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Source: *International Economic Review*, Vol. 36, No. 3 (Aug., 1995), pp. 625-642
Published by: Wiley for the Economics Department of the University of Pennsylvania and Institute of Social and Economic Research, Osaka University
Stable URL: https://www.jstor.org/stable/2527364
Accessed: 31-08-2020 21:33 UTC

INTERNATIONAL ECONOMIC REVIEW
Vol. 36, No. 3, August 1995

# THE WORK EFFORT AND THE CONSUMPTION OF IMMIGRANTS AS A FUNCTION OF THEIR ASSIMILATION*

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Positive self-selection has been used to explain the superior economic performance of some immigrant groups. Even if immigrants and natives are identical, however, the former face different incentives. In particular, they bear costs not incurred by natives, including monetary costs of moving, costs of staying in touch with family, and obligations to those left behind. Nonmonetary costs include stress and loss of location specific human capital. The focus of this paper is on how these costs influence the decisions of immigrants relative to those of natives. Particular attention is given to the role of assimilation.

## 1. INTRODUCTION

Since the early 1980s the United States has been experiencing one of the largest immigrations in her history. Only the immigration at the turn of this century exceeded the current immigration in magnitude. Nor is the United States unique; almost every other industrialized western country has become a de facto immigration country, including some that, like Italy or Spain, were countries of emigration until only very recently. Citizens often view immigration with apprehension. Will immigrants become a burden to society? Will they take jobs away from natives?[2] In spite of such concerns, immigrants' economic performance has often been better than that of natives with similar characteristics.

When immigrants have outperformed natives, the difference has often been attributed to traits distinguishing immigrants from natives. Economic theory predicts that immigrants are not drawn at random from the populations of other countries. The more educated and less risk averse, and maybe those who are more ambitious, are more likely to want to move. In international migration, however, whether or not migration does occur depends not only on the decisions of the prospective migrants, but also on the policies of governments. Borjas (1987, 1990) presents theoretical and empirical evidence demonstrating that the make-up of immigrant populations depends on immigration laws (see also Briggs 1992). Laws favoring the admission of relatives of citizens and permanent residents may result in fewer immigration opportunities available for persons with stronger economic motivation than that of immigrants who are granted preferential admittance.

* Manuscript received September 1993; revised May and September 1994.

[1] I am grateful for comments from three anonymous referees, and from Adrian J. Bailey, Richard J. Sullivan, and Ramalingan Shanmugam. The ideas for this article were first developed when I spent a month at the ILO in Geneva. I am indebted to Roger Böhning for his hospitality and encouragement.

[2] For a rigorous recent analysis of this question see Altonji and Card (1991), and for a survey and discussion of the literature see Greenwood and McDowell (1986).

Immigrants who are systematically drawn from the most educated and ambitious segment of the population of their origin countries are, of course, expected to do well in their destination countries.[3] What has apparently been overlooked until recently, however, is "..., the possibility that migrants' performance could be directly attributed to migrants' incentives..." (Galor and Stark 1990, p. 463) and not necessarily to superior traits. This point seems to have been first noted by Djajić (1989) who incorporated the insight into a theoretical model.

How do migrants' incentives differ from those of natives? One of the most obvious differences is that immigrants may compare earnings and cost-of-living in their origin and their destination countries (Djajić 1989); natives who have no incentive of moving generally do not make such comparisons. In Djajić's two-period model, immigrants spend the first period in the destination country and the second period in the home country. The timing of the return, which signals the start of the second period, is endogenous to the model. This allows for the possibility that the start of the second period coincides with the (fixed) date of death and makes the model general in the sense that it can account for both temporary (guestworker) and permanent migration. Djajić's analysis focuses on the wage differential between the origin and the destination country. He observes that, in the case of permanent migration, it is the real wage differential that matters since the immigrant consumes his income where it is earned. In the case of temporary migration, however, both the real and the relative wage differentials play a role in an individual's decision to migrate. Thus, it could be rational to make a temporary move to work in a country with a lower real wage rate than the origin country, as long as that country's nominal wage rate is higher. If the immigrant chooses a very high savings rate and consumes the savings upon returning to the home country where the purchasing power of the savings is high, migration can result in a higher discounted utility over a lifetime than what it would be without migration.

Galor and Stark's (1990) model (G-S model henceforth) has two periods of fixed length. They assume that labor is supplied inelastically, an assumption that is relaxed in Stark (1991, Chapter 28). We will discuss Stark's more general version of the G-S model here.

The G-S model is set in a perfectly competitive world characterized by overlapping generations. The rate of return on capital is assumed to be stationary. In production the economies exhibit constant returns to scale and they have a concave time-invariant production function. These assumptions imply a constant capital-labor ratio and, hence, a constant wage level in both the origin and destination country. Immigrants and natives are identical within and across generations. Galor and Stark (1990) identify differences in the rights of natives and immigrants as the cause of differences in incentives between members of these two groups. In particular, they consider the uncertainty regarding an immigrant's right to remain in the host country for the second period; they assume a positive probability of return. For an

[3] It deserves to be stressed that migrants may have more human capital and be less risk averse than individuals who stay behind. This does not imply, however, that migrants are superior to the native population of the destination country in every respect. In particular, immigrants from low-wage countries may be skilled by the standards of those countries, but those skills may not be of great value in the economies of the destination countries.

immigrant from a low-income country, this implies a higher expected wage in the first period than in the second. Consequently, the immigrant's work effort in the first period will be larger than in the second. It will also be larger than that of natives who face the same expected wage in both periods. Under the assumptions of the model, if immigrants do not return they will work less than natives during the second period but still enjoy a higher level of consumption because of the greater savings they accumulated during the first period.

