 |

A simple index for measuring the extent of structural shift in terms of employment shares is  $\sum_i |s_{it} - s_{it}^*|$ , where  $s_{it}$  is the employment share in sector  $i$  at the

□ Presented in American Economic Association Meetings, Washington DC, USA

beginning of the period and  $s_{it}$  is the employment share at the end of the period. This index can be interpreted as the minimum proportion of workers who have to change sectors as a result of sectoral shift. A high value for the index indicates a larger structural shift. Table 8 below gives the figures of the measured index using 1-digit level sectoral classification of industries.

**Table 8: Index of Sectoral Employment Shift**

|           | 1982-1987 | 1987-1992 |
|-----------|-----------|-----------|
| Hong Kong | 3.35      | 10.41     |
| Singapore | 2.73      | 0.81      |

In both periods, the index of sectoral employment shift is higher in Hong Kong, but the gap is more pronounced in the later period. There is also some indication that the sectoral employment shift in Singapore had declined over time.

The most difficult task in applying the model developed above to interpret the Hong Kong and Singapore experience is to distinguish between long run and short run adjustments. Given that labour markets in Singapore and Hong Kong are quite flexible one would expect that the long run predictions are more appropriate. However, in view of the massive structural shift that has taken place in Hong Kong in the relatively short period between 1987 and 1992, it is possible that the long run adjustments have not yet been completed.

The figures in Table 9 shows that nominal wages in the manufacturing sector and in the overall economy grew at about the same rate in both Hong Kong and Singapore during the earlier period. But in Hong Kong for the later period, nominal wages in the manufacturing sector grew at 10.36% and was slightly lower than the overall wage growth of 11.41%. In Singapore, however, manufacturing wages grew at 10.67% and was higher than the overall wage growth of 8.33%. Of greater interest is the growth pattern of real wages. In both periods, real wages have been growing at a much higher rate in Singapore than in Hong Kong. For the later period, real manufacturing wages grew at 0.71% in Hong Kong and at 8.06% in Singapore, giving a differential of 7.35%. But overall real wages grew at 1.76% in Hong Kong and 5.72% in Singapore, giving a smaller differential of 3.96%. The very low rates of real wage growth in Hong Kong, and especially in the manufacturing sector for the later period, when compared to that for Singapore is consistent with the predictions of rapid structural shift in Hong Kong due to outward expansion of the manufacturing sector into China.

The expansion of manufacturing operations into China implied a higher rate of return to capital and a lower rate of return to labour in the manufacturing sector. Measured average labour productivity in the manufacturing sector will rise faster. In Hong Kong average labour productivity in manufacturing rose at 8.28% in the later

□ Presented in American Economic Association Meetings, Washington DC, USA

period compared to 3.35% in Singapore. By contrast, the increase of overall average labour productivity was 2.64% in Hong Kong and 3.06% in Singapore.

In Hong Kong, the output deflator for the manufacturing sector grew at 4.05% in the later period and that for the service sector grew at 11.41%. In Singapore, the output deflator for the manufacturing sector grew at 2.46% in the later period and that for the service sector grew at 3.84%. Clearly, the inflation of non-traded goods prices relative to traded goods prices was much higher in Hong Kong than in Singapore.

**Table 9: Labour Market Characteristics by Sector in Hong Kong and Singapore**

|           | Manufacturing                        |           | Overall or Non-manufacturing |           |
|-----------|--------------------------------------|-----------|------------------------------|-----------|
|           | 1982-1987                            | 1987-1992 | 1982-1987                    | 1987-1992 |
|           | Nominal Wage Index Growth %          |           |                              |           |
| Hong Kong | 7.42                                 | 10.36     | 7.56                         | 11.41     |
| Singapore | 6.23                                 | 10.67     | 6.41                         | 8.33      |
|           | Output Deflator Growth %             |           |                              |           |
| Hong Kong | 5.99*                                | 4.05*     | 6.51*                        | 11.41*    |
| Singapore | 2.65*                                | 2.46*     | -0.50*                       | 3.84*     |
|           | Real Wage Index Growth %             |           |                              |           |
| Hong Kong | 1.53                                 | 0.71      | 1.67                         | 1.76      |
| Singapore | 5.57                                 | 8.06      | 5.75                         | 5.72      |
|           | Average Labour Productivity Growth % |           |                              |           |
| Hong Kong | 9.25                                 | 8.28      | 5.66                         | 2.64      |
| Singapore | 6.03                                 | 3.35      | 5.22                         | 3.06      |
|           | Unit Labour Cost Growth %            |           |                              |           |
| Hong Kong | -2.84                                | 1.71      | 1.71                         | 8.74      |
| Singapore | -1.03                                | 5.75      | -0.77                        | 5.52      |

Note: Asterisk values denotes non-manufacturing. All other values denotes overall.

