The Dynamics of Labor Migration When Workers Differ in Their Skills and Information is Asymmetric

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Abstract

The theory of labor migration under asymmetric information in implemented to generate the following predictions. First, when workers in a profession constitute two skill levels – low skill and high skill – under asymmetric information both types migrate (even though if information were symmetric, only the high skill workers would migrate). Subsequently, however, the high skill workers stay while the low skill workers return. With some supplemental structure, a non-screening device is identified that enables the receiving country to attract only high skill workers. Second, when workers in a profession constitute more than two skill levels, say four (without loss of generality), an implementation of the asymmetric information theory generates the following patterns: Migration is sequential, that is, it proceeds in waves. Each migration wave breaks into workers who stay as migrants and workers who return; within waves the returning migrants are the low skill workers. This pattern mimics the pattern pertaining to the two skill levels case. Ex ante, migration is always less selective than it is ex post. Finally, the average skill level of migrants is rising in the order of their cohort.

I. Introduction

One of the least satisfactory features of modern labor migration theories is their capacity to predict only a small subset of empirical regularities. Since a large number of migration-related phenomena must be causally related, the challenge to students of migration is to develop a body of theory that predicts a corpus of stylized facts rather than provide an ad hoc analytical rationale for an isolated observation. It is the purpose of this paper to outline an implementation of the theory of labor migration under asymmetric information that offers a rich and integrated set of predictions.

Suppose first that workers constitute two skill levels – low skill and high skill. An implementation of the theory offers the following predictions: Migration is ex post fully positively selective even though ex ante it is not; migration breaks into workers who stay as migrants and workers who return; and the returning migrants are the low skill workers. The judgment concerning the selective nature of migration is thus sensitive to the time at which the judgment is made. Whereas the *end* result of migration is not sensitive to the information regime (symmetric or asymmetric), the migration path is – it is single-phased under symmetric information, but multi-phased under asymmetric information. With the introduction of some auxiliary structure, the theory identifies a procedure that allows the receiving country to skim off the high quality workers without engaging in (a costly) screening.

Suppose next (without loss of generality) that workers in the profession constitute four skill levels. A plausible implementation of the theory of labor migration under asymmetric information generates the following predictions: Migration is sequential or phased; not all workers who end up as migrants move at the same point in time. Each wave (or cohort) of migration (of migrants) breaks into workers who stay as migrants and workers who return. The century old "law of migration" of Ravenstein (1885) that "each main current of migration produces a compensating counter-current" (p.199) (quoted often but not generated analytically) turns out to be a derivative of a variant of the asymmetric information approach to migration. Within waves (cohorts) the returning migrants are the low quality workers; thus, migration is ex post positively selective within cohorts. When the migration process is fully completed, migration is mildly positively selective – the average quality of migrants is superior to the average quality of workers found at origin – but not all migrants are of higher quality than all workers at origin. (Only in the case of two types of workers does migration turn out to be ex post fully positively selective). Cohort by cohort, the average quality of migrants is rising.

The addition of an explicit intertemporal dimension to the static model of labor migration under asymmetric information (Stark (1991)) amplifies the model and renders it possible to systematically differentiate and fully characterize workers who stay put, workers who migrate and stay at destination, and workers who migrate and return.

The next section presents the basic model of labor migration under asymmetric information. Section III traces migration patterns arising from a two-skill-levels example. Section IV examines a four-skill-levels case and derives the resulting migratory patterns. Section V places the approach utilized in the paper in the context of related research on labor migration.

II. Labor Migration under Asymmetric Information: The Basic Model

Assume a world consisting of two countries: A rich country, R, and a poor country, P. We can likewise assume a given country consisting of a rich urban area and a poor rural area. In a given occupation let the net wages for a worker with skill level θ be $W_R(\theta)$ and $W_P(\theta)$ in the rich country and the poor country respectively[1] (such that $\partial W_P(\theta)/\partial\theta > 0$ and $\partial W_R(\theta)/\partial\theta > 0$. Thus, workers' productivities in the sending and receiving countries are identically ranked). To reflect the fact that R is rich and P is poor, it is assumed that $W_R(\theta) > W_P(\theta)$ for all θ.[2] Also, without loss of generality, let θ be defined upon the closed interval $[0, 1]$ and let the density function of P workers on θ be $\mathrm{F}(\theta)$