Immigrants may either choose to return to their country of origin, or they may be forced to do so. The assumptions of the G-S model (Galor and Stark 1990, and Stark 1991) imply that immigrants strictly prefer living in the destination country to returning. Other things being equal, therefore, there is no possibility of voluntary return. Under the assumptions of their model, the probability of return can only denote the probability of involuntary return. Galor and Stark mention that "...social pressures by alienated indigenous populations, psychological pressures arising from prolonged absence from home, and change in the status of assets left behind could compel return migration." (Galor and Stark 1990, p. 464) This argument for return implies either a change in the immigration policies of the destination country which could result in forced return, or a change in the preferences of the immigrants which makes return more desirable than staying, or a change in conditions in the origin country. But while the possibility of forced return is accounted for in the G-S model, it cannot account for changes in preferences or changes occurring in the origin country. In their formulation, therefore, the only reason for return that is consistent with the model is forced return.

In addition to the contributions of Djajić (1989), Galor and Stark (1990), and Stark (1991), our model shares similarities with a model presented in Djajić and Milbourne (1988). In their model Djajić and Milbourne introduce the assumption that migrants have a stronger preference for consumption in their home country than in the destination country, an assumption also made in our model. Their model differs from Djajić (1989), Galor and Stark (1990), Stark (1991), and also from ours, however, in that it does not use the native-born population in the destination country as the reference group to which the immigrants are compared. Instead, it compares the migrants' consumption of goods when they are in a foreign country to their consumption when they are back in the home country. The timing of the migrant's return to the home country is determined endogenously.

A difference between the G-S and Djajić's (1989) model, on one side, and ours on the other, is that we do not assume that immigrants and natives are identical in *every* respect. Instead, we consider the immigrants' degree of assimilation as an important personal characteristic that distinguishes them from the native-born population. We are able to show how the initial familiarity of immigrants with the destination country, and their changing degree of assimilation[4] over time, affect work and savings efforts. Djajić and Milbourne (1988) introduce the idea that migrants' level

[4] "Assimilation: the act of coming to a resemblance. The word 'assimilate' means to become similar." *Webster's New Twentieth Century Dictionary*, unabridged, second edition (William Collins Publishers, 1980). In the context of immigration, Hammar and Lithman (1987) write that "In a general sense, *assimilation* stands for the process whereby something is made an indistinguishable part of a whole, losing all identity of its own." (p. 235)

of utility derived from the consumption of a given bundle of goods and leisure may depend on whether they are in the destination or in their home country, respectively. Because this idea is a key assumption in our model, it is important to clearly point out how our model differs from that of Djajić and Milbourne (1988). One difference, already mentioned above, is that the focus of the Djajić and Milbourne model is on the migrants and their home (source) country. By contrast, the focus of our model is on the destination country. Thus, we compare immigrants to natives; they compare immigrants' behavior in the first period to their behavior in the second period, after they have returned to their home country. Because they do not use the native-born of the destination country as the reference group to which immigrants are to be compared, Djajić and Milbourne cannot model the effects of assimilation. Thus, the innovation of our model, and the most important way in which it differs from earlier contributions, is the consideration and treatment of assimilation as a factor in economic decisions made by international migrants.

## 2. ASSIMILATION AS A FACTOR IN ECONOMIC DECISIONS OF IMMIGRANTS

Djajić (1989), Galor and Stark (1990), and Stark (1991) assume that natives and immigrants are identical. They do so to focus on other factors that contribute to differences in economic behaviors of immigrants relative to natives. Our work is motivated by similar considerations. But immigrants and natives are not identical in every respect because immigrants bear a cost to come to the destination country, a cost not incurred by natives. Therefore, even when immigrants have the same qualifications and utility function as the native-born, and the probability of involuntary return is zero, they face different conditions and incentives. The purpose of our model is to explore the effects of the costs of migration on immigrants' decisions.

What is the nature of the costs of migration? Let us first focus on the monetary side of these costs. The monetary costs of migration should be interpreted more broadly than as just the one-time expense of moving from the origin to the destination country. They should also include the expenses of staying in touch with family and friends who stay behind through correspondence, phone calls, and visits. When family support makes an individual's emigration possible, strong and costly expectations are linked to the support, expectations of obligations that are not encountered by natives. Such expenses occur over a period of time. Taken together they can add up to a considerable amount.

Any migrant has the option not to maintain family ties and honor informal obligations, but the pressures to do so, particularly from close relatives, are considerable. Those who ignore the pressures may gain some advantages, but they also encounter serious losses, such as loss of support networks which may insure against the risks of migration and provide other monetary and psychic benefits (Caces et al. 1985, Schaeffer 1987).

The nonmonetary costs are also significant and include the opportunity cost of the time spent on efforts to stay in touch with family and friends and meet obligations to them. Another important nonmonetary cost is the loss of location specific human capital because it reduces one's efficiency of operating in the labor market, at least initially. It is hardly a coincidence that immigrants from Canada and

the United Kingdom to the United States do better than those from countries where English is not the native language (Chiswick 1986). But the language barrier is only one factor. Recent immigrants have to acquire information about labor, housing, and commodity markets that natives already possess. Until immigrants have filled their information gap they will be less efficient in these markets. In addition, the initial consumption preferences of immigrants will continue to reflect tastes acquired before emigration, which reflect income constraints and commodity prices in their countries of origin. The adaptation to new consumption patterns, and the acquisition of new tastes, will not be immediate. Continuing consumption patterns that were established in the origin country may be relatively expensive, as some commodities to which recent arrivals are used to will be regarded as "specialty goods" in the destination country.