One important prediction of the model when an abundant supply of low wage foreign labour becomes available is that the economy grows. Table 10 shows that real GDP growth in Hong Kong in the later period slowed down to 4.98% from 7.87% in the earlier period. In Singapore, the real GDP growth rate increased from 5.13% in the earlier period to 8.23% in the later period. These results appear to contradict the model's prediction, but the most important point to notice is that GDP as a measure fails to capture income from investments abroad. Unfortunately, Hong Kong does not have GNP measures. If one looks at the growth rates private consumption expenditures as a proxy for economic performance, the economic growth of Hong Kong is significantly better. Another reason for the slow growth of GDP in Hong Kong is the low rate of growth of the labour force. In the later period, the labour force grew at 0.47% in Hong Kong, but at 4.03% in Singapore. Unlike Singapore, Hong Kong does not have a significant program to import workers.

□ Presented in American Economic Association Meetings, Washington DC, USA

The high rates of consumer price inflation in Hong Kong in the later period is due largely to the increase in the price of services relative to manufactured goods caused by structural adjustments in the economy. Both Hong Kong and Singapore has a monetary regime based on the currency board system, where the price of the local currency is linked to a foreign currency or a basket of foreign currencies, and the currency itself is fully backed by an equivalent amount of foreign currency. As a consequence money supply is largely passive and accomodates real demand growth. An increase in the demand for non-traded goods results not only in an increase in relative prices but also in an increase in the domestic price level given the original exchange rate. It is not surprising therefore to find that Hong Kong has a higher rate of inflation than Singapore. Domestic inflation in Singapore is also lower because the Singapore exchange rate has appreciated more than the Hong Kong exchange rate.

**Table 10: Macroeconomic Indicators in Hong Kong and Singapore**

|           | 1982-1987                                      | 1987-1992 |
|-----------|--|-----------|
|           | Real GDP Growth %                              |           |
| Hong Kong | 7.87   | 4.98      |
| Singapore | 5.13   | 8.23      |
|           | Real Private Consumption Expenditures Growth % |           |
| Hong Kong | 6.82   | 7.30      |
| Singapore | 4.44   | 8.22      |
|           | Current Account Surplus as a % of GDP*         |           |
| Hong Kong | 6.03   | 8.43      |
| Singapore | -2.18  | 5.91      |
|           | Unemployment Rate %*                           |           |
| Hong Kong | 3.3  | 1.6       |
| Singapore | 4.0  | 2.8       |
|           | Capital Account Surplus as a % of GDP*         |           |
| Hong Kong | N.A.   | N.A.      |
| Singapore | 6.91   | 5.65      |
|           | Consumer Price Inflation %                     |           |
| Hong Kong | 5.89   | 9.65      |
| Singapore | 0.66   | 2.61      |
|           | Exchange Rate Index Depreciation %             |           |
| Hong Kong | -3.03  | 2.59      |
| Singapore | -2.09  | 4.13      |
|           | Labour Force Growth %                          |           |
| Hong Kong | 1.78   | 0.47      |
| Singapore | 1.19   | 4.03      |

Note: Asterisked values are in terms of levels. All other values are in terms of growth rates.