In addition, given that P workers are likely to have a preference for P life style because of cultural factors, social relationships, and so on, it is assumed that P workers apply a discount factor to R wages when comparing them to P wages. Thus, when making the migration decision, they compare $kW_R(\theta)$ with $W_P(\theta)$ where $0 < k < 1$. A P worker will therefore migrate from P to R

[1]To make the analyses tractable we assume throughout that the wages in both R and P are dependent only upon a worker's skill level and not upon the excess supply of or demand for labor. In this we follow the similar assumption made in the optimal tax literature. Thus, for example, $W_R(\theta)$ and $W_P(\theta)$ may be linear in θ such that $W_R(\theta) = r_0 + r\theta$, $r_0 > 0$, $r > 0$ and $W_P(\theta) = p_0 + p\theta$, $p_0 > 0$, $p > 0$. It can be shown (see Stark (1991), Chapter 12) that these equations are reduced equilibrium forms where in each equation the left-hand side is the equilibrium whereas the right-hand side is the productivity of a worker with skill level θ.

[2]This may, for example, result from a higher capital-to-labor ratio in R, from a superior technology in R, or from externalities arising from a higher average R country level of human capital per worker.

if

$$kW_R(\theta) > W_P(\theta). \tag{1}$$

Clearly, without further restrictions on $W_R(\theta)$ and $W_P(\theta)$ there may be several values of θ for which $kW_R(\theta) - W_P(\theta) = 0$. Hence, as illustrated in Figure 1, there may be several distinct skill groups along the skill axis. Thus, in Figure 1, the workers in skill intervals $0\theta_1$, $\theta_2\theta_3$, $\theta_4 1$ migrate, whereas those in the complementary intervals do not. We shall refer to a case in which there are at least three distinct groups (for example, along the θ axis, migrating, non-migrating, migrating) – a situation which can only occur if at least one of the $W_P(\theta)$ and $W_R(\theta)$ functions is non-linear in θ – as the non-convex case. Similarly, we shall refer to the type of case in which there are only two or fewer distinct groups as the convex case.

Let us now assume that the skill of each potential migrant is known in P where he or she has been observed for many years, but is unknown in R. When markets are isolated in the sense that information does not ordinarily flow across them (or does not flow costlessly and freely) an employer (or employers) in one market may possess information on individual worker productivity – for example, such information may be revealed to the employer over time as a by-product of his or her normal monitoring and coordinating activities – but the information is employer- or market-specific. Also, for the moment, let us exclude the possibility that true skill is revealed in R over time.

Faced with a group of workers whose individual productivity is unknown to the employer (only the distribution of earnings abilities is known), the wage offered will be the same for all such workers and will be related to the average product of all members of the group. Let us assume that the actual individual