Migration, as other important changes in a person's life, is stressful and results in psychic costs. Stress may result from being in an unfamiliar environment and from the loss of the company and support of family and friends left behind. Individuals who move alone will feel such losses particularly acutely, but even when whole families move, some relatives and friends will stay behind. In the case of family migration it is also likely that some members will be tied movers.[5] That may impose frustrations and stress on all family members.[6]

Finally, recent immigrants do not enjoy the same rights as natives. In the United States, for example, only citizens are eligible for civil service employment with the federal government. Some states impose additional restrictions. For example, the courts upheld a California law that excludes aliens from becoming peace officers. Aliens are also excluded from certain federal loan programs (Weissbrodt 1989). While these restrictions may not be of great concern to most immigrants, they illustrate the potential for more significant restrictions on economic and political activities of immigrants.[7]

We consider both the monetary and the nonmonetary cost of migration. To account for the nonmonetary costs we assume that they reduce the utility derived from the consumption of leisure, $l_i$, and commodities, $c_i$ $(i = 1, 2)$. This assumption was apparently first used in Djajić and Milbourne (1988). The enjoyment of leisure and consumption of commodities are social activities. The utility of both forms of consumption may be smaller when dear relatives and friends are absent and cannot share in the consumption. Thus, the migrant's objective function is as follows:

$$(1) \qquad U(c_1, c_2, l_1, l_2) = u(\gamma_1 c_1, \varphi_1 l_1) + \beta u(\gamma_2 c_2, \varphi_2 l_2), \quad \text{where}$$

$$\gamma_i \in (0, 1],\ \varphi_i \in (0, 1],\ i = 1, 2, \qquad \text{and} \qquad \gamma_1 \leq \gamma_2,\ \varphi_1 \leq \varphi_2.$$

[5] For the definition of the concepts of "tied mover" and "tied stayer" see Mincer (1978).

[6] See McCollum (1990) for a discussion of the effects of the stress from migration on female migrants in the United States. She mentions that women who had moved recently were more likely to miss work because of illness than other women that were included in her study. It has also been said that guestworkers in Northern Europe miss more work days because of illness than do native workers.

[7] The passage of "English Only" amendments to the constitutions of a number of U.S. states is an illustration of how citizens can impose rules and restrictions on immigrants.

Immigrants are identical to natives in that their utility function has the same form and both immigrants and natives command the same wage rate. This formulation preserves the spirit of the Djajić (1989), Galor and Stark (1990), and Stark (1991) models. It adds realism but still allows us to use the native-born as the reference group to which immigrants are compared. The conditions $\gamma_1 \leq \gamma_2$ and $\varphi_1 \leq \varphi_2$ allow for the possibility of assimilation, so that the difference between migrants and natives decreases or even disappears (if $\gamma_2 = \varphi_2 = 1$) in the second period.[8] Low values of $\gamma_i$ and $\varphi_i$ indicate a large cultural, and possibly social, distance between immigrants and natives. The relative differences measure the change in the degree of assimilation of immigrants from period 1 to period 2:

$$\frac{\gamma_2 - \gamma_1}{\gamma_1} \quad \text{and} \quad \frac{\varphi_2 - \varphi_1}{\varphi_1}.$$

The values of the two measures need not be the same. It seems likely that assimilation to the consumption patterns of the destination country progresses faster than social assimilation.

The rate of assimilation is not entirely up to the immigrants' efforts, values, and attitudes but is also influenced by other persons, and the responsibilities immigrants have to such persons. Thus, obligations to parents who stayed behind can provide for a strong tie to the country of origin and may slow down the rate of assimilation. The rights of immigrants in the destination country also have an important effect. If deportation is perceived as an event with a significant probability of occurring, then risk averse immigrants will maintain strong enough ties to be able to return to their countries of origin and be reintegrated there. At the same time the immigrants' incentives to assimilate themselves into their host society would be reduced.[9]

The monetary costs of migration are captured in the first-period budget constraint by the size of the assets. The constraint is presented as the accounting identity of first-period consumption,

$$c_1 = \bar{w}(1 - l_1) - s + a. \tag{2}$$

The present value of assets net of monetary migration costs is denoted by $a$. The wage rate is assumed to be constant and is denoted by $\bar{w}$; $s$ is savings. For natives we assume that $a > 0$. For immigrants, the present value of assets can be positive or negative as it includes the present value of obligations incurred, for example to parents, as a result of migration. As mentioned above, such obligations can amount to a substantial financial responsibility.[10] The identity for second-period consump-

[8] Duration of stay does not, however, guarantee assimilation or integration into the society and economy of the host country. See Ipsen (1977).

[9] We wish here to distinguish between integration and assimilation. To integrate means to blend in, to function normally within the economic and social environment. Assimilation implies integration, but not vice versa. Since our model formulation uses the native-born as the reference group, it is assimilation that is being modeled here. As noted above, to assimilate is to become indistinguishable from the native-born population. That our model assumes perfect integration can be concluded from the equal treatment of immigrants and natives in the labor market.