The Economic Consequences of Abundant Foreign Labour Supply  
School of Economics and Finance, The University of Hong Kong

- Presented in American Economic Association Meetings, Washington DC, USA

□ Presented in American Economic Association Meetings, Washington DC, USA

## VI Conclusion

The recent technological and political revolutions means great opportunities to advanced countries to tap the abundant labour supply in the developing countries by investing in them. This will cause structural changes in the capital exporting countries. For a small country, when factors are perfectly mobile between sectors, such capital outflow must increase the returns to capital and reduce the returns to labour. Its impact on output and relative prices depend on relative factor intensities of traded and non-traded goods. However, when labour are sectoral immobile, the impact can be quite different. Though such capital outflow must hurt workers in the traded good sector, its impact on returns to capital and labour in the non-traded good sector is ambiguous. Relative prices of non-traded goods and its share in the total output must increase. An increase in the labour force in the non-trade good sector will reduce the increase in relative prices of non-traded goods while increases in the labour force in the non-traded good sector will increase the relative prices of non-traded goods further. It is interesting to note that if  $K_T > K_N$ , and that the increase in the relative prices of the non-traded goods which some small countries experienced recently is the result of labour immobility, then the surge will only be temporary and when wages are equalized between sectors, the relative prices of non-traded goods will fall.

□ Presented in American Economic Association Meetings, Washington DC, USA

### Appendix

$$\begin{aligned}
 L_T f'_T + g L_T f'_N + f''_T k_f &= L_T \left[ g f'_N + f'_T + f''_T k_f / L_T \right] \\
 &= L_T \left[ \frac{g}{p} f'_T + f'_T + f''_T + f''_T k_f / L_T \right] \quad (\text{using (2)}) \\
 &= L_T \left[ f'_N \left(1 + \frac{g}{p}\right) + \frac{f''_T k_f}{L_T} \right] \\
 &= L_T f'_T \left[ \left(1 + \frac{P_T C_T}{P_N L_N}\right) + \frac{f''_T}{f'_T} \left(\frac{1}{L_T}\right) k_f \right] \\
 &= L_T f'_T \left[ \left(1 + \frac{P_T C_T}{P_N L_N}\right) - \Sigma_T \frac{k_f}{k_T} \right] \\
 &= L_T f'_T \left[ \frac{P_N L_N + P_T C_T}{P_N C_N} - \Sigma_T \frac{k_f}{k_T} \right]
 \end{aligned}$$

where  $\Sigma_T \equiv -\frac{f''_T}{f'_T} k_T$

As capital outflow in most uses is only a small part of the capital stock,  $\frac{k_f}{k_T} \ll 1$ . If

the production function takes the Cobb-Douglas form,

$$\begin{aligned}
 X_T / L_T &= A k_T^\alpha \\
 f'_T &= \alpha A k_T^{\alpha-1} & f''_T &= \alpha(\alpha-1) A k_T^{\alpha-2} \\
 \Sigma_T &= -\frac{\alpha(\alpha-1) A k_T^{\alpha-2}}{\alpha A k_T^{\alpha-1}} k_T = 1 - \alpha < 1
 \end{aligned}$$

For a Cobb-Douglas production function,  $\Sigma_T < 1$ . Since  $\frac{P_N C_N + P_T C_T}{P_N C_N} > 1$ , it is

reasonable to assume that  $L_T f'_T + g L_T f'_N + f''_T k_f > 0$ .

- Presented in American Economic Association Meetings, Washington DC, USA

### Footnotes

1. Milton Friedman, “The New Economic Order” a public lecture delivered at the University of Hong Kong, 18 October 1993.
2. Milton Friedman, “The Second Industrial Revolution”, *Far Eastern Economic Review*, 28 October 1993, p. 23.
3. This ensures that returns to the workers in the non-traded goods sector is higher than that of the traded goods sector which is consistent with the experience of some small countries. It is possible that returns to labour in the traded goods sector is higher than those in the non-traded goods sector. A necessary condition is that the non-traded good is capital intensive. We rule this out in the analysis.

- Presented in American Economic Association Meetings, Washington DC, USA

## References

Corden, M., 1960, The Geometric Representation of Policies to Attain Internal and External Balance. *Review of Economic Studies*, 28:1, 1-22.

Corden, W.M., 1984, Booming Sector and Dutch Disease Economics: A Survey. *Oxford Economic Papers* 36, 359-380.

Corden, W.M., and Neary, J.P., 1982, Booming Sector and De-Industrialisation in a Small Open Economy. *Economic Journal*, 92, 825-848.

Dornbusch, R., 1973, Devaluation, Money, and Nontraded Goods. *American Economic Review*, 73:5, 871-880.

Dornbusch, R., 1974, Real and Monetary Aspects of the Effects of Exchange Rate Changes, in R.Z. Aliber (ed.) *National Monetary Policies and The International Financial System*, (Chicago: U. of Chicago Press).