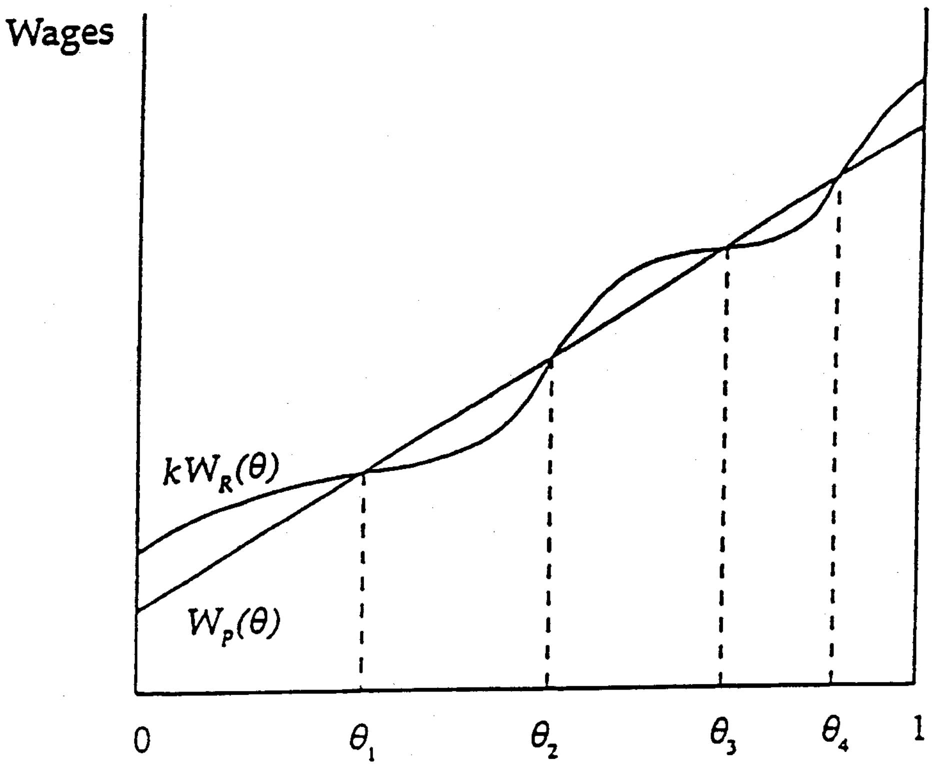

Figure 1

wage offered is equal to the average product of the group[3] and that wage offers are known to all workers.

Hence, denoting by $\overline{W}_R$ the wage payable in the rich country to a migrant of unknown skill level and assuming n distinct migrating groups, $\overline{W}_R$ is given by

$$\overline{W}_R = \sum_{i=1}^{n} \int_{\underline{\theta}^i}^{\overline{\theta}^i} W_R(\theta)F(\theta)d\theta / \sum_{i=1}^{n} \int_{\underline{\theta}^i}^{\overline{\theta}^i} F(\theta)d\theta \tag{2}$$

where $\underline{\theta}^i$ and $\overline{\theta}^i$ are respectively the lowest and highest skill level migrating in group i, where i is one of the continuous groups migrating, and where the skill level increases with i. (Note that $0 < \underline{\theta}^1 < \overline{\theta}^n < 1$ for non-empty migrating sets). It follows immediately that $\overline{W}_R < W_R(\overline{\theta}^n)$.

The following result can now be established.

Under asymmetric information if the top skill level migrating is $\overline{\theta}^n$ then any skill level $\tilde{\theta}$ where $\tilde{\theta} < \overline{\theta}^n$ will also migrate.

To prove this result consider any $\tilde{\theta}$, such that $\tilde{\theta} < \overline{\theta}^n$. Now, since by assumption $\overline{\theta}^n$ migrate, it must be that $k\overline{W}_R > W_P(\overline{\theta}^n)$. Also, since $\tilde{\theta} < \overline{\theta}^n$ then $W_P(\tilde{\theta}) < W_P(\overline{\theta}^n)$ and hence $k\overline{W}_R > W_P(\tilde{\theta})$ so that $\tilde{\theta}$ skill levels also migrate.

The implication of this result is that under asymmetric information, everyone with a skill level less than or equal to $\overline{\theta}^n$ migrates, so that all workers in

[3]If employers are risk neutral and production functions are linear in skills, the employer does not suffer from his or her ignorance of the true skill level of each worker, so that paying the average product per worker will be the competitive outcome. These assumptions of risk neutrality and linearity in production are the commonly accepted assumptions in the screening literature (see, for example, Stiglitz (1975)).

the interval $[0, \overline{\theta}^n]$ migrate. Note the contrast with the case of full information, as depicted in Figure 1, where the migration pattern could be non-convex.

Thus, under asymmetric information the wage payable to all migrating workers in R is

$$\overline{W}_R = \int_0^{\theta^*} W_R(\theta)F(\theta)d\theta / \int_0^{\theta^*} F(\theta)d\theta \tag{3}$$

where θ^* is the top skill level migrating. Thus $\overline{W}_R$ can be written as $\overline{W}_R(\theta^*)$.

Under asymmetric information then, workers of skill level θ for which

$$k\overline{W}_R(\theta^*) > W_P(\theta) \tag{4}$$

will migrate from P to R.[4]

Given this characterization of the migration pattern under asymmetric information we can now proceed, first, to an example of a convex (two group) case and then to an example of a non-convex case.