[10] An anonymous referee of this journal and Richard J. Sullivan in comments to the author both stressed the importance of assets as one of the reasons for the different economic behaviors of immigrants relative to those of natives. See also Sullivan (1994).

tion is given below. The rate of return to savings, $\bar{r}$, is assumed to be constant,

$$c_2 = \overline{w}(1 - l_2) + (1 + \bar{r})s. \tag{3}$$

To isolate the effects of reduced utility derived from consumption of commodities and leisure by immigrants, we ignore the possibility of involuntary return although it would be easy to include a positive probability to account for such an event. Our model can be regarded as a general version of the G-S model with the probability of involuntary return being set equal to zero ($\alpha = 0$). Because of $\alpha = 0$, the wage rate is the same in both periods ($w_1 = w_2 = \overline{w}$). In the G-S model the expected wage rate in the second period is lower than the wage rate obtained in the first period. We combine the budget constraints for the first and second period into one constraint to obtain the formulation of the immigrant's optimization problem:

$$\max_{\{c_1, l_1, c_2, l_2\}} U(c_1, l_1, c_2, l_2) = u(\gamma_1 c_1, \varphi_1 l_1) + \beta u(\gamma_2 c_2, \varphi_2 l_2) \tag{4}$$

subject to the budget constraint

$$c_2 - (1 + \bar{r})(a + \overline{w}(1 - l_1) - c_1) - \overline{w}(1 - l_2) = 0. \tag{5}$$

We can now formulate the Lagrangean function and obtain the first-order necessary conditions for utility maximization:

$$\begin{aligned} &\mathscr{L}(c_1, l_1, c_2, l_2 | \gamma_1, \varphi_1, \gamma_2, \varphi_2, a) \\ &\quad \equiv u(\gamma_1 c_1, \varphi_1 l_1) + \beta u(\gamma_2 c_2, \varphi_2 l_2) \\ &\qquad - \lambda\{c_2 - (1 + \bar{r})(a + \overline{w}(1 - l_1) - c_1) - \overline{w}(1 - l_2)\}. \end{aligned} \tag{6}$$

The first-order necessary optimality conditions for an interior solution are

$$\gamma_1 \frac{\partial u(\gamma_1 c_1, \varphi_1 l_1)}{\partial(\gamma_1 c_1)} - \lambda(1 + \bar{r}) = 0 \tag{7.a}$$

$$\varphi_1 \frac{\partial u(\gamma_1 c_1, \varphi_1 l_1)}{\partial(\varphi_1 l_1)} - \lambda(1 + \bar{r})\overline{w} = 0 \tag{7.b}$$

$$\beta\gamma_2 \frac{\partial u(\gamma_2 c_2, \varphi_2 l_2)}{\partial(\gamma_2 c_2)} - \lambda = 0 \tag{7.c}$$

$$\beta\gamma_2 \frac{\partial u(\gamma_2 c_2, \varphi_2 l_2)}{\partial(\varphi_2 c_2)} - \lambda\overline{w} = 0 \tag{7.d}$$

$$-c_2 + (1 + \bar{r})(a + \overline{w}(1 - l_1) - c_1) + \overline{w}(1 - l_2) = 0. \tag{7.e}$$

To simplify the notation we use $u_l(\cdot\cdot)$ and $u_c(\cdot\cdot)$ to denote the first derivatives of the terms of the utility functions with respect to leisure and consumption, respectively. The first-order optimality conditions imply that

$$\frac{u_l(\gamma_1 c_1, \varphi_1 l_1)}{u_c(\gamma_1 c_1, \varphi_1 l_1)} = \left(\frac{\gamma_1}{\varphi_1}\right)\overline{w} \tag{8.a}$$

$$\frac{u_l(\gamma_2 c_2, \varphi_2 l_2)}{u_c(\gamma_2 c_2, \varphi_2 l_2)} = \left(\frac{\gamma_2}{\varphi_2}\right)\overline{w} \tag{8.b}$$

$$\frac{u_c(\gamma_1 c_1, \varphi_1 l_1)}{u_c(\gamma_2 c_2, \varphi_2 l_2)} = \left(\frac{\gamma_2}{\gamma_1}\right)\beta(1+\bar{r}) \tag{8.c}$$

$$\frac{u_l(\gamma_1 c_1, \varphi_1 l_1)}{u_l(\gamma_2 c_2, \varphi_2 l_2)} = \left(\frac{\varphi_2}{\varphi_1}\right)\beta(1+\bar{r}) \tag{8.d}$$

$$\frac{u_l(\gamma_1 c_1, \varphi_1 l_1)}{u_c(\gamma_2 c_2, \varphi_2 l_2)} = \left(\frac{\gamma_2}{\varphi_1}\right)\beta(1+\bar{r})\overline{w} \tag{8.e}$$

$$\frac{u_l(\gamma_2 c_2, \varphi_2 l_2)}{u_c(\gamma_1 c_1, \varphi_1 l_1)} = \left(\frac{\gamma_1}{\varphi_2}\right)\frac{1}{\beta}\frac{\overline{w}}{(1+\bar{r})}. \tag{8.f}$$

At the optimum, the marginal rate of substitution between leisure and consumption depends not only on the ratio of the price of a unit of leisure (the wage rate $\overline{w}$) and a unit of the consumption good (since $c_i$ is the numeraire that price is 1), but on a modified expression that includes the ratio of the parameters $\varphi_1$ and $\gamma_1$ (8.a). This ratio is less than 1.0 if $\gamma_1 < \varphi_1$, that is, if the migrant's utility from consumption of commodities is more strongly affected than that of leisure. The effect is the same as that of a reduction of the real wage rate. In this case, we expect the immigrant to move away from work and consumption of commodities to more leisure. Conversely, the ratio is larger than 1.0 if $\gamma_1 > \varphi_1$ and the work effort is expected to increase (consumption of leisure to decrease).[11] The same holds true for the trade-off between leisure and consumption of commodities in period 2 (8.b).