Dornbusch, R., 1975, Exchange Rates and Fiscal Policy in a Popular Model of International Trade. *American Economic Review*, 65:5, 859-871.

Friedman, M., 1993, The New Economic Order. A public lecture delivered at the University of Hong Kong, 18 October 1993.

Friedman, M., 1993, The Second Industrial Revolution. *Far Eastern Economic Review*, 28 October 1993.

Juhn, C., Murphy, K.M., and Pierce, B., 1993, Wage Inequality and the Rise in Returns to Skill. *Journal of Political Economy*, 101:3, 539-553.

Lucas, R.E., 1993, Making a Miracle. *Econometrica*, 61:2, 251-272.

Meade, J.E., 1956, The Price Adjustment and the Australian Balance of Payments. *Economic Record*, 32:4, 239-256.

Salter, W.E., 1959, Internal and External Balance: The Role of Price and Expenditure Effects. *Economic Record*, 35:3, 226-238.

Shen, G., 1993, China's Investment in Hong Kong, in P.K. Choi and L.S. Ho, ed., *The Other Hong Kong Report 1993*, (Hong Kong: Chinese University Press), 425-454.

Suen, W., 1995, Sectoral Shifts: Impact on Hong Kong Workers. *The Journal of International Trade and Economic Development*, 4:2, 135-152.

□ Presented in American Economic Association Meetings, Washington DC, USA

Sung, Y.W., 1991, Hong Kong's Economic Value to China, in Y.W. Sung and M.K. Lee, ed., *The Other Hong Kong Report 1991*, (Hong Kong: Chinese University Press) 477-504.

Sung, Y.W., 1994, Foreign Investment and Trade in M. Brousseau and C.K. Lo, ed., *China Review 1994*, (Chinese University Press, Hong Kong) 12.1-12.12

Swan, T., 1960, Economic Control in a Dependent Economy. *Economic Record* 36:1, 51-66.

Swan, T., 1963, Longer-Run Problems of the Balance of Payments, in H.W. Arndt and M.W. Corden, ed., *The Australian Economy: A Volume of Readings*, (Melbourne: Cheshire Press).