III. A Convex Case: An Example

Assume that there are just two types of workers: Low skill workers whose skill level is θ_1, and high skill workers whose skill level is θ_2, with skill-related wage rates $W_i(\theta_1)$ and $W_i(\theta_2)$ in the poor country $i = P$ and rich country $i = R$. Assume that the two skill types constitute α and $1-\alpha$ percent of workers in the

[4] Inequality (4) provides a cut-off condition which is due to individual rationality. It can be proven that the arising equilibrium is compatible with, indeed ensues from, the other side of the market, namely, the behavior of firms in the destination R. See Stark (1991), Chapter 12.

profession respectively. Suppose that no costs are associated with migration, except those embodied in k, and that k is such that $kW_R(\theta_1) < W_P(\theta_1)$ yet $kW_R(\theta_2) > W_P(\theta_2)$. This assumption is introduced in order to capture the differential migration incentives of the symmetric information state and the asymmetric information state. It implies that under symmetric information only the relatively high skill workers will migrate. However, if we assume that

$$\alpha kW_R(\theta_1) + (1-\alpha)kW_R(\theta_2) > W_P(\theta_2) \tag{5}$$

then, under asymmetric information, the θ_2 workers will again migrate but this time the θ_1 workers will migrate as well (a result that follows immediately from the above lemma). If at the end of the first period of employment employers in R identify costlessly and correctly the skill levels of individual workers and adjust pay accordingly, the low skill workers will return to P while the high skill workers will stay in R. Since θ_1 are not pooled together with θ_2, θ_2's R country wage can only be higher, that is

$$kW_R(\theta_2) = \alpha kW_R(\theta_2) + (1-\alpha)kW_R(\theta_2) > \alpha kW_R(\theta_1) + (1-\alpha)kW_R(\theta_2). \tag{6}$$

By assumption, the most right hand side of this last expression is larger than the alternative poor country wage $W_P(\theta_2)$.

There are three implications of this outcome.

First, considering the entire migration experience we see that migration is positively selective. Even though no selectivity is observed initially – both low skill workers and high skill workers leave – with the passage of time and the removal of informational asymmetry, the return of the low skill migrants to their home country produces a feature of positive selectivity. Whereas initially migration is not selective in skills, ex post it is.

Second, the judgment concerning the selective nature of migration is sensitive to the timing (phase) at which the judgment is being made. (At first migration appears not selective, at last – it is fully positively selective). Empirical findings concerning the selective nature of migration are thus phase-dependent.

Third, even though the end result of migration is not path-dependent, the symmetric information single-phase path (with only workers of skill level θ_2 migrating) is different from the asymmetric information multi-phase path (with group θ_2 found in R only when migratory moves halt altogether).

Suppose now that the rich country wishes to attract and retain only high skill workers, and that screening (testing) individual migrants (would be or actual) is very costly or highly unreliable. The asymmetric information approach identifies an instrument that facilitates such a differentiation.

The rich country can announce an entry tax (visa fee) of $\overline{T}$ units. This tax must be large enough to make it unworthy for the low skill workers to migrate under asymmetric information but not too large as to swamp the high skill workers' own discounted wage differential. To secure these dual requirements, it is necessary to find the minimal tax that solves

$$k[\alpha W_R(\theta_1) + (1-\alpha) W_R(\theta_2) - \overline{T}] < W_P(\theta_1). \tag{7}$$

That is, the tax $\overline{T}$ should solve

$$k[\alpha W_R(\theta_1) + (1-\alpha) W_R(\theta_2) - (\overline{T} - \varepsilon)] = W_P(\theta_1) \tag{7'}$$

where $\varepsilon > 0$ is a sufficiently small constant, while maintaining

$$k[W_R(\theta_2) - \overline{T}] > W_P(\theta_2). \tag{8}$$

From (7) and (8) we obtain

$$k\alpha W_R(\theta_1) + k(1-\alpha)W_R(\theta_2) - W_P(\theta_1) < k\overline{T} < kW_R(\theta_2) - W_P(\theta_2). \tag{9}$$

Existence then requires that

$$W_P(\theta_2) - W_P(\theta_1) < \alpha k[W_R(\theta_2) - W_R(\theta_1)]. \tag{10}$$

Existence is thus more likely the steeper the wage profile is by skill in the rich country relative to the wage profile by skill in the poor country, a condition quite likely to hold. If the proportion of the low skill workers in the occupation under review, α, is relatively large, and if the rate of location discount is not high, the entry tax that solves (7') will also fulfill (8).