From (8.c) follows that the marginal utility of consumption in the first period is equal to the discounted marginal utility of consumption in the second period, adjusted by the factor $\beta(1+\bar{r})$ and the ratio of $\gamma_2$ and $\gamma_1$. If, as expected, $\gamma_2 > \gamma_1$,

[11] Some casual evidence of the relationship between work effort and assimilation is provided in interviews with immigrants. See, for example, Bruce Finley, "Hmong Valued as Workers: Homesickness Behind Zeal for Jobs," *The Denver Post* (January 15, 1990), 1A, 7A.

the effect would be the same as that of a decrease of the discount rate (an increase in $\beta$) and the immigrant would have the incentive to allocate more of the consumption to the second period than an otherwise identical native worker. If assimilation were incorporated into the G-S model, this would compound the effect of a positive probability of return on the work effort in the first period. The opposite would be the case if $\gamma_2 < \gamma_1$. A similar result is obtained for the trade-off between leisure consumed in period 1 and period 2, respectively (8.d).

The last two equations deal with the intertemporal trade-off between consumption of commodities and leisure. Equation (8.e) is similar to (8.a), except that the ratio of $\gamma_2$ and $\varphi_1$ is multiplied by a wage rate that is discounted on the one hand, and adjusted for returns, $\bar{r}$, to savings, on the other. Finally, equation (8.f) is similar to (8.b) with the right-hand side equal to the present value of the wage rate $\bar{w}$ obtained in period 2, multiplied by the ratio of $\gamma_1$ and $\varphi_2$ and the inverse of $\beta$.

## 3. COMPARATIVE STATIC ANALYSIS

The comparative static results showing how the consumption of leisure and commodities change with changes in the parameters $a$, $\gamma_i$, and $\varphi_i$ are of interest ($i = 1, 2$). We assume that the utility function is strictly concave and twice continuously differentiable. Under these assumptions the second-order necessary conditions are met.

The results are ambiguous. The reason for this is easily seen in the case of a change in $\gamma_i$ or $\varphi_i$. Referring back to the implications of the first-order necessary conditions in (8), we see that the effect of changing one of these parameters is like changing the ratio of the price of commodities and leisure, respectively. For example, from (8.a), (8.c) and (8.f) we can see that an increase in $\gamma_i$ has the same effect as that of lowering the price of $c_1$ relative to $l_1$, $c_2$, and $l_2$. And just as in the case of a lowering of the price we have a substitution and an income effect. The total effect is, therefore, not determined. If we assume that commodities and leisure are normal goods we can derive the signs of the derivatives of $c_i$ and $l_i$ with respect to $a$, and those of $c_i$ and $l_i$ with respect to $\gamma_i$ and $\varphi_i$, respectively. The signs of the other derivatives cannot be determined.[12]

Under the assumption that consumption and leisure are normal goods, an increase (decrease) in the size of the initial assets, $a$, has a positive (negative) effect on the consumption of commodities and leisure in both periods:

$$(9) \qquad \frac{dc_i}{da} > 0 \quad \text{and} \quad \frac{dl_i}{da} > 0, \qquad i = 1, 2.$$

Thus, if immigrants and natives are truly identical in every respect, including their

[12] The derivation of the comparative static results is quite tedious. It is therefore relegated to an appendix that is available from the author upon request.

initial endowments, then immigrants, who must spend part of their endowment to finance the cost of migration, will consume less leisure and fewer commodities than natives in both periods.

As we have shown in (8), a change in $\gamma_i$ or $\varphi_i$ has the same effect as a change in price. Thus, an increase in $\gamma_i$, for example, is like a decrease in the price of $c_l$. The assumption that $c_l$ is a normal good implies that the derivative of $c_l$ with respect to $\gamma_i$ is positive (e.g., Varian 1978). That is

$$\frac{dc_1}{d\gamma_1} > 0. \tag{10}$$

For the same reason

$$\frac{dl_1}{d\varphi_1} > 0;\ \frac{dc_2}{d\gamma_2} > 0; \quad \text{and} \quad \frac{dl_2}{d\varphi_2} > 0. \tag{11}$$

Thus, for example, the less socially assimilated an immigrant is, as expressed by the magnitude of $\varphi_i$, the greater the work effort. This makes sense. An immigrant who is very different from the natives in values and attitudes most likely didn't move for social but for economic reasons. Of course, over time, as the immigrant's values and attitudes become more similar to those of the native population, work behavior also will become more similar but will continue to be influenced by the differential savings effort during the first period.

With respect to the other derivatives, we would expect the effect of an increase (decrease) in $\gamma_i$ or $\varphi_i$ on $c_j$ and $l_j$, $i \neq j$, to be negative (positive). The effect of an increase in $\gamma_1$ or $\varphi_1$ is the same as that of an increase in the discount rate, and that of an increase in $\gamma_2$ or $\varphi_2$ of a decrease in the discount rate.

We are less confident regarding the derivatives of $c_i$ with respect to $\varphi_i$, and $l_i$ with respect to $\gamma_i$, $i = 1, 2$. Consider, for example, a utility function of the Cobb-Douglas form,

$$\begin{aligned} U(c_1, l_1, c_2, l_2) &= k(\gamma_1 c_1)^{\omega}(\varphi_1 l_1)^{\rho} + \beta k(\gamma_2 c_2)^{\omega}(\varphi_2 l_2)^{\rho} \\ &= (\gamma_1)^{\omega}(\varphi_1)^{\rho} k(c_1)^{\omega}(l_1)^{\rho} + \beta(\gamma_2)^{\omega}(\varphi_2)^{\rho} k(c_2)^{\omega}(l_2)^{\rho}, \end{aligned} \tag{12.a}$$

where $\omega + \rho < 1$ to ensure the strict concavity of $U(c_1, l_1, c_2, l_2)$; $k$ is a constant. Since the scale doesn't impact decisions based on the utility function, we can divide both sides of (12.a) by $(\gamma_1)^{w}(\varphi_1)^{\rho}$ to obtain

$$U'(c_1, l_1, c_2, l_2) = k(c_1)^{\omega}(l_1)^{\rho} + \beta' k(c_2)^{\omega}(l_2)^{\rho} \tag{12.b}$$

where $\beta' = \left(\frac{\gamma_2}{\gamma_1}\right)^{\omega}\left(\frac{\varphi_2}{\varphi_1}\right)^{\rho}\beta$.