□ Presented in American Economic Association Meetings, Washington DC, USA

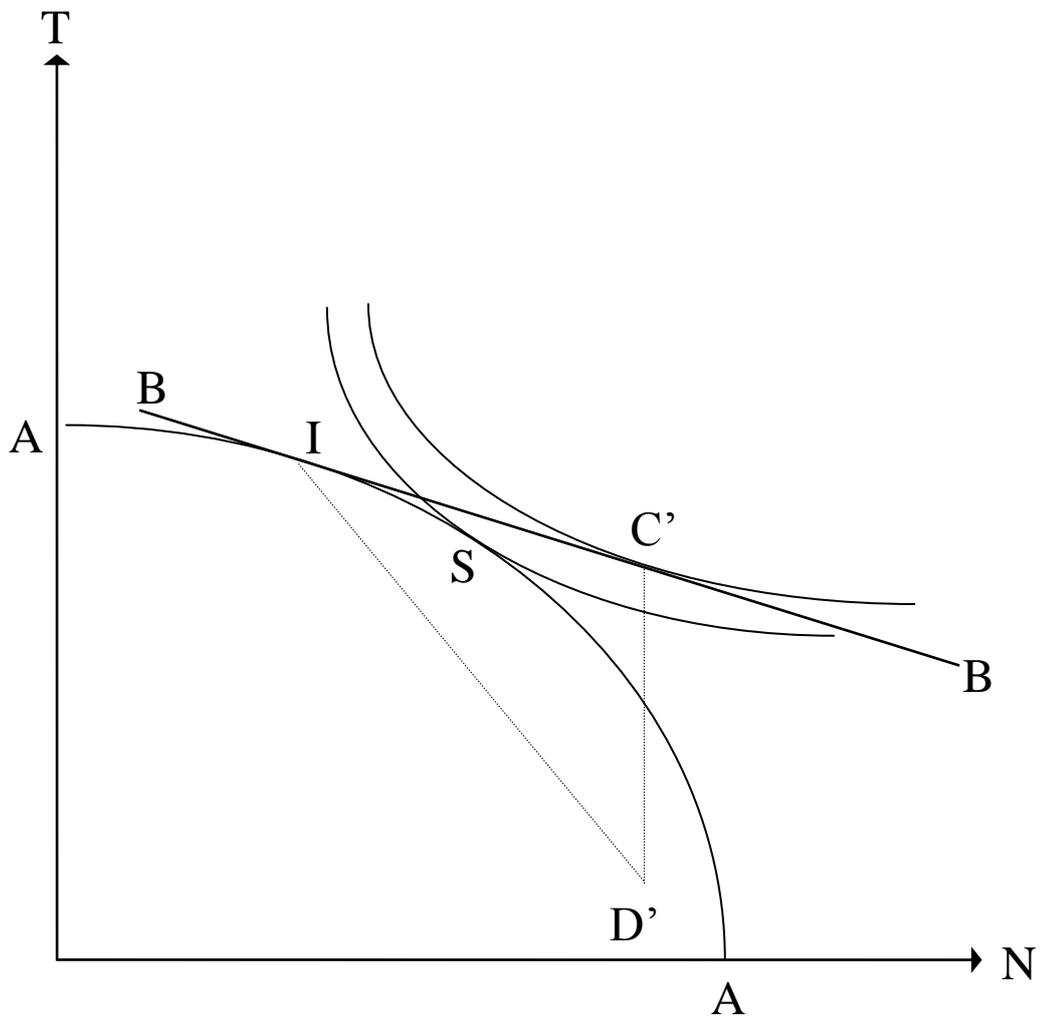


Figure 1

□ Presented in American Economic Association