A Theory of Migration as a Response to Occupational Stigma*

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Abstract

A theory is developed of labor migration that is prompted by a desire to avoid "social humiliation." In a general equilibrium framework it is shown that as long as migration can reduce humiliation sufficiently, migration will occur *even* between two identical economies. Migration increases the number of individuals who choose to perform degrading jobs and consequently, migration lowers the price of the good produced in the sector that is associated with low social status. Moreover, the greater an individual's aversion to performing degrading jobs, the more likely it is that he will experience a welfare gain when the economy opens up.

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1. Introduction

Why people migrate is one of the most interesting questions in social science research. The tendency in this research has been to focus on the pecuniary angle: people choose to migrate because of an expected net income gain; it is the substitution of income in B for income in A that *explains* the migration from A to B. The fact that migration entails a change not only of earnings or labor markets but also of social groupings has received scant attention. This is somewhat surprising because it is well recognized that people care about their social standing and consequently are inclined to *act* in order to improve their social standing (even if as a consequence no income gains will come their way).[2] Migration can rationally be pursued in order to avoid association with, or exposure to, a social group. In what follows we study the case where migration is prompted by a desire to avoid "social humiliation."

Specifically, the current paper attempts to explore the role of "social distance" (Akerlof (1997)) in migration, by investigating the interaction between social distance and social status.[3, 4] In a general-equilibrium framework, we show that labor migration is

[2] For example, see the collection of articles in Agarwal and Vercelli (2005).

[3] Inter alia, Akerlof (1997, p. 1010) states: "I shall let individuals occupy different locations in social space. Social interaction … will increase with proximity in this space. Current social location is acquired and dependent on the [individual's] decision … ." Based on this social distance theory, Akerlof (1997, 2007) examines various aspects of the social and psychological repercussions of individual behaviors.

[4] Notable contributions to the economics literature of social status include Cole et al. (1992), Fershtman and Weiss (1993), Weiss and Fershtman (1998) who provide a survey of this literature, and Becker et al. (2005).

prompted by a desire to avoid "social humiliation." The following examples serve to illustrate the idea that underlies our inquiry.

- When in the 90's the shipbuilding industry in Nikolayev, Ukraine went through hard times, there was a sharp decline in the demand for shipbuilding engineers, less so for welders. Nikolayev shipbuilding engineers worked as welders elsewhere, but not in Nikolayev. For a shipbuilding engineer welding is a thoroughly low status occupation.[5]

- "The Double Life of Alfred Bloggs," is taken from an influential English textbook (Alexander 1967, p. 18) where we read as follows: "These days, people who do manual work often receive far more money than clerks who work in offices. People who work in offices are frequently referred to as 'white collar workers' for the simple reason that they usually wear a collar and tie to go to work. Such is human nature, that a great many people are often willing to sacrifice higher pay for the privilege of becoming white collar workers. This can give rise to curious situations, as it did in the case of Alfred Bloggs who worked as a dustman for the Ellesmere Corporation. When he got married, Alf was too embarrassed to say anything to his wife about his job. He simply told her that he worked for the Corporation. Every morning, he left home dressed in fine black suit. He then changed into overalls and spent the next eight hours as a dustman. Before returning home at night, he took a shower and changed back into his suit. Alf did this for over two years and his fellow dustmen kept his secret. Alf's wife has

[5] Personal communication from Professor Olena Nizalova.

never discovered that she married a dustman and she never will, for Alf has just found another job. He will soon be working in an office as a junior clerk. He will be earning only half as much as he used to, but he feels that his rise in status is well worth the loss of money. From now on, he will wear a suit all day and others will call him 'Mr Bloggs', not 'Alf'."

Occupations confer social prestige or social stigma, and occupational choices are governed (also) by the "social color" of jobs. Indeed, in much of the sociology and economics literature, it is intimated that occupations are associated with social status, and that social status often differs significantly across occupations.[6] The examples suggest that when people engage in an occupation of low social status, they have an incentive to pull themselves out from the group whose members' opinions matter to them, and immerse themselves in a group whose members' opinions do not matter to them. That is why a shipping engineer in Ukraine, where the pay for ship welders is the same in all shipyards, is willing to weld away from his home shipyard but not at his home shipyard, and that is why Alfred Bloggs hides the secret of his true occupation from his wife.

We contend that "social humiliation" is sensed when others about whom an individual cares consider what the individual does to be shameful.[7] We posit that the individuals who perform degrading jobs will not want their engagement in the jobs to be

[6] For examples of related sociological literature, see Treiman (1977) and Nam and Powers (1983).

[7] A limiting case is that in which the "others" who consider the individual's predicament as shameful is the individual himself. In this case, our analysis is closely in line with Akerlof and Kranton (2000), who inquire how "identity," that is, a person's sense of self, affects economic outcomes.

known to those whose opinion matters to them - they do not want to be exposed; migration often confers such a guise. In other words, in relation to the theory of social distance developed by Akerlof (1997), we contend that in the home country or in the home region, the social distance is relatively short, which implies that the disutility from occupational stigma is high; in the foreign country or in the foreign region, however, the social distance is relatively long, which implies that the disutility from occupational stigma is low. Migration can be driven by this consideration. Individuals *as migrants* will be observed to perform jobs that they will not perform at home where their social group is informed about what they do. The opinions and views of those in whose midst the migrants live do not matter to the migrants or matter to them little in comparison with the opinions and views of those at home.

The received literature has shown, both empirically and theoretically, how migration is prompted by a desire to reduce relative deprivation.[8] The impetus for that body of work was recognition that discontent can arise not only from having a low wage, but also from having a wage that is lower than that of others. It considered a case in which, given the set of the individuals with whom comparisons are made, an unfavorable comparison could induce a departure for work elsewhere where wages are higher, without changing the set of individuals with whom comparisons are made. Building on the work of social psychologists, that body of work has argued that a comparison of the income of individual *i* with the incomes of others who are richer in *i*'s reference group results in *i*'s feeling of relative deprivation, and that the associated disutility impinges on migration

[8] For example, see Stark and Taylor (1991), Stark and Wang (2007), and Stark et al. (2009).

behavior. This literature also provided evidence that distaste for relative deprivation matters; relative deprivation is a significant explanatory variable of migration behavior.

However, in all that work, occupational considerations and occupational choices played no role at all: there was nothing inherent or imbedded in an occupation that rendered it more or less appealing in different countries or regions. Yet occupational humiliation can play a distinct role in migration behavior, and this role differs, both theoretically and empirically, from the role of relative deprivation. For example, holding the income of an individual constant, the relative deprivation consideration will predict migration into a group of people whose incomes are lower than the incomes of the people at origin; the social humiliation consideration will allow migration into a group of people whose incomes are higher than the incomes of the people at origin. Put differently, in a model of migration in response to relative deprivation, a reduction of the income of others will weaken the incentive to migrate; in a model of migration in response to social humiliation such an income change will not impinge upon the incentive to migrate. In the relative deprivation tale, the opinions of others are orthogonal to the migration calculus. In the social humiliation tale these opinions are at the heart of the migration calculus. In the relative deprivation tale, the purpose of migration is to reap relative income gains; in the social humiliation tale the purpose of migration is to reap social exposure gains. In the relative deprivation tale, it is the individual knowing the incomes of others in comparison with his own income that drives migration; in the social humiliation tale, it is others knowing the individual's occupation that is the drive. In the relative deprivation tale, the individual does not manipulate information; in the social humiliation tale, concealing information motivates migration. The two approaches differ then conceptually,

empirically, and consequently, and quite obviously, also in terms of the corresponding policy design: what works when relative deprivation is the motive for migration will not bear on migration behavior when avoidance of social humiliation is the reason, and vice versa.