$U'(c_1, l_1, c_2, l_2)$ is identical to the utility function of natives, except for the "discount" factor $\beta'$. Since we assume that $\gamma_1 > \gamma_2$ and $\varphi_1 > \varphi_2$, the discount factor for immigrants is larger than that of natives. Since the Cobb-Douglas utility function is homogeneous, an increase (decrease) in either $\gamma_2$ or $\varphi_2$ ($\gamma_1$ or $\varphi_1$) would lower $c_1$ and $l_1$ by the same proportion, and the increase in $c_2$ would be proportional to the increase in $l_2$. The reverse would hold if the change is in the opposite direction.

Now consider the slightly more general case of a homogeneous utility function that need not be of the Cobb-Douglas kind. Then,

$$(13.a) \qquad U(c_1, l_1, c_2, l_2) = u(\gamma_1 c_1, \varphi_1 l_1) + \beta u(\gamma_2 c_2, \varphi_2 l_2)$$

$$= (\gamma_1)^{\theta} u\left(c_1, \frac{\varphi_1}{\gamma_1} l_1\right) + \beta(\gamma_2)^{\theta} u\left(c_2, \frac{\varphi_2}{\gamma_2} l_2\right),$$

where $\theta < 1$ to ensure the strict concavity of $U(c_1, l_1, c_2, l_2)$. If we divide both sides by $(\gamma_1)^{\theta}$ we obtain

$$(13.b) \qquad U'(c_1, l_1, c_2, l_2) = u\left(c_1, \frac{\varphi_1}{\gamma_1} l_1\right) + \beta' u\left(c_2, \frac{\varphi_2}{\gamma_2} l_2\right)$$

where $\beta' = \left(\frac{\gamma_2}{\gamma_1}\right)^{\theta} \beta$. Since $\gamma_2 > \gamma_1$ by assumption, it follows that $\beta' > \beta$. Thus, even if $\gamma_i = \varphi_i$, the effect of the higher effective discount factor of immigrants versus that of natives, would result in the former working more and consuming less in period 1 and more in period 2. This is the same result as in the Cobb-Douglas case. If, as we expect, $\gamma_i > \varphi_i$, the incentive to work would be further enhanced in period 1, and also in period 2, when compared to the work effort of natives.

It is not as clear, however, what would happen in this case if, for example, $\gamma_1$ would increase. Clearly, $c_1$ would increase, and $c_2$ and $l_2$ would decrease, as before. The consumption of leisure, $l_1$, however, could increase, stay the same, or decrease. Since an increase in $\gamma_1$ shifts the effective price ratio in favor of $c_1$, we have a substitution effect that works against the consumption of leisure in period 1. But there is also a substitution effect between period 1 and 2 which works in favor of $l_1$, as well as an income effect as the same consumption $c_1$ results in a higher level of utility. Which of these effects dominates cannot be predetermined.

## 4. FACTORS INFLUENCING THE VOLUNTARY RETURN TO THE ORIGIN COUNTRY

The model introduced in this paper can help make the trade-off between nonmonetary costs of migration and monetary benefits explicit. To illustrate this we will only look at the conditions under which an immigrant would voluntarily return to the origin country. To keep the problem tractable we assume that labor is supplied inelastically and that $\varphi_2 = 1$. While this reduces the generality of the analysis it allows some additional insight into the relationship between degree of

assimilation and voluntary return. The analysis in this section shares similarities with that in Djajić and Milbourne (1988, section 4.3, p. 346). They show that an increase in the flow of utility associated with a given rate of consumption abroad will increase the level of consumption and, consequently, the optimal length of stay. In the extreme case, the length of stay coincides with the life of the immigrant. Because the Djajić and Milbourne model makes length of stay an endogenous variable, it is more general than ours in this respect. There is a subtle but important difference between the two analyses, however. Our model shows that an immigrant who *becomes* better assimilated is less likely to voluntarily return to the origin country, irregardless of the degree of assimilation when that individual first arrived. By contrast, Djajić and Milbourne's model can only show that an immigrant who *is* well assimilated when she arrives will stay longer. Since immigration to most industrialized countries is increasingly from countries of very different cultures, the ability to model changes in the degree of assimilation is very important for policy analysis.

Under the assumptions of our model a person will voluntarily return to the origin country in period 2 if the following inequality is satisfied:[13]

$$\kappa\bar{w}(1-l_2)+(1+\bar{r})s>\gamma_2\bar{w}(1-l_2)+\gamma_2(1+\bar{r})s \tag{14.a}$$

where $\kappa<1$ is the factor by which wages in the origin country lag behind those in the host country. Inequality (14.a) can be rearranged into a form that is easier to interpret,

$$(1-\gamma_2)(1+\bar{r})s>-(\kappa-\gamma_2)\bar{w}(1-l_2). \tag{14.b}$$

Since $\gamma_2\leq 1$ by assumption, the left-hand side is nonnegative. It shows the opportunity gain from returning in terms of the greater consumption value of savings. The greater consumption value is not the result of lower prices (as, for example, in Djajić 1989) but of the greater enjoyment of commodities consumed in the origin country. The right-hand side is the opportunity loss from returning in terms of lower real earning power. Only when $\gamma_2>\kappa$ is this expression positive. An immigrant will stay in the destination country voluntarily for a second period only if inequality (14.b) is reversed. As (14.b) shows, the inequality is more likely to be reversed the smaller the wage rate in the origin country relative to that of the destination country (the smaller value of $\kappa$), the higher the degree of assimilation in period 2 (the closer the value of $\gamma_2$ is to 1), and the higher the work effort in the second period (the lower $l_2$).