A numerical example serves to illustrate the convex case. Suppose $W_P(\theta_1) = 7$, $W_P(\theta_2) = 9$, $W_R(\theta_1) = 10$, $W_R(\theta_2) = 20$; $F(\theta)$ is such that $\alpha = 1-\alpha = \frac{1}{2}$; and $k = \frac{2}{3}$. Thus under symmetric information only θ_2 migrate as $kW_R(\theta_2) = \frac{2}{3}\cdot 20 > 9$ but $kW_R(\theta_1) = \frac{2}{3}\cdot 10 < 7$, while under asymmetric information both skill levels migrate as $k\alpha W_R(\theta_1) + k(1-\alpha)W_R(\theta_2) = \frac{2}{3}\cdot\frac{1}{2}\cdot 10 + \frac{2}{3}\cdot\frac{1}{2}\cdot 20 = 10 > (W_P(\theta_1) = 7;\ W_P(\theta_2) = 9)$. As for the tax scenario, (7') gives a tax $\overline{T} = 4\cdot 5 + \varepsilon$. With this tax in place, it is readily seen that regardless of whether they migrate along with the high skill workers or alone, the low skill workers will be worse off migrating than not migrating: In the first case, their prediscounted wage will be $10.5 - \varepsilon$ units, which is worth less to them than the alternative home-country wage ($\frac{2}{3}(10.5-\varepsilon) < 7$); and in the second case, their prediscounted rich country wage will be $5.5 - \varepsilon$, which is below their home country wage. Not so, however, for the high skill workers, whose post-tax, discounted rich country wage is still superior to the home country wage ($\frac{2}{3}(15.5-\varepsilon) > 9$).

IV. A Non-Convex Case: An Example

Assume that there are four types of workers with skill levels θ_i increasing in i, $i = 1, ..., 4$ and corresponding wage rates of $W_P(\theta_i)$ and $W_R(\theta_i)$ in the poor country and rich country, respectively. Suppose that $F(\theta)$ is given, that is, the proportion of skill type i in the profession is α_i. Once again it is assumed that no costs are associated with migration, except those embodied in k. Suppose that even though $W_R(\theta_i) > W_P(\theta_i) \forall_i i = 1, ..., 4$, the skill-specific wage rates are such that $kW_R(\theta_2) > W_P(\theta_2)$ and $kW_R(\theta_4) > W_P(\theta_4)$, whereas $kW_R(\theta_1) < W_P(\theta_1)$ and $kW_R(\theta_3) < W_P(\theta_3)$; it is efficient for the most able and third most able groups to migrate, but not for the other two. It follows at once that under symmetric information only θ_2 and θ_4 migrate. Once informational asymmetry is introduced, the set of possibilities becomes quite rich. We limit the discussion to one interesting case where $k\left(\sum_{i=1}^{2}\alpha_i\right)^{-1}\sum_{i=1}^{2}\alpha_i W_R(\theta_i) > W_P(\theta_2)$ and $k\left(\sum_{i=3}^{4}\alpha_i\right)^{-1}\sum_{i=3}^{4}\alpha_i W_R(\theta_i) > W_P(\theta_4)$, while $k\left(\sum_{i=1}^{3}\alpha_i\right)^{-1}\sum_{i=1}^{3}\alpha_i W_R(\theta_i) < W_P(\theta_3)$ and $k\sum_{i=1}^{4}\alpha_i W_R(\theta_i) < W_P(\theta_4)$. Ruling out strategic considerations (but see the discussion at the end of this section), what this configuration means is that under asymmetric information workers of skill levels θ_1 and θ_2 will migrate whereas workers of skill levels θ_3 and θ_4 will not migrate, even though the latter workers would have found it advantageous to migrate if they could do so alone – which by the lemma of section II we know that they cannot.

If as a by-product of the employment and production processes complete information revelation takes place at the end of the first employment period, workers of skill level θ_1 return to P while workers of skill level θ_2 stay in R. Both these groups are fully removed from the pool of workers who are subject to asymmetric information.[5] Now types θ_3 and θ_4 find it attractive to migrate. Thus, at this time, group θ_1 is found in P whereas groups θ_2, θ_3 and θ_4 are in R. However, if once again complete information about individual skill levels is obtained after one employment period, workers of skill level θ_3 return to origin, whereas workers of skill level θ_4 stay in R. There now emerges a pattern of migration wherein workers of skill levels θ_2 and θ_4 are found in R whereas workers of skill levels θ_1 and θ_3 are in P. Once again it turns out that even though the *end* result of migration is not path-dependent, the symmetric information single-phase path (with workers of skill levels θ_2 and θ_4 migrating right from the start) is very different from the asymmetric information multi-phase path (with groups θ_2 and θ_4 found in R only when migration halts altogether).