The remainder of this paper is structured as follows. In Section 2, we set up the basic analytical framework by constructing a general equilibrium model that incorporates occupational status, and we examine the interactions between the goods market and the labor market. We show that holding other things the same, a worker who performs a "humiliation" type job will receive a higher wage than a worker who performs a "normal" type job, which is consistent with the principle of "compensating wage differentials."[9] In Section 3, we extend the general equilibrium framework of occupational status in a closed, single economy to an open economy in a world that consists of two countries or two regions. We demonstrate the existence and uniqueness of a general equilibrium in this extended setting. We show that as long as migration can sufficiently reduce humiliation, migration will occur *even* between two identical economies. Hence, we present a new model of migration in which migration is motivated by a desire to reap social exposure gains. Moreover, we show that the more migration reduces the "humiliation" of performing degrading jobs, the larger the number of

[9] A large literature tests for "compensating wage differentials." This body of work generally provides empirical support for the theory. Recent writings include Gertler et al. (2005), Butler and Worrall (2008), Del Bono and Weber (2008), Diaz-Serrano et al. (2008), and Edlund et al. (2009). For surveys of the earlier theoretical and empirical literature on "compensating wage differentials" see Rosen (1986), and Bender (1998).

individuals who end up choosing such jobs, and the lower the price of the good produced in the sector associated with low social status. We also show that the cost of migrating from one economy to the other has an ambiguous impact on the price of the good produced in the sector associated with a low social status.

In Section 4, we investigate the repercussions of migration in the extended framework developed in Section 3. We show that migration increases the number of individuals who choose to perform degrading jobs, and that consequently it reduces the prices of the outputs produced in the corresponding sector. Migration also reduces the "compensating wage differential" for degrading jobs. In addition, we conduct a welfare analysis, comparing the level of wellbeing when the economy is open to that when the economy is closed. We find that an individual who works in the "normal" sector when the economy is closed is better off when the economy is open; that an individual who works in the "degrading" sector when the economy is closed is worse off when the economy is open if he continues to work in the "degrading" sector in his home country; and that an individual who works in the "degrading" sector when the economy is closed may be better off when the economy is open if he migrates to work in the "degrading" sector of the foreign country.

In Section 5, we extend the model by addressing the case of migration as a response to occupational honor, which logically is the flip side of the case of migration driven by the avoidance of humiliation. People can migrate in order to detach themselves from a social group that has a long "social distance" with them, and immerse themselves in a social group whose members' opinions matter to them.

2. General equilibrium in a closed economy

In this section we develop a general equilibrium model in a closed economy setting. The model builds on the idea that individuals derive utility not only from their material consumption but also from their social status, and it examines the interaction between the goods market and the labor market in the light of this idea. The analysis in this section provides the basic analytical framework and a comparison benchmark for the subsequent sections.

Consider an economy that consists of a large number of individuals. Let the population size be of measure one. Individuals in the economy produce and consume two goods (or services): x and y. We refer to the sector producing x as the "normal" sector, and to the sector producing y as the "humiliation" sector. For the sake of convenience and clarity of exposition, we will also refer to the sectors producing x and y as the "X" sector and the "Y" sector, respectively. An individual works in either the "X" sector or in the "Y" sector. Prior to making their occupational choices, all the individuals are assumed to be identical, except for having an idiosyncratic taste for working in the "humiliation" sector. An individual's utility function is as follows:

(2.1) $$u = \alpha \ln x + (1-\alpha)\ln y - \kappa(j)\varepsilon$$

where $\alpha \in (0,1)$ is constant; j indicates the sector in which the individual works such that

if the individual works in the "X" sector, $j = X$, and if the individual works in the "Y" sector, $j = Y$; $\kappa(j)$ is a function that depends on the individual's occupational choice such that $\kappa(X) = 0$ and $\kappa(Y) = 1$; and ε is a random variable over the domain $[0, \infty)$, with its distribution function and probability density function denoted, respectively, by "$F(\cdot)$" and "$f(\cdot)$." We assume that the function "$F(\cdot)$" is continuous and differentiable with respect to its variable, and that $f(z) = F'(z) > 0$ for all $z \in [0, \infty)$. The variable ε captures the extent of humiliation; the higher the value of ε, the greater the humiliation. Put differently, ε serves as an index that measures the degree of "humiliation aversion" of the individual. Intuitively, ε can be determined by the individual's personality and character, upbringing, family and cultural background, and so on.

We assume that labor is the only factor of production. Every individual is endowed with one unit of labor, which is supplied inelastically. The production functions in the sectors producing x and y are, respectively, $X = L_x$ and $Y = L_y$, where X and Y are the total quantities of the outputs in the "X" sector and in the "Y" sector, respectively, and L_x and L_y are the total labor inputs in the "X" sector and in the "Y" sector, respectively. We use the price of x as the numeraire, and we denote the price of y by p. Since the economy is perfectly competitive, the wage rates in the sectors producing x and y, which we denote by w_x and w_y, are, respectively,

(2.2) $$w_x = 1 \text{ and } w_y = p$$

The budget constraint of an individual in this economy is then

(2.3) $$x + py = w_i \quad i \in \{x, y\}$$

Maximizing (2.1) subject to (2.3), we get that

(2.4) $$x = \alpha w_i \text{ and } y = \frac{(1-\alpha)w_i}{p}, \; i \in \{x, y\}$$

Thus, if an individual works in the "X" sector, then upon inserting (2.4) into (2.1) and rearranging, we get that his utility is

(2.5) $$\begin{aligned} u_x &\equiv \alpha \ln x + (1-\alpha)\ln y \\ &= \alpha \ln \alpha + (1-\alpha)\ln(1-\alpha) + \ln w_x - (1-\alpha)\ln p \end{aligned}$$

If an individual works in the "Y" sector, then upon inserting (2.4) into (2.1) and rearranging, we get that his utility is

(2.6) $$\begin{aligned} u_y &\equiv \alpha \ln x + (1-\alpha)\ln y - \varepsilon \\ &= \alpha \ln \alpha + (1-\alpha)\ln(1-\alpha) + \ln w_y - (1-\alpha)\ln p - \varepsilon \end{aligned}$$

Clearly, an individual will choose to work in the "Y" sector if and only if $u_x < u_y$, namely if and only if

(2.7)
$$\begin{aligned}&\alpha \ln \alpha + (1-\alpha)\ln(1-\alpha) + \ln w_x - (1-\alpha)\ln p \\ &< \alpha \ln \alpha + (1-\alpha)\ln(1-\alpha) + \ln w_y - (1-\alpha)\ln p - \varepsilon\end{aligned}$$

that is, if and only if

(2.8)
$$\varepsilon < \ln w_y - \ln w_x$$

Thus, the proportion (and the number) of individuals who choose to work in the sector producing y is

(2.9)
$$P(\varepsilon < \ln w_y - \ln w_x) = F(\ln w_y - \ln w_x)$$

Therefore, the total quantity supplied of y is:

(2.10)
$$F(\ln w_y - \ln w_x)$$

Also, from (2.4) and (2.9), we know that the total quantity demanded of y is:

(2.11)
$$\frac{(1-\alpha)w_y}{p} F(\ln w_y - \ln w_x) + \frac{(1-\alpha)w_x}{p}[1 - F(\ln w_y - \ln w_x)]$$

Then, market equilibrium entails that the quantity supplied of y is equal to the quantity demanded of y, namely

(2.12) $$F(\ln w_y - \ln w_x) = \frac{(1-\alpha)w_y}{p} F(\ln w_y - \ln w_x) + \frac{(1-\alpha)w_x}{p}[1 - F(\ln w_y - \ln w_x)]$$

that is

(2.13) $$F(\ln w_y - \ln w_x)[p - (1-\alpha)(w_y - w_x)] = (1-\alpha)w_x$$

From (2.2), we can rewrite (2.13) as

(2.14) $$F(\ln p)[p - (1-\alpha)(p-1)] = 1-\alpha$$

Let the equilibrium level of p in a closed economy be denoted by p^c. Then, we have the following proposition.

Proposition 1: (a) p^c *exists and is unique.* (b) $p^c > 1$. (c) *An individual will choose to work in the "Y" sector if and only if* $\varepsilon < \ln p^c$.

Proof: See the Appendix.

Proposition 1 characterizes the equilibrium price in a general-equilibrium framework in which every individual obtains utility from consumption and from social status. Note that we consider the general equilibrium not only of the labor market, but also of the goods market, thereby extending the related literature (Fershtman and Weiss

1993). Recall that the wage rates in the "X" and "Y" sectors are, respectively, 1 and p^c. The second part of Proposition 1 implies that individuals in the "Y" sector are paid a higher wage in compensation for the loss of social status from working in the sector. This is in line with the concept of "compensating wage differential," which refers to a wage difference that is due to the non-pecuniary aspects of different occupations. The second part of Proposition 1 predicts that holding other things constant, a worker who performs a "humiliation" type job will receive a higher wage than a worker who performs a "normal" type job.