In reality, of course, outcomes are not so clear cut. For one thing, our analysis ignores uncertainty. But even in the absence of uncertainty, the level of assimilation

[13] The inequality is obtained by comparing the second-period utility if the immigrant stays with the utility that is obtained if she or he returns to the country of origin, respectively.

at the beginning of the second period will not be the same for all immigrants but will be distributed over a range of values. Thus, if we pick an immigrant at random, what is the probability that this particular immigrant will voluntarily return to the country of origin? The probability that a migrant will voluntarily return to origin country for period 2 is as follows:

$$\text{Probability} = P(x) \tag{15}$$

$$\text{where} \quad x = (1-\gamma_2)(1+\bar{r})s + (\kappa-\gamma_2)\overline{w}(1-l_2)$$

$$\text{and} \quad \frac{dP}{dx}(x) \leq 0.$$

The value of $x$ is a function of $\gamma_2$ and can be negative only if $\gamma_2 > \kappa$. Under the assumptions of our model no voluntary return migration will take place if $x$ is positive.

One of the implications of this is that immigrants from countries with cultures and attitudes that are very different from those of the destination country are more likely to return home than immigrants from cultures that are similar. Thus, governments of countries that do not wish immigrants to stay permanently, yet find that it is to their economic advantage to admit foreign workers, may be well advised in seeking workers from countries of a much different culture. We can also conclude that immigrants from countries with a wage rate far below that of the destination country ($\kappa \ll 1$) are less likely to return than immigrants from countries with wage rates only moderately lower. Thus, for example, one can argue that the admission of workers from South Korea to oil-producing countries of the Middle East is a rational policy, since most Middle Eastern countries do not want to be considered destinations for permanent immigrants.[14] South Koreans have a different language, religion, foods, attitudes towards women, on the one hand, yet can expect a fairly high work income at home, on the other hand. Both characteristics of this immigration increase the likelihood of the eventual voluntary return of these "guestworkers."

Similarly, the investment by the government of a host country into the education of the children of immigrants in the language of these children's parents is rational if this country doesn't wish to be considered an "immigration country." The experience of Germany and Switzerland with such policies make us skeptical about their efficiency, however. It seems the main effect of such deliberate policies is that they make the children of immigrants feel separate in the country that, in many cases, is the country of their birth. It doesn't seem to build ties to the countries of their

[14] South Koreans are working on large construction projects with internationally active Korean firms. This further enhances the probability of their returning to Korea upon completion of the work for which they were needed.

parents that are strong enough to encourage a significant rate of emigration to these countries.[15]

The likelihood of return is also lowered if the optimal work effort in the second period, $l_2$, is high, as long, of course, as the condition $\gamma_2 > \kappa$ is met. The reason for this is that the opportunity cost of earning less in the origin country weighs more heavily in favor of staying the more an individual works in the second period. One of the implications of this is that individuals who must make a very large investment to migrate and are less likely to return.

## 5. GUESTWORKERS

An interesting question is whether an individual with a low degree of assimilation, and who doesn't expect to become assimilated in the prospective destination country, would ever decide to migrate anyway. In particular, would a person for whom inequalities (14) are met ever make a decision to migrate for one period to benefit from the higher wage rate, but then return to the origin country for period 2? In other words, can this model explain the existence of "true" guestworkers? It is clear that in a model of this kind, and without uncertainty, emigration to another country will either occur at the beginning of period 1 or not at all. A guestworker will be defined as someone who emigrates to another country in period 1 and returns to the origin country in a pre-planned migration move in period 2. For this to happen, the following condition must be met:

$$(16.a) \qquad u(\gamma_1 c_{1f}, \varphi_1 l_{1f}) + \beta u(c_{2h_f}, l_{2h_f}) > u(c_{1h}, l_{h1}) + \beta u(c_{2h}, l_{h2}),$$

where $f$ denotes the destination or foreign country, and $h$ the origin or home country. The second subscript $f$ in the second term in (16.a) denotes the consumption of leisure and consumption in the home country in period 2 when the first period was spent in the foreign country. No equivalents of $\gamma_i$ and $\varphi_i$ need to be included for the home country because they are 1 by definition.

After some rearranging inequality (16.a) becomes

$$(16.b) \qquad \beta\left\{u(c_{2h_f}, l_{2h_f}) - u(c_{2h}, l_{h2})\right\} > u(\gamma_1 c_{1f}, \varphi_1 l_{1f}) - u(c_{1h}, l_{h1}).$$

Inequality (16.b) says that the discounted gain in utility that is obtained through higher consumption of leisure and/or goods in period 2, made possible by greater earnings if period 1 is spent in country $f$, must exceed the loss in utility that is the

[15] Germany and Switzerland do not automatically grant citizenship to children of foreign residents, even if the children are born in these countries. The children maintain the citizenship of their parents and remain, technically, foreigners. This situation has resulted in the oxymoronic expression "second generation immigrants."

result from spending period 1 in country $f$ instead of country $h$, the migrant's home country. If this condition is met, then "true" guestworkers do exist.

It is clear from (8.c) to (8.f) that guestworkers consume less and work more in period 1 than permanent immigrants or natives; for guestworkers $\gamma_2$ and $\varphi_2$ can be set equal to 1 if they return to their home country where they are fully assimilated into society. The effect is the same as if guestworkers had a lower discount rate than permanent immigrants or natives of country $f$.