We see that when there are more than two skill levels, the asymmetric information approach to labor migration can produce several of the empirically observed migration regularities: Migration is sequential; each wave of migration produces a counter flow of return migration[6]; and migration is positively selective but not strongly so. We expand this point as follows. The result obtained implies that migration is ex post fully selective within cohorts but only mildly selective across cohorts. When migration halts altogether, types θ_1 and θ_3 are found in the poor country while types θ_2 and θ_4 are in the rich country. Since skill-wise type θ_3 workers dominate type θ_2 workers, not all migrant workers have a higher skill level than all non-migrant workers. Put differently, there is a migrant group at destination – of θ_2 – which is dominated by return migrant

[5]Since θ_1 and θ_2 are removed from the averaging process, we can normalize θ_3 and θ_4 to constitute the $[0, 1]$ interval and therefore, $\overline{W}_R(\theta^*)$ is fully defined as per equation (3).

[6]This is Ravenstein's (1885) well-known law of migration. Indeed, the analytically derived sequential pattern of migration is also in line with Ravenstein's (1885) observation that migration streams have a ***built-in*** tendency to increase over time.

workers found at origin of type θ_3. It is therefore incorrect to argue that only the low quality workers return (θ_2 do not whereas θ_3 do) even though such a claim holds true cohort by cohort. Moreover, as in the case of two skill levels, we see that a judgment concerning the selective nature of migration is highly sensitive to the timing (phase) at which the judgment is being made. So much so that at first glance migration appears to be overall negatively selective (as θ_1 and θ_2 leave whereas θ_3 and θ_4 stay put); subsequently, as type θ_1 return, mildly negatively selective (type θ_2 are migrants, types θ_3, θ_4 and θ_1 are not), and so on. Since the completed or final outcome of migration is revealed only intertemporally, consideration of migration patterns at a given point in time, that is, in isolation from past and expected future dynamics, produces a biased account.

We also see that migration is perpetual in the sense that a given wave of migration melts the dike blocking a subsequent migration wave. There is a widespread belief in the migration literature that the perpetual, phased structure of migration arises from low order waves of migrants providing employment and job-related information to subsequent waves (Stark (1991)). The asymmetric information approach suggests a new explanation of the externality that a given wave confers on subsequent waves: High order waves (for example, the wave consisting of types θ_3 and θ_4) migrate only because the cloud of informational asymmetry dissipates, thereby removing the low order wave workers (types θ_1 and θ_2) from the pool of workers who are lumped together. By migrating, θ_1 and θ_2 block the migration of θ_3 and θ_4; but by subsequently exposing themselves to identification these very migrants pave the way for the migration of higher quality workers. "Information" then does play a role, but a very different role than the one conventionally assumed.

Note that the approach predicts that the average quality of migrants rises in the order of their cohort.[7]

Finally, we need to address the possibility that workers time their migration strategically. Consider the earning sequence of the θ_4 workers. In period 1 they earn $W_P(\theta_4)$, in period 2 - $\alpha_3 W_R(\theta_3) + \alpha_4 W_R(\theta_4)$, and in period 3 - $W_R(\theta_4)$. The reason for this earning profile is that the period wherein the θ_4 workers earn in R a wage based on their own skill level alone must be preceded by a period in R wherein their wage is based on an averaging of skill levels. Why then not bring forward (from 3 to 2) the period at which $W_R(\theta_4)$ is earned by bringing forward (from 2 to 1) the employment cum averaging period? Instead of earning at the first period $W_P(\theta_4)$, θ_4 workers could earn at this period $(\alpha_1+\alpha_2+\alpha_4)^{-1}[\alpha_1 W_R(\theta_1)+\alpha_2 W_R(\theta_2)+\alpha_4 W_R(\theta_4)]$ - if θ_4 workers join θ_1 and θ_2, θ_1 and θ_2 will find it advantageous to migrate a-fortiori - and thereafter earn $W_R(\theta_4)$ per period. We know however that $k \sum_{i=1}^{4} \alpha_i W_R(\theta_i) < W_P(\theta_4)$, and it is likely that