Meetings, Washington DC, USA

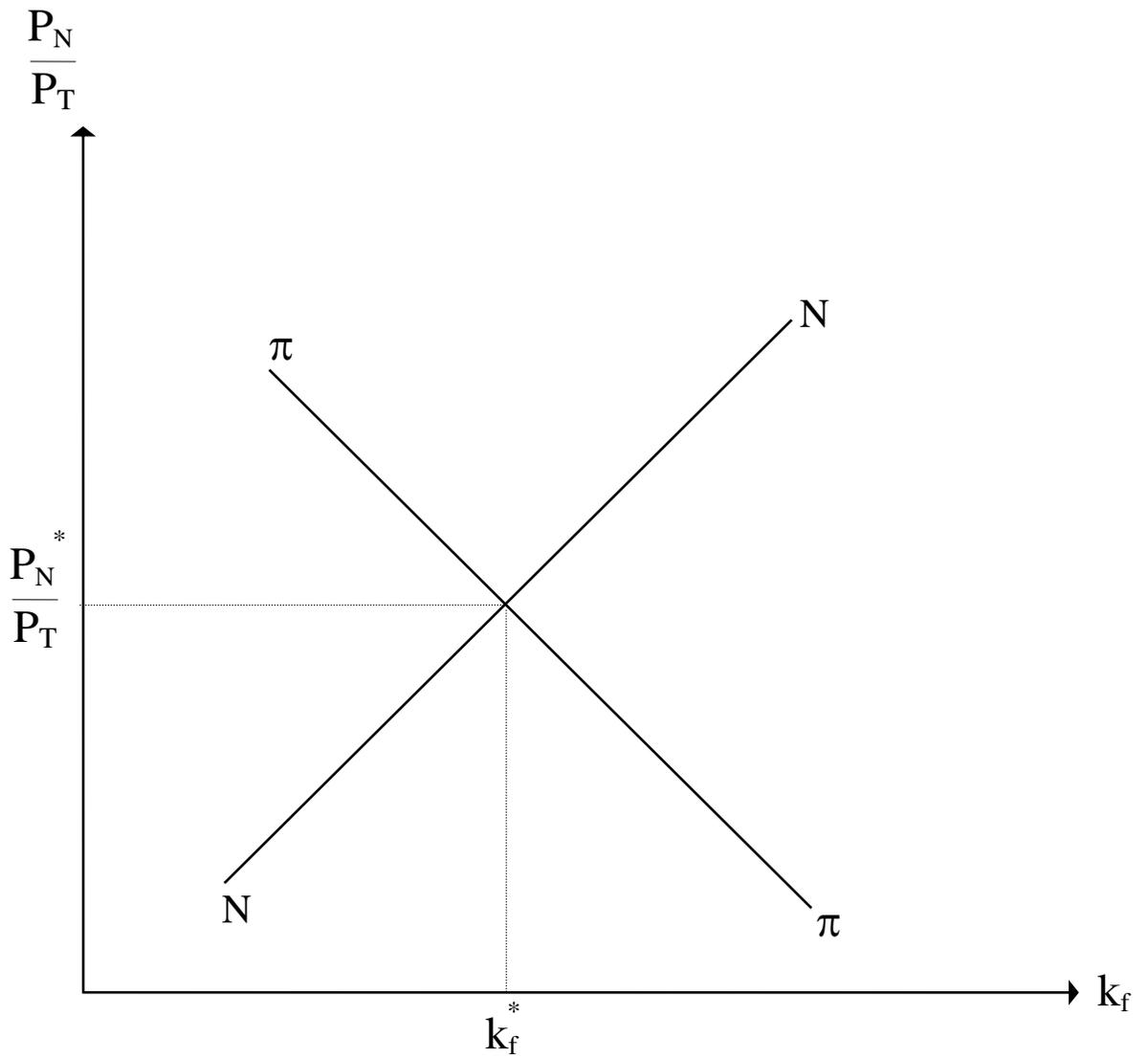


Figure 2

- Presented in American Economic Association Meetings, Washington DC, USA