The principle of a "compensating wage differential" is one of the oldest insights in economics. In his classical book that established the foundations of modern economics, *The Wealth of Nations*, Adam Smith (1776, Chapter 10) states: "… the wages of labour vary with the ease or hardship, the cleanliness or dirtiness, the honourableness or dishonourableness of the employment." Adam Smith assigns a particularly important role of honor or humiliation to the principle of a "compensating wage differential." For example, Adam Smith (1776, Chapter 10) states: "Honour makes a great part of the reward of all honourable professions. In point of pecuniary gain, all things considered, they are generally under-compensated… . The most detestable of all employment, that of public executioner, is, in proportion to the quantity of work done, better paid than any common trade whatever." While the topic of the "compensating wage differential" has received considerable attention in the economics literature in general,[10] somewhat surprisingly relatively little attention has been paid to the particular role of honor or

[10] For example, see the literature survey in Ehrenberg and Smith (2009).

humiliation in shaping wage differentials. Our analysis helps fill this gap.

The third part of Proposition 1 implies that the higher the price of good Y, the larger the proportion (and number) of individuals who will choose to work in the "Y" sector. Also, from (2.2) and (2.9) we know that the number of individuals working in the "Y" sector is $F(\ln p^c) > 0$.

3. General equilibrium in an open economy

In this section, we extend the general equilibrium framework of occupational status in a closed, single economy to an open economy with two countries. To highlight the essential idea of our paper, we consider two identical economies.[11] We choose such a setting for two reasons (let alone the advantage of technical simplicity). First, the setting implies that there will be no trade between the two countries (assuming that production in each country is based on constant returns to scale technologies). Consequently, we are able to focus on international *migration* between the two economies. Second, the setting implies that there is no wage differential between the two countries. Thus, this specification helps highlight our key idea that migration can be caused by the consideration of aversion to "humiliation," rather than by a wage differential.

We extend the model of the preceding section by assuming that an individual has the additional option of working abroad (or, for that matter, in a "foreign" region or in a

[11] The two economies can likewise be two regions or two cities in the same country.

"foreign" city). If an individual works abroad, his utility function becomes

$$u_f = \alpha \ln x + (1-\alpha)\ln y - \gamma\kappa(j)\varepsilon \tag{3.1}$$

where γ (<1) is a positive constant. The difference between (3.1) and (2.1) is the inclusion in (3.1) of the parameter γ. The assumption that $\gamma < 1$ captures the idea that there is less humiliation upon working in the "Y" sector of the foreign country (utility is reduced by a lesser amount) than upon working in the "Y" sector of the home country. As explained in the introduction, $\gamma < 1$ stems from the greater "social distance" between an individual and his living environment in the foreign country, and from the barriers to the transmission of information about the individual's occupational status from the foreign country to the home country, a country in which the social distance between the individual and the local inhabitants is naturally much shorter. Moreover, it is easy to verify that for an individual who works in the "Y" sector of the foreign country and whose utility function is given by (3.1), the optimal consumption bundle is characterized by (2.4), where in this case w_i indicates net income.

We assume that there is a fixed cost of migration, which we denote by c. When the economies are identical and migration is costly, migrants will never work in the "X" sector of the foreign country. In other words, if there is migration, the migrants must work in the "Y" sector of the foreign country.

Let w_f denote the wage in the foreign "Y" sector. Note that the equilibrium

prices in the foreign country and in the home country must be the same since the countries are identical. Then, akin to the analysis in the preceding section, we can infer that the utility of working in the "Y" sector of the foreign country is

(3.2) $$u_f \equiv \alpha \ln \alpha + (1-\alpha)\ln(1-\alpha) + \ln(w_f - c) - (1-\alpha)\ln p - \gamma\varepsilon$$

Because both economies are competitive and identical, in equilibrium we have that

(3.3) $$w_x = 1 \text{ and } w_f = w_y = p^o$$

where p^o denotes the equilibrium price when the economies are open, which will be derived later.

We first provide a condition for migration to exist. If and only if migration does not take place will it follow that $p^o = p^c$. We thus have the following proposition.

Proposition 2: *Migration will occur if and only if*

(3.4) $$\gamma < \frac{\ln(p^c - c)}{\ln p^c}$$

Proof: See the Appendix.

Since p^c is independent of γ, (3.4) will hold if γ is sufficiently small. In other words, Proposition 2 shows that as long as migration can reduce humiliation sufficiently, migration will occur even between two identical economies. Also, since p^c is independent of c, (3.4) is more likely to hold the smaller is c. Thus, Proposition 2 implies that the two crucial factors that determine whether migration occurs are the reduction of humiliation from migration, and the cost of migration.

We next, have the following lemma.

Lemma 1. *In an open economy, if migration occurs (that is, if (3.4) is satisfied), then*

(a) *An individual will work in the "X" sector of the home country if*

$$\varepsilon > \frac{\ln(p^o - c)}{\gamma} \tag{3.5}$$

In this case, the individual's wage / income is 1.

(b) *An individual will work in the "Y" sector of the home country if*

$$\varepsilon < \frac{\ln p^o - \ln(p^o - c)}{1-\gamma} \tag{3.6}$$

In this case, the individual's wage / income is p^o.

(c) *An individual will work in the "Y" sector of the foreign country if*

(3.7) $$\frac{\ln p^o - \ln(p^o - c)}{1-\gamma} < \varepsilon < \frac{\ln(p^o - c)}{\gamma}$$

In this case, the individual's wage is p^o, and his net income is $p^o - c$.

Proof: See the Appendix.

We next embark on the derivation of p^o. Because the two countries are identical, in equilibrium the number of foreigners working in the "Y" sector of the home country must be equal to the number of "domestic" individuals working in the "Y" sector of the foreign country. Thus (suppressing the superscript), the total labor force in the "Y" sector of the home country is simply $F\left[\frac{\ln(p-c)}{\gamma}\right]$. Among these workers, the proportion (and number) of the domestic individuals working in the "Y" sector in the home country is:

(3.8) $$F\left[\frac{\ln p - \ln(p-c)}{1-\gamma}\right]$$

Thus, the proportion (and number) of foreign individuals working in the "Y" sector in the home country is

(3.9) $$F\left[\frac{\ln(p-c)}{\gamma}\right] - F\left[\frac{\ln p - \ln(p-c)}{1-\gamma}\right]$$

Also, the proportion (and number) of the individuals working in the "X" sector in the home country is $1-F\left[\frac{\ln(p-c)}{\gamma}\right]$. Thus, from Lemma 1 and (2.4), we know that the total demand for y in the home country is

$$\begin{aligned}&\frac{(1-\alpha)(p-c)}{p}\left\{F\left[\frac{\ln(p-c)}{\gamma}\right]-F\left[\frac{\ln p-\ln(p-c)}{1-\gamma}\right]\right\}\\&+\frac{(1-\alpha)p}{p}F\left[\frac{\ln p-\ln(p-c)}{1-\gamma}\right]+\frac{(1-\alpha)}{p}\left\{1-F\left[\frac{\ln(p-c)}{\gamma}\right]\right\}\end{aligned} \tag{3.10}$$

We know that the total quantity supplied of y in the home country is $F\left[\frac{\ln(p-c)}{\gamma}\right]$. Thus, market equilibrium entails

$$\begin{aligned}F\left[\frac{\ln(p-c)}{\gamma}\right]=&\frac{(1-\alpha)(p-c)}{p}\left\{F\left[\frac{\ln(p-c)}{\gamma}\right]-F\left[\frac{\ln p-\ln(p-c)}{1-\gamma}\right]\right\}\\&+\frac{(1-\alpha)p}{p}F\left[\frac{\ln p-\ln(p-c)}{1-\gamma}\right]+\frac{(1-\alpha)}{p}\left\{1-F\left[\frac{\ln(p-c)}{\gamma}\right]\right\}\end{aligned} \tag{3.11}$$

Namely

$$\left(\alpha+\frac{c+1-\alpha-\alpha c}{p}\right)F\left[\frac{\ln(p-c)}{\gamma}\right]-\frac{c(1-\alpha)}{p}F\left[\frac{\ln p-\ln(p-c)}{1-\gamma}\right]-\frac{(1-\alpha)}{p}=0 \tag{3.12}$$

Note that p^o is the solution to (3.12). We then have the following proposition.

Proposition 3: (a) *If migration exists, then p^o exists and is unique.* (b) $p^o > 1+c$.