$$(\alpha_1 + \alpha_2 + \alpha_4)^{-1}[\alpha_1 W_R(\theta_1) + \alpha_2 W_R(\theta_2) + \alpha_4 W_R(\theta_4)] < \sum_{i=1}^{4} \alpha_i W_R(\theta_i) = \left(\sum_{i=1}^{4} \alpha_i\right)^{-1} \sum_{i=1}^{4} \alpha_i W_R(\theta_i).$$

The reason for this latter inequality is that compared with its right-hand side, in its left-hand side the weights of the low wages $W_R(\theta_1)$ and $W_R(\theta_2)$ are relatively higher, while the high wage $W_R(\theta_3)$ is deleted altogether (two lowering effects), even though the highest wage $W_R(\theta_4)$ is weighted more (one increasing effect). But by transitivity, $k[\alpha_1 W_R(\theta_1) + \alpha_2 W_R(\theta_2) + \alpha_4 W_R(\theta_4)] < W_P(\theta_4)$. Therefore, if we impose the additional conditions that capital markets (and

[7]Borjas (1987) provides evidence that the quality of migrant cohorts from Western Europe to the United States has been increasing over the 1955-1979 period. However, his measures of quality are different from the one used in this paper.

other institutions) preclude borrowing against future returns to human capital investments (especially migration), and that in themselves $W_P(\theta_i)$ are too low to permit consumption smoothing, or alternatively we assume a strong time preference, a strategic migratory move will not take place. To close the argument note that θ_3 cannot possibly move along with θ_4 since if they were to do so, the rich country (multiplied by k) average wage for θ_4, $k\sum_{i=1}^{4}\alpha_i W_R(\theta_i)$, would clearly be less than their P country wage, $W_P(\theta_4)$, a shortfall which due to any of the above restrictions implies that θ_4 will not migrate.

A numerical example serves to illustrate. Suppose the wage rates in the poor country are $W_P(\theta_i) = 6, 8, 21, 21\frac{1}{2}$, and in the rich country $W_R(\theta_i) = 10, 30, 40, 48$; workers are uniformly distributed across the four skill categories, that is $F(\theta)$ is uniform; and $k = \frac{1}{2}$. Thus, whereas under informational symmetry only θ_2 and θ_4 migrate (as $kW_R(\theta_2) = \frac{1}{2}\cdot 30 > W_P(\theta_2) = 8$ and $kW_R(\theta_4) = \frac{1}{2}\cdot 48 > W_P(\theta_4) = 21\frac{1}{2}$, but $kW_R(\theta_1) = \frac{1}{2}\cdot 10 < W_P(\theta_1) = 6$ and $kW_R(\theta_3) = \frac{1}{2}\cdot 40 < W_P(\theta_3) = 21$), under informational asymmetry only θ_1 and θ_2 migrate. Clearly, θ_3 and θ_4 are better off staying in P since $k\overline{W}_R(\theta^*)|_{\theta^*=\theta_3} = \frac{1}{2}\frac{80}{3} < W_P(\theta_3) = 21$ or $k\overline{W}_R(\theta^*)|_{\theta^*=\theta_4} = \frac{1}{2}\frac{128}{4} < W_P(\theta_4) = 21\frac{1}{2}$. Verification that θ_1 and θ_2 will migrate is also straightforward as $k\overline{W}(\theta^*)|_{\theta^*=\theta_2} = \frac{1}{2}\frac{40}{2} > (W_P(\theta_1) = 6;\ W_P(\theta_2) = 8)$.