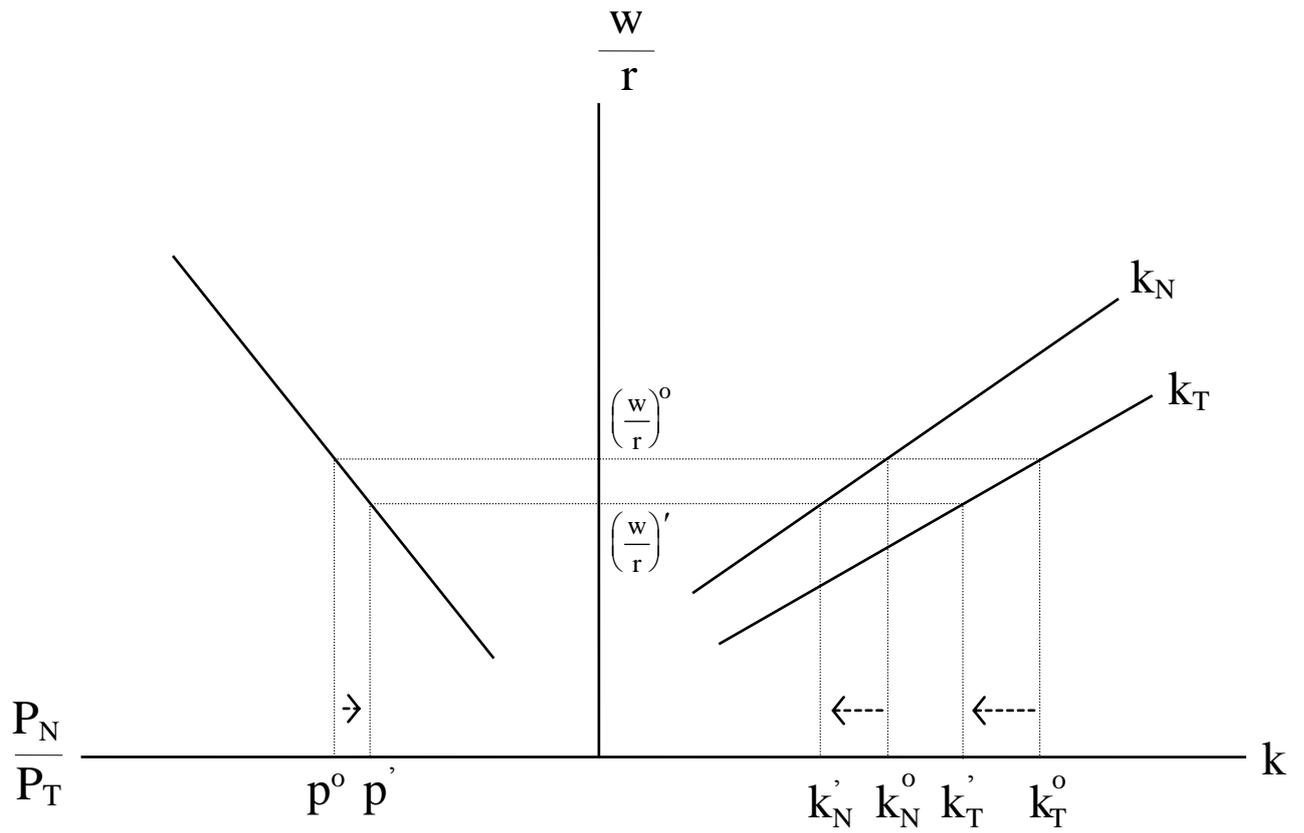


Figure 3

□ Presented in American Economic Association Meetings, Washington DC, USA

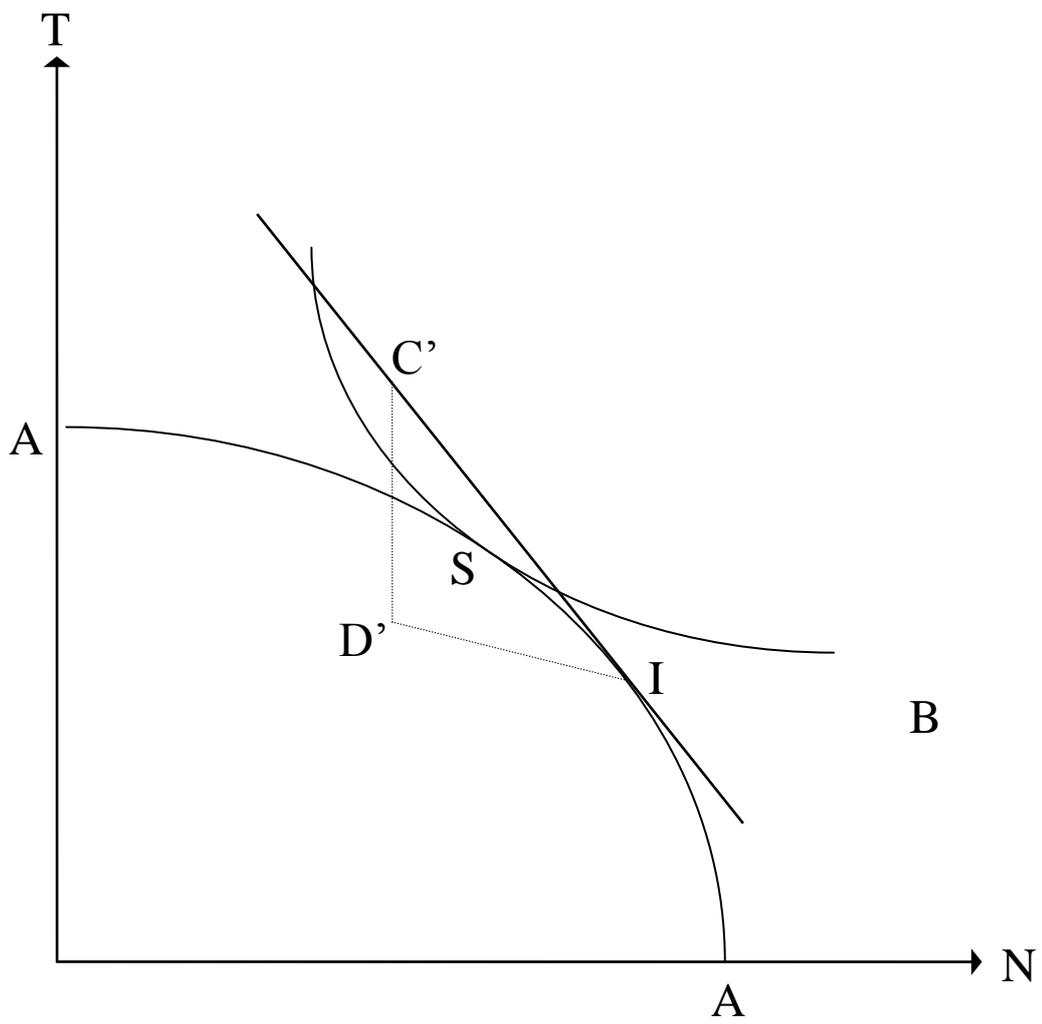


Figure 4