Proof: See the Appendix.

When p^o is determined, the wage rates for the "X" and "Y" sectors in both the home country and the foreign country will be solved. Thus, Proposition 3 characterizes the general equilibrium of a model of occupational status that allows for international migration. Recall that the wage rate in the "X" sector of the home country and the net wage in the "Y" sector of the foreign country are, respectively, 1 and $p^o - c$. Part (b) of Proposition 3 demonstrates that the principle of "compensating wage differentials" continues to hold in the new environment of migration and open economy.

The analysis in this section provides a general equilibrium framework of occupational status and migration. In the received literature, it is ordinarily stated that people migrate for the sake of a higher wage at destination. We unearth a rationale that adds to the received literature, and we demonstrate that the rationale arises from an aversion to humiliation rather than from an aspiration for higher wages as such. Moreover, we show that migration is undertaken by rational individuals in a market equilibrium setting, although if occupational stigma were not considered, migration (which is costly) would appear to be a "waste."

Next, we have the following proposition.

Proposition 4: (a) $\frac{d(p^o)}{d\gamma} > 0$

(b) *the sign of* $\frac{d(p^o)}{dc}$ *is ambiguous.*

Proof: See the Appendix.

The intuition of this proposition is as follows. First, as γ decreases, the occupational stigma associated with working in the "Y" sector of the foreign country will decrease. Consequently, the total labor supply in the "Y" sector will increase,[12] which leads to the price of the y good to drop in equilibrium. Second, as c decreases, the total labor supply in the "Y" sector will tend to increase. However, a decrease in c also increases the demand of the migrants. As both the supply and the demand increase, the net impact on the price of the y good is ambiguous.

This proposition has an interesting empirical implication. Information about a humiliating job performed away from home does not become available if migration is to a faraway destination, but becomes readily available if migration is to a destination nearby. In other words, social distance and geographical distance are often positively correlated, implying that γ may decrease with distance. Thus, Part (a) of Proposition 4 implies that the impact of faraway migration on p^o will be greater than the impact of short-distance migration and consequently and correspondingly, will be the impact of

[12] Proposition 6 in the next section provides a rigorous proof of the labor supply changes.

faraway migration on wage rates, and on the reallocation of employment between the "X" sector and the "Y" sector. Although a longer distance might be associated with a higher cost of migration, namely "c," Part (b) of Proposition 4 states that the impact of "c" on p^o is ambiguous. Thus, particularly when a longer distance does not increase "c" substantially, which is likely to be the case with the modern technologies of international transportation, a longer distance of migration will reduce p^o, a reduction which is associated with a larger supply of labor in the "Y" sector, and a lower relative wage in that sector.

4. The consequences of migration

In this section, we investigate the repercussions of migration in the extended framework developed in Section 3. First, we have the following proposition.

Proposition 5: *If migration exists (that is, if (3.4) is satisfied), then*

$$p^o < p^c$$

Proof: See the Appendix.

Proposition 5 shows that migration entails a decrease in the price of the output of the "Y" sector. From the analysis in the preceding sections we know that the net wage for work in the "humiliation" sector strictly increases in the price of the output of that sector.

Thus, an interesting testable implication is that international migration reduces the "compensating wage differential" for the "humiliation" sector. The intuition for this implication is as follows. When a place is hardly accessible to migrants, the "humiliation" sector work is performed by the locals. To induce the locals to perform humiliating work, it would be necessary to pamper them with a relatively high wage. When a place is accessible to migrants, humiliating work can be performed by migrants. Since they are detached from the reference group that matters to them, they are willing to perform the humiliating work with less of a cushioning of a compensating wage. In this case, the "compensating wage differential" will be low. Therefore, the model predicts that the more isolated (open) a place, the higher (smaller) the "compensating wage differential" for the "humiliation" sector jobs.

We also have the following proposition.

Proposition 6: *If migration exists, then there will be fewer individuals working in the "X" sector in the open economy than in the closed economy.*

Proof: See the Appendix.

Proposition 6 shows that the opening up of the economy leads to a reduction in the number of individuals working in the "X" sector, and to an increase in the number of individuals working in the "Y" sector.[13] The rationale is quite straightforward. In the "X"

[13] For simplicity, we have not allowed for a revision of social attitudes as a function of the number of

sector, the demand decreases in the open economy because a decrease of the relative price of the y good (Proposition 5) reduces the income of those who work in the "Y" sector (in terms of the numeraire x), and because the cost of migration reduces the income of the migrants who constitute a fraction of those who work in the "Y" sector. This implies that the supply of the x good and hence the labor force in the "X" sector will decrease in equilibrium.[14] In contrast, in the "Y" sector, the decrease of the relative price of the y good increases the demand for it, which implies that the supply of the y good and hence the labor force in the "Y" sector will increase in equilibrium.

Moreover, from Proposition 6, we have the following proposition.

Proposition 7:

$$F\left[\frac{\ln(p^o - c)}{\gamma}\right] > F[\ln(p^c)]$$

Proof: See the Appendix

---

individuals who are working in the "Y" sector. Akin to Akerlof (1980), a case could be made that the larger the number of individuals working in a "degrading" sector, the less the associated social humiliation. It could then follow that working in the "Y" sector will be even more attractive, drawing in additional workers, and lowering further both the wage in this sector and the price of good y.

[14] Note that the cost of migration - the fixed cost of being away from the home country - does not affect an individual's output since this cost is assumed to be a pecuniary cost rather than a time cost of labor supply.

Our analysis suggests that while the "normal" jobs are performed by natives, the degrading jobs are often performed by both migrants and natives. Moreover, from Lemma 1 and Proposition 7 we can see that the possibility of migration increases the number of individuals working in the "Y" sector of each country by the amount

$$F\left[\frac{\ln(p^o - c)}{\gamma}\right] - F[\ln(p^c)] \tag{4.1}$$

This is precisely the number of individuals who leave the "X" sector in their home country for the "Y" sector in the foreign country. From Proposition 1 and Lemma 1 we can further see that the number of individuals who leave the "Y" sector in their home country for the "Y" sector in the foreign country is

$$F[\ln(p^c)] - F\left[\frac{\ln p^o - \ln(p^o - c)}{1-\gamma}\right] \tag{4.2}$$

Finally, we conduct a welfare analysis, comparing the level of wellbeing in an open economy with the level of wellbeing in a closed economy. To this end, we state the following lemma.

Lemma 2: *An individual who works in the "X" sector in the closed economy will not work in the "Y" sector of the home country in the open economy.*

Proof. See the Appendix.

Drawing on Lemma 2, the individuals of a country can be divided into four types:

(1) those who would work in the "X" sector in the closed economy and continue to work in the "X" sector in the open economy;

(2) those who would work in the "X" sector in the closed economy but work in the "Y" sector of the foreign country in the open economy;

(3) those who would work in the "Y" sector of the home country in the closed economy and continue to work in the "Y" sector of the home country in the open economy;

(4) those who would work in the "Y" sector of the home country in the closed economy but work in the "Y" sector of the foreign country in the open economy.

We now have the following proposition.

Proposition 8: *Comparing the level of wellbeing in an open economy with the level of wellbeing in a closed economy, we have that:*

(a) *Type (1) individuals will be better off.*

(b) *Type (2) individuals will be better off.*

(c) *Type (3) individuals will be worse off.*

(d) *A Type (4) individual will be better off if and only if his ε satisfies*

(4.3) $$\varepsilon > \frac{\alpha \ln p^c - \ln(p^o - c) + (1-\alpha)\ln p^o}{1-\gamma}$$

Proof: See the Appendix.

This proposition states that international migration entails different welfare implications for different types of individuals.

For those who work in the "X" sector in the closed economy and continue to work in the "X" sector in the open economy (type (1) individuals), their (nominal) income is unchanged but the price of good y decreases. These individuals do not incur any disutility from humiliation. Thus, they are better off in the open economy.