Our model implies that guestworker migration is unlikely to exist if immigrants are fully assimilated. Since earnings are superior in country $f$ the immigrant would not return to country $h$ because, if the individual is fully assimilated in country $f$, there would be no nonmonetary benefit in the form of higher utility from consumption to compensate for the monetary loss in the form of lower earnings (see also (14.b)).[16] The policies of countries like Germany or Switzerland, which make naturalization and political participation difficult, are perfectly rational economic policy as neither country wants to be considered a country of immigration. It would be interesting to check if turnover rates of the foreign populations of these two countries are higher then in other destination countries, such as Sweden, that have a more positive attitude towards the integration of immigrants.

Lack of assimilation has thus been shown to be an important determinant of the existence of guestworker migrations. As Djajić (1989) has shown, however, return migration can remain attractive even to a fully assimilated immigrant, as long as consumption in the origin country is sufficiently cheaper than in the destination country. This shows that assimilation and cost-of-living differences together contribute to the existence of temporary (guestworker) migrations.

## 6. SUMMARY AND CONCLUSIONS

Recent analyses of immigration have focused on differences in incentives to explain differences in the economic performances and success of immigrants versus those of natives. They assumed that immigrants and natives are identical in every respect; the only reason they perform differently is because of externally imposed differences in incentives. But immigrants differ from natives because of the costs of migration. From the start, therefore, immigrants face different conditions even if they are otherwise identical to natives. Since we assume migration to be voluntary, differences in incentives because of the costs of migration are self-imposed. By changing the nature of the differences in incentives from those externally imposed, such as the possibility of forced return to the origin country, to differences that reside within a person, we show that the effects of such differences are quite complex.

[16] As demonstrated by Djajić (1989), however, this implication may not hold if the cost-of-living in the origin country (country $h$) is lower than in country $f$. In this case even a fully assimilated migrant may choose to return to country $h$. The higher the savings (accumulated in period 1) and the consumption of leisure, $l_2$, the greater the monetary incentive for voluntary return migration.

Galor and Stark (1990) argue that by keeping the probability of return positive, the government of the destination country can provide an incentive for immigrants to work and save more than natives in period 1. This effect is the stronger the higher the probability of return, $\alpha$. Our result reinforces that conclusion. Assimilation is likely only if the probability of return is low. The higher the probability of return, the more immigrants have an incentive to maintain strong ties to their origin country to "keep their options open" and facilitate a possible return with minimal economic and social disruption. Mathematically this can be expressed by the derivatives

$$(17) \qquad \frac{d(\gamma_2 - \gamma_1)}{d\alpha} < 0 \quad \text{and} \quad \frac{d(\varphi_2 - \varphi_1)}{d\alpha} < 0.$$

Our results show that low values of $\varphi_i$ encourage greater work efforts by immigrants. Assimilation is much more difficult to achieve if immigrants have an uncertain status. Thus, in such a case, the values of $\gamma_i$ and $\varphi_i$, $i = 1, 2$, will be lower than they would otherwise be and immigrants will work harder. We have also shown, however, that a low value of $\gamma_2$ encourages immigrants to return in period 2 (see (14) and (15)), in which case the benefits of the greater work effort are likely to be transferred to the origin country in the form of savings. Thus, while our results are compatible with those of Galor and Stark, our model formulation also recognizes the undesirable effects of a policy of manipulating $\alpha$.

In fact, (14) and (15) point to a possible policy dilemma. If government impedes assimilation, immigrants are more likely to work harder than identical natives, but they are also more likely to return to their origin country in the second period. Conversely, if government assists them, their work effort will be reduced, but they are more likely to stay. Of course, if a country wishes only to attract temporary foreign workers, a policy of making assimilation difficult is rational.

Our results have another interesting implication. Immigrants from countries with a greater cultural distance from the destination country should work and save more than those from countries with similar cultural values, since the latter are expected to have values of $\gamma_i$ and $\varphi_i$ that are larger than those of the former group of immigrants. This conclusion depends, however, on the assumption that immigrants from both groups are identical to one another in every respect but the values of $\gamma_i$ and $\varphi_i$ in their utility functions. Unless the cultural and social distance between them is small at the time of migration, this assumption is very unlikely to hold.

A possible argument against this type model is that potential immigrants cannot assess the likelihood of their assimilation into the host society. We believe this argument is incorrect. While there are, of course, substantial uncertainties regarding not only the success of becoming assimilated, but also with respect to economic opportunities, the experience of previous immigrants provides information that should result in the formation of reasonably accurate expectations on the part of a prospective immigrant. Thus, in mass migrations at least, sufficient information is likely available to potential immigrants to make a model of this kind relevant for policy analysis. We grant that, in the case of small numbers of immigrants, this

assumption may not be met. But, in such a case, policy concerns over immigration will also not have very high priority.

Assimilation doesn't just happen. The immigrant and, possibly, the host society invest into the process. One of the questions we have not answered, but that is deserving of analysis in the future, is that of the optimal investment level. We should note that there are two different optima that need to be considered, as well as two different optimal investment strategies. One is that of the immigrant, the other is that of the host society. The two are related and it is likely that a greater investment by one may discourage investment by the other.

It is possible to apply a model of the kind presented here to problems of discrimination. In the United States, discrimination on the basis of race, religion, national origin, gender, or age, is illegal. This does not mean that it does not occur, but it may be subtle. Thus, two workers with identical qualifications and responsibilities, one a member of a minority and the other a member of the dominant group, may be paid the same wage. But if the member of the minority group feels unwelcome to join in social gatherings after work and other events not strictly work related, her or his utility may be reduced in ways that can be represented as we did for immigrants in this paper.

In summary, this paper presents a model that provides a theoretical framework for the analysis of the work effort and consumption of immigrants relative to those of native-born citizens. The analysis and discussion show the complexity of such a comparison.

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