Upon complete information revelation, workers of skill level θ_1 return to P while workers of skill level θ_2 stay in R. Types θ_3 and θ_4 now migrate as $k\overline{W}_R(\theta^*)|_{\theta^*=\theta_4} = \frac{1}{2}\frac{88}{2} > (W_P(\theta_3) = 21;\ W_P(\theta_4) = 21\frac{1}{2})$. Once again, the revelation of full in formation splits the migrants into returnees and stayers: Workers of skill level θ_3 return to P, since $kW_R(\theta_3) = \frac{1}{2}\cdot 40 < W_P(\theta_3) = 21$, while workers of skill level θ_4 stay in R as for them $kW_R(\theta_4) = \frac{1}{2}\cdot 48 > W_P(\theta_4) = 21\frac{1}{2}$. Since the (location discounted) earning profile of the θ_4 workers is $21\frac{1}{2}$, 22, 24, bringing forward their time of migration results in an earning sequence of $14\frac{2}{3}$, 24, 24 that under any of the alternative restrictions postulated above cannot be sustained.

V. Concluding Remarks

A set up where all workers know what wages will await them, where in response to this information workers either stay put, migrate and stay at destination, or migrate and return, and where stayers, movers, and those who return are fully characterized is new. In a large number of professions (for example, science and engineering) where employers have only an inaccurate measure of new workers' abilities and where these abilities correlate strongly with productivity, the time induced information improvement rests with the employers, not with the migrant workers.

The sequential, relative, and return attributes of migration as derived in this paper do not arise then from imperfect information about wage rates at destination. If such were the case then, even if migrants had precise information on their *expected* wage at destination, realization of wage variance could induce some to stay and others to return. But if we recognize that workers differ in their attributes then, for this line of argument to carry weight, attributes must be systematically correlated with realized wage rates. It is not enough to merely argue that return migration is a decreasing function of premigration information (McCall and McCall (1987)), or that "migration back to an original location occurs because expectations were not fulfilled" (Polachek and Horvath (1977)).

Dynamics in general and return migration in particular could be generated by changes in information in a more subtle way. For example, suppose that workers have information on wages in location i, where they are currently located, and on wages in locations j, k, l, and so on. Suppose, further, that workers always have more information on the location they are actually in than on other locations; and finally, suppose that the value of locational information inversely relates to its quantity. Suppose now that workers move from i to j. Then, not only does information on j becomes less valuable than it was prior to the move, it could also become less valuable than information on i, k, l, and so on. Since the only way to convert information on a wage elsewhere – that is, now, on wages in i, k, or l, and so on – to an actual wage is to move, a *given* move, as it reshuffles the entire information structure may well lay the ground for subsequent moves. Clearly, one such move is back to i. Here too, then, changes in information could play a role in migration – motivating migration, including return migration – but the changes are in the information in the hands of the migrant workers, not the employers, and a systematic link with workers' attributes is missing.

A simple cobweb model could generate some dynamics if we assume, again, that realized wages differ from anticipated wages: An initial wave of migrants pushes down the wage at destination, an outcome that was not duly foreseen by the migrants. Consequently, some migrants return. This raises somewhat the wage at destination and pulls in some migrants. And so on. Once again, this approach also assumes homogeneity of workers' attributes, that the workers drawn in and the workers pushed out are always randomly selected, and that workers are unable to assess accurately their destination wages.

Finally, sequential migration could arise from the technology of production exhibiting economies of scale to the application of skill. Consider the following example. For each skill level θ, workers in economy R are paid more than workers in economy P, with the wage differential increasing in θ. Skills can be acquired, albeit at a cost, and migration from P to R can take place at a cost c. Initially, the system is in full equilibrium with no migration. Suppose that as a consequence of an exogenous shock, c falls such that now $W_R(\theta^n) - c > W_P(\theta^n)$ where θ^n is the top skill level. As θ^n type workers migrate, they confer both positive and negative externalities: The productivity of skilled workers in R rises due to the enlargement of the pool of skilled workers there and the operation of scale economies. This raises $W_R(\theta^n)$. Workers in P with skill levels below θ^n who previously had no incentive to invest in acquiring additional skills now find that the joint return to investment in skill acquisition and migration is greater than the sum of the returns arising from each of these investments undertaken separately. They also witness a decline in their wage earnings arising from the absence of the θ^n workers. These workers invest in skill acquisition and then migrate, thus giving rise to a second wave of migrants. Additional waves of migrants are likewise produced until the cost of migration c exactly offsets the increase in the wage differential induced by the (two ended) scale economies, or until all skilled workers leave P for R. Notice that if the reason for the initial skill distribution of workers is ability (see Miyagiwa (1991)), the quality of migrants, as measured by their ability, will decline in the order of their cohort.

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