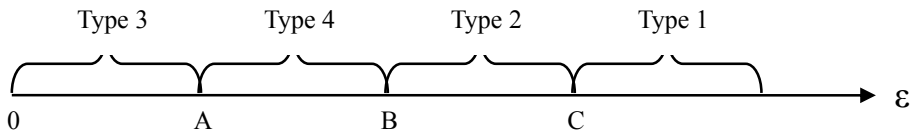
For those who work in the "Y" sector of the home country in the closed economy setting but work in the "Y" sector of the foreign country in the open economy setting (type (4) individuals), international migration reduces their disutility from occupational stigma by the amount of $(1-\gamma)\varepsilon$, which clearly increases with ε. Thus, when ε is sufficiently large that such an individual's gain from the reduction of humiliation outweighs the cost of migration and the reduction of the wage in the "Y" sector, namely when (4.3) is satisfied, the individual will be better off in an open economy with international migration.

For those individuals who change occupations from the "X" sector to the "Y" sector due to the opportunity of migration (type (2) individuals), welfare will increase too. The basic intuition for this result is as follows. From Proposition 1 it follows that ε is higher for the individuals who work in the "X" sector in a closed economy than for the

individuals who work in the "Y" sector in the closed economy. This implies that international migration reduces humiliation more for the individuals who work in the "X" sector in a closed economy than for the individuals who work in the "Y" sector in the closed economy. Therefore, by the same logic as that of the preceding paragraph, for individuals of this type the gain from experiencing lower humiliation upon international migration outweighs the cost of migration, which in turn implies that international migration increases their welfare.

However, international migration will reduce the welfare of those who work in the "Y" sector of the home country in the closed economy setting and who continue to work in the "Y" sector of the home country in the open economy setting (type (3) individuals). This occurs because as analyzed in the general-equilibrium framework presented in the preceding sections, international migration increases the supply of the workforce in the "Y" sector, and decreases the demand for the output of the "Y" sector, which in turn decreases the real income of the individuals working in the "Y" sector. Meanwhile, since these individuals continue to work in the "Y" sector of the home country, they experience the same level of humiliation before and after the economy opens up. Thus, they end up being worse off in the open-economy setting.

From Proposition 1, Lemma 1, and Proposition 7, the typology of individuals can be illustrated with the help of the following schematic depiction,



where A = $\dfrac{\ln p^o - \ln(p^o - c)}{1-\gamma}$, B = $\ln(p^c)$, and C = $\dfrac{\ln(p^o - c)}{\gamma}$

Moreover, from the schematic depiction and Proposition 8, we can obtain as a straightforward corollary that an individual will be better off in the open economy setting if and only if his ε satisfies condition (4.3). Thus, Proposition 8 implies that the greater is ε for an individual, the more likely the individual will experience a welfare gain when the economy opens up. If an individual with a high value of ε continues to work in the "X" sector in the open-economy setting, his utility will increase due to the decrease in the price of "Y" good[15]; if an individual with a high value of ε switches to work in the "Y" sector of the foreign country, the preceding analysis also shows that he will be better off than in the closed-economy setting. In contrast, individuals with a sufficiently low value of ε will continue to work in the "Y" sector of the home country in the open-economy setting, and they will experience a welfare loss when the economy opens up. Individuals who switch from working in the "Y" sector of the home country to working in the "Y" sector of the foreign country will also experience a welfare loss in the open-economy setting if their ε is small such that (4.3) is not satisfied; if however their ε is relatively

[15] The humiliation-induced migration of other individuals confers a utility gain upon the non-migrating individuals who work in the "normal" sector.

large such that (4.3) is satisfied, they will experience a welfare gain in the open-economy setting.

Proposition 8 suggests that migration does not result in a Pareto improvement nor in a Pareto deterioration and hence, it has ambiguous social welfare implications. This could further explain why often migration is a politically contentious issue. Nonetheless, if from a social welfare point of view the greatest concern is with the wellbeing of those who experience much humiliation, then migration could be seen as a purveyor of a social welfare gain.

Moreover, from the proof of Proposition 8 in the Appendix we can see that the parameter γ is a crucial determinant of the impact of migration on welfare. Recall that $(1-\gamma)\varepsilon$ measures the reduction of humiliation from migration. Thus, the smaller γ, the larger the reduction. As noted earlier, a greater distance of migration may reduce γ. Thus, distance will then be a benefit, not a hindrance, and it will correlate positively, not negatively, with migration. The standard claim in migration theory is that distance is a proxy for cost and hence that distance is detrimental to migration. The humiliation perspective predicts the opposite: distance is conducive to migration if the information available to others, whose opinion the individual values, is a declining function of the distance between the migration destination and the location of those "others." In the economics of migration and humiliation, distance yields a *valuable* decaying of information. Distance could confer a benefit that is larger than the cost of covering it.[16]

[16] This is not the first time though that distance features positively in the calculus of migration. The

5. Migration and occupational honor

The theme of this paper is its title: migration as a response to occupational stigma. Migration of this type is usually by unskilled workers. But migration could also be undertaken in pursuit of occupational honor by skilled workers. In a number of developing countries such as, for example, India and China today, and Israel, Japan, and Korea in the 1960s and 1970s, many nationals who obtained their Ph.D. in the United States returned home. Whereas these individuals could have commanded good salaries in the United States, they nonetheless went back to receive considerably lower salaries at home.[17] In the economics literature this phenomenon is referred to as "return migration."[18]

In the received literature, it is usually argued that while the nominal earnings in rich countries are high, the price levels in poorer countries are low. Thus, individuals may find it optimal to spend positive fractions of their lifetime work in the home country and in the foreign country, which means that they will elect to return-migrate from a rich

---

literature on migration and risk refers to the diversification of family risks and to the lowering of overall familial risk as reasons for migration by a family member. In that context, when income realizations covary less as the destination is farther away from the home economy, distance is conducive to migration. (Inter alia, see Rosenzweig and Stark 1989.)

[17] See, for example, Zweig et al. (2008) and the literature reviewed therein.

[18] In the literature of other social sciences, this phenomenon is often referred to as "brain circulation." See, for example, Gaillard and Gaillard (1997), and Zweig et al. (2008).

country to a poor country.[19]

Drawing, with some modification, on the setup of the preceding sections, we shed light on this phenomenon of return migration from a new angle. Similar to the preceding sections, we assume that individuals derive utility from two sources: income, and occupational status. But unlike in the preceding sections, we now contend that an individual with a prestigious occupation, say a university professor, enjoys occupational honor. Moreover, the closer the "social distance" between that individual and the people in his living environment, the higher is his utility from occupational honor. The glory (like the shame) that an individual experiences is intimately related to the social group he belongs to, and to the psychological distance between himself and that group. In the United States, the social distance between, for example, a Ph.D. who comes from Korea and the community he lives in is usually long. Consequently, he derives little glory (utility) from being, say, a professor in the United States. In Korea, however, the social distance between himself and his community is short. People in his social group (family members, old classmates, and so on) bask in his glory. This is valuable to him; namely, he derives considerable utility from being a professor in his home country. Thus, individuals may choose to migrate in order to pull themselves out from a social group that has a long "social distance" with them, and immerse themselves in a social group whose members' opinions matter to them.

[19] For writings on return migration from rich destinations to not-so-rich origins see, for example, Stark et al. (1997), and Stark and Fan (2007).

Our analysis therefore implies that the migration of skilled workers can also be related to a concern for occupational status and social distance. Such a line of reasoning suggests a novel explanation for return migration from rich to poor countries.

6. Summary and conclusions

In the substantial literature on labor migration, the basic theoretical tenet is the wage differential: people migrate for the sake of a higher wage at destination. However, while it is often observed that the desire to reap pecuniary rewards is not the only incentive for migration, the non-pecuniary aspects of migration have not been researched extensively. The current paper attempts to help fill this gap by exploring, in a general-equilibrium framework, the idea that labor migration is prompted by a desire to avoid "social humiliation."

We first construct a general equilibrium model that incorporates occupational status by examining the interactions of the goods market and the labor market. We then extend the general equilibrium framework of occupational status in a closed, single economy to an open economy in a world that consists of two countries or two regions. We demonstrate the existence and uniqueness of a general equilibrium in this setting. We show that as long as migration can reduce humiliation sufficiently, migration will occur *even* between two identical economies. Hence, we delineate a new model of migration in which migration is resorted to as a means of obtaining social exposure gains.

There are numerous observations that as migrants, individuals engage in work, often of a degrading nature, which on the occupational prestige ladder is inferior to the work that they would have engaged in if at home. The rationale that is provided for this behavior in the received literature is often the prevalence of a wage differential. What we have sought to do in this paper is to unearth a novel rationale which adds to the received literature, demonstrate that the rationale arises from an aversion to humiliation rather than from aspiration for higher wages as such, show that the rationale yields testable implications, and point out that these implications can differentiate empirically between the wage rationale approach and our new approach. In reality, we believe that migration is undertaken for a combination of reasons, and that while a wage differential is one such reason, it is not the only one.

Our model shows that migration increases the number of individuals who choose to perform degrading jobs, and consequently lowers the price of the good produced in the sector that is associated with low social status. We show that the more migration reduces the humiliation of performing degrading jobs, the more individuals will choose such jobs, and the lower will be the price of the good produced in the corresponding sector. A related and interesting testable implication is that international migration reduces the "compensating wage differential" for degrading jobs. We conduct a welfare analysis, comparing the level of wellbeing in an open economy with the level of wellbeing in a closed economy. We find that the greater the psychological cost to an individual of performing degrading jobs, the more likely it is that the individual will experience a welfare gain when the economy opens up. Finally, we extend the model by referring to the case of migration as a response to occupational honor. This extension helps explain

the migration of skilled workers from rich to poor countries.

The model has a number of interesting policy implications. For example, it suggests that the employment of migrants in degrading activities may not be due to discrimination by the host society but rather to individuals' choosing destinations far from home as arenas for their activities. A presumption by members of the host society that "we would be humiliated to perform jobs that the migrants do" is not synonymous with migrants feeling that they perform humiliating jobs. Conversely, if an individual believes that others think that he is engaged in a degrading activity, the individual will sense humiliation even if, by himself, he does not conceive of his job to be degrading, provided that the individual cares about the opinions of those others. Thus, efforts to give migrants jobs that their hosts consider to be less humiliating in order to increase the migrants' sense of wellbeing will be misguided if individuals migrate in order to avoid or lower humiliation at home. It is the humiliation at home that matters, less or not so at destination. Put differently, if individuals migrate to secure higher wages, then a higher wage at home or a lower wage at destination will have a symmetrical adverse impact on the incentive to migrate: in the case of humiliation described in this paper the reduced humiliation at home matters more, while an increase in (exogenously conceived) humiliation at destination matters less, or not at all.

We have employed the simplest model in order to highlight the essential idea of the paper. In future research we will seek to extend the model in several directions. For example, we will want to consider migration as a response to occupational stigma in a poor country - rich country setting. In such a context, it could be shown that migration is

caused by both a wage differential and a desire to avoid humiliation. Migration that takes place under the "guise" of a wage differential from a poorer country to a richer country could just as well be undertaken for the purpose of lowering humiliation, even though the prevalence of this motive is ordinarily masked, so to speak, by the observed wage differential. In addition, the model can be extended to explore the implications of labor heterogeneity. Based on a model similar to the one presented in the current paper with labor being interpreted as unskilled labor, we could introduce a dimension of skilled labor. In such an extension, we will have skilled labor producing another good, say good "Z". It is reasonable to assume that from the perspective of consumers' utility maximization, the goods produced by skilled labor and unskilled labor are complementary. In a closed economy without migration, the concern of humiliation results in too few unskilled individuals working in the "Y" sector. Consequently, the relative prices of both the "Z" good and the "X" good are low relative to the "Y" good. By a similar logic to that of the existing model, migration will "invite" more unskilled individuals to work in the "Y" sector, which in turn will increase the relative prices of both the "Z" good and the "X" good. Consequently, we could show that a skilled individual's real income and welfare will increase upon opening the economy to the migration of unskilled individuals. Moreover, based on Section 5, we may consider the repercussions of the migration of skilled individuals from rich to poor countries. In the contemporary world, most developed countries apply selection criteria such that skilled individuals from poor countries have higher chances of migrating to rich countries than unskilled individuals. When the concern for "honor" is not considered, the prediction would be that only a few skilled migrants will return to their home country. Then, due to the scarcity of skilled labor in the poor country, the relative price of the "Z" good will be

high, which reduces the welfare of unskilled individuals. However, when we incorporate the effect of "honor" in an individual's utility and admit that this effect is stronger when the "social distance" between an individual and the local population decreases, we will predict that many migrants will return home even when the wage gap between the rich and the poor countries is still high. Due to the consequent increase in the supply of skilled labor in the poor country, the relative price of the "Z" good will be lower, which raises the welfare of the unskilled individuals.

An interesting venue of future research will be to pursue a rigorous empirical study based on the preceding theoretical analysis. For example, our model implies that international migration reduces the "compensating wage differential" for the "humiliation" sector. We may test this implication with both micro and macro level data and examine whether increased migration at the era of globalization shrinks the "compensating wage differential". As another and specific blueprint of an empirical study, take the case of migration that is prompted by a desire to avoid humiliation. Suppose that we identify migrants who perform humiliating jobs. We then ask them: "will you be willing to perform *at home* this very same job for the very same wage, "W," that you are getting now?" The evidence will be in support of our theory if and only if the answer is "no." Suppose that the reply is "no." Then we will ask: "what would be the wage that if paid to you at home will render you willing to perform that very same job at home?" Suppose they answer "H," and that $H > W$. Then, $H-W$ is the "humiliation premium," and as long as $H-W > 0$, our theory will be supported by evidence.

Appendix: Proofs

Proof of Proposition 1: (a) Note that p^c is the solution to (2.14). To prove its existence, we consider the properties of $F(\ln p)[p-(1-\alpha)(p-1)]$ when $p=1$, and when $p \to \infty$. When $p=1$, we know that

(A.1) $$F(\ln p)[p-(1-\alpha)(p-1)] = F(0) = 0 < 1-\alpha$$

When $p \to \infty$, we know that

(A.2) $$\lim_{p\to\infty} F(\ln p)[p-(1-\alpha)(p-1)] = \lim_{p\to\infty} \alpha p + (1-\alpha) > 1-\alpha$$

Thus, from the continuity of $F(\cdot)$ and the term $1-\alpha w_x = 1-\alpha$, there exists a $p^c \in (1, N)$, where N is a sufficiently large number, such that p^c is a solution to (2.14). Furthermore, there are no solutions to equation (2.14) in the interval (0,1), as in this case condition (2.8) for participation in the "Y" sector (noting (2.2)) would become

(A.3) $$\varepsilon < \ln p < 0$$

not allowing for any production of Y at all.

To prove the uniqueness of p^c, we note that for all p greater than 1

$$
\begin{aligned}
&\frac{d\{F(\ln p)[p-(1-\alpha)(p-1)]\}}{dp} \\
&= \frac{F'(\ln p)}{p}[p-(1-\alpha)(p-1)] + F(\ln p)\alpha \\
&= \frac{f(\ln p)}{p}[\alpha p + (1-\alpha)] + F(\ln p)\alpha \\
&> 0
\end{aligned}
\tag{A.4}
$$

This implies that the left-hand side of (2.14) increases with p for $p \in (1,\infty)$. Meanwhile, the right-hand side of (2.14) is independent of p. Therefore, p^c is unique.

(b) $p^c > 1$ is already demonstrated in the preceding proof of part (a).

(c) From (2.2), (2.8), and part (a) of this proposition, the proof of the remaining part (c) is trivial. ■

Proof of Proposition 2*:* Consider the two identical economies at the initial situation in which $p = p^c$. In this case,

$$
w_x = 1 \text{ and } w_f = w_y = p^c \tag{A.5}
$$

We check under what conditions will migration take place when $p = p^c$.

An individual will choose to work in the "Y" sector of the foreign country over working in the "X" sector of the home country if and only if

(A.6)
$$\begin{aligned}&\alpha \ln \alpha + (1-\alpha)\ln(1-\alpha) + \ln(w_f - c) - (1-\alpha)\ln p - \gamma\varepsilon \\ &> \alpha \ln \alpha + (1-\alpha)\ln(1-\alpha) + \ln w_x - (1-\alpha)\ln p\end{aligned}$$

When $p = p^c$ and noting that $w_x = 1$, (A.6) can be reduced to

(A.7)
$$\varepsilon < \frac{\ln(w_f - c) - \ln w_x}{\gamma} = \frac{\ln(p^c - c)}{\gamma}$$

An individual will choose to work in the "Y" sector of the foreign country rather than in the "Y" sector of the home country if and only if

(A.8)
$$\begin{aligned}&\alpha \ln \alpha + (1-\alpha)\ln(1-\alpha) + \ln(w_f - c) - (1-\alpha)\ln p - \gamma\varepsilon \\ &> \alpha \ln \alpha + (1-\alpha)\ln(1-\alpha) + \ln w_y - (1-\alpha)\ln p - \varepsilon\end{aligned}$$

When $p = p^c$, (A.8) can be reduced to

(A.9)
$$\varepsilon > \frac{\ln w_y - \ln(w_f - c)}{1-\gamma} = \frac{\ln p^c - \ln(p^c - c)}{1-\gamma}$$

In order for an individual with a migration preference to exist, inequalities (A.7) and (A.9) need to specify a non-empty interval for ε. Namely

(A.10)
$$\frac{\ln(p^c - c)}{\gamma} > \frac{\ln p^c - \ln(p^c - c)}{1-\gamma}$$

or

(A.11) $$\gamma < \frac{\ln(p^c - c)}{\ln p^c}$$

We note that (A.11) is the very same as (3.4). If (A.11) is satisfied / if (3.4) is satisfied, then some individuals will choose to migrate and hence $p = p^c$ cannot be the equilibrium in the open economy setting. On the other hand, if (A.11) is not satisfied / if (3.4) is not satisfied, then no individual will choose to migrate and hence $p = p^c$ will continue to be the equilibrium in the open economy setting. In other words, migration will occur if and only if (3.4) is satisfied. ■

Proof of Lemma 1: The logic and the procedure of the proof of this lemma are essentially the same as the logic and the procedure of the proof of Proposition 2, with p^c being replaced by p^o. Moreover, from (3.3), we know that if an individual works in the "X" sector of the home country, his wage / income will be 1; if an individual works in the "Y" sector of the home country, his wage / income will be p^o; if an individual will work in the "Y" sector of the foreign country his wage will be p^o and his net income will be $p^o - c$ (since he incurs the cost of international migration).■

Proof of Proposition 3: (1) Note that p^o is the solution to (3.12). To prove its existence, we consider the cases in which $p = 1 + c$ and $p \to \infty$.

When $p = 1 + c$, we know that the left-hand side of (3.12) is

$$
\begin{aligned}
&\left(\alpha+\frac{c+1-\alpha-\alpha c}{p}\right)F\left[\frac{\ln(1+c-c)}{\gamma}\right] \\
&-\frac{c(1-\alpha)}{p}F\left[\frac{\ln(1+c)-\ln(1+c-c)}{1-\gamma}\right]-\frac{(1-\alpha)}{p} \\
&=-\frac{c(1-\alpha)}{p}F\left[\frac{\ln(1+c)}{1-\gamma}\right]-\frac{(1-\alpha)}{p}<0
\end{aligned}
\tag{A.12}
$$

When $p \to \infty$, we know the left-hand side of (3.12) is

$$
\begin{aligned}
&\lim_{p\to\infty}\left\{\left(\alpha+\frac{c+1-\alpha}{p}\right)F\left[\frac{\ln(p-c)}{\gamma}\right]-\frac{c(1-\alpha)}{p}F\left[\frac{\ln p-\ln(p-c)}{1-\gamma}\right]-\frac{(1-\alpha)}{p}\right\} \\
&=\alpha>0
\end{aligned}
\tag{A.13}
$$

Thus, there exists a $p^o \in (1+c, N)$, where N is a sufficiently large number, such that p^o is a solution to (3.12). Furthermore, if migration exists, then any solution to equation (3.12) is greater than 1+c: in the case where $p<1+c$, any individual would clearly prefer working in the "X" sector at home for a wage of $w_x = 1$ to working in the "Y" sector for a net wage smaller than 1 and migration would not occur.

Next, to prove the uniqueness of the solution, we rewrite (3.12) as

$$
(\alpha p+c+1-\alpha-\alpha c)F\left[\frac{\ln(p-c)}{\gamma}\right]-c(1-\alpha)F\left[\frac{\ln p-\ln(p-c)}{1-\gamma}\right]-(1-\alpha)=0 \tag{A.14}
$$

Note that the derivative of the left-hand side of (A.14) with respect to p, for all $p > 1 + c$, is

$$
\begin{aligned}
\Gamma &\equiv \alpha F\left[\frac{\ln(p-c)}{\gamma}\right] + \frac{(\alpha p + c + 1 - \alpha - \alpha c)}{\gamma(p-c)} F'\left[\frac{\ln(p-c)}{\gamma}\right] \\
&- \frac{c(1-\alpha)}{1-\gamma}\left(\frac{1}{p} - \frac{1}{p-c}\right) F'\left[\frac{\ln p - \ln(p-c)}{1-\gamma}\right] \\
&= \alpha F\left[\frac{\ln(p-c)}{\gamma}\right] + \frac{(\alpha p + c + 1 - \alpha - \alpha c)}{\gamma(p-c)} f\left[\frac{\ln(p-c)}{\gamma}\right] \\
&+ \frac{c^2(1-\alpha)}{(1-\gamma)p(p-c)} f\left[\frac{\ln p - \ln(p-c)}{1-\gamma}\right] \\
&> 0
\end{aligned}
\tag{A.15}
$$

Thus, p^o must be unique.

Finally, the proof of part (b) of the proposition is already included in the preceding proof. ■

Proof of Proposition 4: (a) Totally differentiating (A.14) with respect to p and γ, noting (A.15), and rearranging, we get

$$
\begin{aligned}
\frac{dp}{d\gamma} &= \frac{1}{\Gamma}\left\{\frac{\ln(p-c)}{\gamma^2}(\alpha p + c + 1 - \alpha - \alpha c) F'\left[\frac{\ln(p-c)}{\gamma}\right]\right. \\
&\left. + \frac{\ln p - \ln(p-c)}{(1-\gamma)^2} c(1-\alpha) F'\left[\frac{\ln p - \ln(p-c)}{1-\gamma}\right]\right\} \\
&> 0
\end{aligned}
\tag{A.16}
$$

(b) Totally differentiating (A.14) with respect to p and c, noting (A.15), and rearranging,

we get

$$\text{(A.17)}\quad \begin{aligned}\frac{dp}{dc} = -\frac{1}{\Gamma}\Bigg\{ & F\left[\frac{\ln(p-c)}{\gamma}\right](1-\alpha) - \frac{1}{\gamma(p-c)}F'\left[\frac{\ln(p-c)}{\gamma}\right](\alpha p + c + 1 - \alpha - \alpha c) \\ & -(1-\alpha)F\left[\frac{\ln p - \ln(p-c)}{1-\gamma}\right] - \frac{c(1-\alpha)}{(1-\gamma)(p-c)}F'\left[\frac{\ln p - \ln(p-c)}{1-\gamma}\right]\Bigg\}\end{aligned}$$

Thus, the sign of $\frac{d(p^o)}{dc}$ is ambiguous. ■

Proof of Proposition 5: Inserting $p = p^o$ into (A.14) and rearranging, we get

$$\text{(A.18)}\quad \begin{aligned}&\left(\alpha + \frac{1-\alpha}{p^o}\right)F\left[\frac{\ln(p^o - c)}{\gamma}\right] + \frac{c(1-\alpha)}{p^o}\Bigg\{F[\frac{\ln(p^o - c)}{\gamma}] \\ &-F\left[\frac{\ln p^o - \ln(p^o - c)}{1-\gamma}\right]\Bigg\} - \frac{(1-\alpha)}{p^o} = 0\end{aligned}$$

Recall that if migration takes place, then

$$\text{(A.19)}\quad F\left[\frac{\ln(p^o - c)}{\gamma}\right] > F\left[\frac{\ln p^o - \ln(p^o - c)}{1-\gamma}\right]$$

In combination, (A.18) and (A.19) imply

$$
\begin{aligned}
&\left(\alpha+\frac{1-\alpha}{p^o}\right)F\left[\frac{\ln(p^o-c)}{\gamma}\right]-\frac{(1-\alpha)}{p^o} \\
&=-\frac{c(1-\alpha)}{p^o}\left\{F\left[\frac{\ln(p^o-c)}{\gamma}\right]-F\left[\frac{\ln p^o-\ln(p^o-c)}{1-\gamma}\right]\right\} \\
&<0
\end{aligned}
\tag{A.20}
$$

namely that

$$
(1-\alpha+\alpha p^o)F\left[\frac{\ln(p^o-c)}{\gamma}\right]<1-\alpha \tag{A.21}
$$

Meanwhile, note that

$$
p-(1-\alpha)(p-1)=1-\alpha+\alpha p \tag{A.22}
$$

Thus, from (A.21) and (2.14), noting that p^c satisfies (2.14), and upon inserting (A.22) into (2.14), we have that

$$
(1-\alpha+\alpha p^o)F\left[\frac{\ln(p^o-c)}{\gamma}\right]<1-\alpha=(1-\alpha+\alpha p^c)F(\ln p^c) \tag{A.23}
$$

We now claim that $p^o < p^c$. We prove this by contradiction. Suppose not. Namely suppose that $p^o \geq p^c$. Then, first, we have that

(A.24) $$(1-\alpha+\alpha p^{o}) \geq (1-\alpha+\alpha p^{c})$$

Also, if migration takes place, then there exists some ε that satisfies Inequality (3.7). Then, similar to the proof of Proposition 2, we can show that if migration takes place, we will have that $\gamma < \frac{\ln(p^{o}-c)}{\ln p^{o}}$. Thus, if $p^{o} \geq p^{c}$, then

(A.25) $$\frac{\ln(p^{o}-c)}{\gamma} > \ln p^{o} \geq \ln p^{c}$$

From (A.24), (A.25), and the monotonicity of $F(\cdot)$, we get

(A.26) $$(1-\alpha+\alpha p^{o})F\left[\frac{\ln(p^{o}-c)}{\gamma}\right] \geq (1-\alpha+\alpha p^{c})F(\ln p^{c})$$

(A.26) contradicts (A.23), which completes the proof of the proposition. ■

Proof of Proposition 6: We prove this by contradiction. Suppose not. Namely, suppose that in equilibrium, the number of individuals working in the "X" sector in the open economy is greater than or equal to that in the closed economy. Recalling (2.2) and (2.4), we know that for an individual working in the "X" sector, his net supply of x is[20]

[20] An individual's net supply of a good is defined as the difference between the individual's output of the good and his demand for the good.

(A.27) $$1-\alpha w_x = 1-\alpha$$

If the number of individuals working in the "X" sector in the open economy is greater than or equal to that in the closed economy, then the total net supply of x in the open economy is greater than or equal to that in the closed economy.

The net demand of x comes from those who work in the "Y" sector.[21] Recall that the demand of every individual working in the "Y" sector is a constant fraction (α) of his income. If migration exists, then a fraction of individuals working in the "Y" sector in the open economy incurs a cost of migration, which reduces their income. Moreover, the decrease of the price of Y in the open economy reduces the income of everyone who works in the "Y" sector. Thus, if the number of individuals working in the "Y" sector in the open economy is less than or equal to that in the closed economy, then the total net demand of x in the open economy is less than that in the closed economy.

Thus, since the total net supply of x increases, while the total net demand of x decreases, the market cannot reach an equilibrium in the open economy with the number of individuals working in the "X" sector being greater than or equal to that in the closed economy. This completes the proof of the proposition. ■

Proof of Proposition 7: From the analysis in Section 2, we know that the number of

[21] An individual's net demand for a good is defined as the difference between the individual's demand for the good and his output of the good. The output of x of individuals who work in the "Y" sector is zero. Thus, their net demand for x is equal to their demand for x.

individuals working in the "X" sector in closed economy is

(A.28) $$1 - F[\ln(p^c)]$$

From the analysis in Section 3, we know that the number of individuals working in the "X" sector in closed economy is

(A.29) $$1 - F\left[\frac{\ln(p^o - c)}{\gamma}\right]$$

From Proposition 6, we know that

(A.30) $$1 - F\left[\frac{\ln(p^o - c)}{\gamma}\right] < 1 - F[\ln(p^c)]$$

which implies

(A.31) $$F\left[\frac{\ln(p^o - c)}{\gamma}\right] > F[\ln(p^c)]$$

■

Proof of Lemma 2: From (A.8), we know that an individual's utility gain (in the open economy) of switching from working in the "Y" sector of the home country to working in the "Y" sector of the foreign country is:

$$
\begin{aligned}
&\{\alpha \ln \alpha + (1-\alpha)\ln(1-\alpha) + \ln(p^o - c) - (1-\alpha)\ln p^o - \gamma\varepsilon\} \\
&- \{\alpha \ln \alpha + (1-\alpha)\ln(1-\alpha) + \ln p^o - (1-\alpha)\ln p^o - \varepsilon\} \\
&= (1-\gamma)\varepsilon + \ln(p^o - c) - \ln p^o
\end{aligned} \tag{A.32}
$$

Thus, the higher ε, the larger the benefit of switching from working in the "Y" sector of the home country to working in the "Y" sector of the foreign country. As we have demonstrated, some individuals who work in the "Y" sector of the home country in the closed economy will work in the "Y" sector of the foreign country in the open economy. An individual who works in the "X" sector in the closed economy has a higher ε than any individual who works in the "Y" sector of the home country in the closed economy. Therefore, if any individual who would work in the "Y" sector of the home country in the closed economy chooses to work in the "Y" sector of the foreign country, then an individual who works in the "X" sector in the closed economy must work in the "Y" sector of the foreign country if he chooses to work in the "Y" sector. ■

Proof of Proposition 8: We compare the level of wellbeing in an open economy with the level of wellbeing in a closed economy for each of the 4 types of individuals.

(a) For those who work in the "X" sector in the closed economy and continue to work in the "X" sector in the open economy, their (nominal) income is unchanged but the price of good y decreases. These individuals do not incur any disutility from humiliation. Thus, they are better off in the open economy.

(b) For an individual who works in the "X" sector in the closed economy but who works in the "Y" sector of the foreign country in the open economy, we know that, similar to (A.6), he will be better off in the open economy setting if and only if

$$\text{(A.33)} \qquad \begin{aligned} &\alpha \ln \alpha + (1-\alpha)\ln(1-\alpha) + \ln(p^o - c) - (1-\alpha)\ln p^o - \gamma\varepsilon \\ &> \alpha \ln \alpha + (1-\alpha)\ln(1-\alpha) + \ln(1) - (1-\alpha)\ln p^c \end{aligned}$$

Namely, if and only if

$$\text{(A.34)} \qquad \gamma\varepsilon < \ln(p^o - c) + (1-\alpha)\ln(p^c / p^o)$$

From Proposition 1 and Lemma 1 we know that for an individual who works in the "X" sector in a closed economy but who works in the "Y" sector in an open economy

$$\text{(A.35)} \qquad \ln(p^c) < \varepsilon < \frac{\ln(p^o - c)}{\gamma}$$

From Proposition 5 we know that $\ln(p^c / p^o) > 0$. Thus, clearly, $\varepsilon = \dfrac{\ln(p^o - c)}{\gamma}$ satisfies (A.34), which implies that any ε defined in (A.35) satisfies (A.34). Thus, individuals of type (2) are better off in the open economy setting.

(c) For an individual who works in the "Y" sector of the home country in the closed economy and who continues to work in the "Y" sector of the home country in the

open economy, we know that he will be worse off in the open economy setting if and only if

$$\text{(A.36)} \qquad \begin{aligned} &\alpha \ln \alpha + (1-\alpha)\ln(1-\alpha) + \ln p^o - (1-\alpha)\ln p^o - \varepsilon \\ &< \alpha \ln \alpha + (1-\alpha)\ln(1-\alpha) + \ln p^c - (1-\alpha)\ln p^c - \varepsilon \end{aligned}$$

namely if and only if

$$\text{(A.37)} \qquad \alpha \ln p^o < \alpha \ln p^c$$

From Proposition 5, we know that (A.37) (and hence (A.36)) is satisfied, which implies that individuals of this type are worse off in the open economy.

(d) For an individual who works in the "Y" sector of the home country in the closed economy but works in the "Y" sector of the foreign country in the open economy, we know, similar to (A.8), that he will be better off in the open economy setting if and only if

$$\text{(A.38)} \qquad \begin{aligned} &\alpha \ln \alpha + (1-\alpha)\ln(1-\alpha) + \ln(w_f - c) - (1-\alpha)\ln p^o - \gamma\varepsilon \\ &> \alpha \ln \alpha + (1-\alpha)\ln(1-\alpha) + \ln p^c - (1-\alpha)\ln p^c - \varepsilon \end{aligned}$$

From inserting (3.3) into (A.38), we see that (A.38) is equivalent to (4.3). ■

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