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The text of Dr Oded Stark's article originally appeared in the July 1983 (Vol. 19, No. 4) issue of the Journal. Most regrettably, however, the earlier text contained a number of errors, despite the fact that the author had pointed them out in the usual way at proof stage. The Editors have decided that simple notification of *errata* would be insufficient to correct the situation and that, in fairness to Dr Stark, the article should be published in properly corrected form. The Editors apologise to Dr Stark for the publication of the erroneous text and regret any inconvenience caused.

A Note on Modelling Labour Migration in LDCs

by Oded Stark*

Taking the family as the rural-to-urban migration decision-making unit, will the 'expected-income migration model' accurately predict the level of migration? Consideration of two variables – desire for leisure, and aversion to risk – serves to show that the expected-income model yields a systematic downward bias in the predicted level of rural-to-urban migration. Likely policy implications emanating from the incorporation of these variables in the migration decision are indicated.

I. INTRODUCTION

Since the pioneering article by Todaro¹ it has generally been accepted that the observed fact that rural people migrate to the urban sector in spite of (and simultaneously with) urban unemployment, may be explained in terms of *expected income* maximization behaviour. Expected income soon became the major, often the only explanatory variable. Many theoretical studies offered revisions of Todaro's model² but there are still some important analytical omissions, with significant policy implications. To some extent this can be accounted for by the general – often tacit – adherence to Todaro's postulate that *the individual* is the optimizing migration decision-maker. However, there are strong analytical and empirical grounds to assume that *the family* is the relevant decision-making entity.³ It follows that while expected individual maximization can be used to explain rural-to-urban migration, it is rather unsatisfactory in that it ignores the characteristics of the utility function – both shape and arguments – which typifies the family unit. In this note two additional explanatory variables – desire for leisure and aversion to risk – are introduced.⁴ Once allowance is made for these, the received model is seen to yield a systematic downward bias in the predicted level of rural-to-urban migration in LDCs as well as an inefficient migration-related policy mixture.

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II. MIGRATION, THE FAMILY, AND DESIRE FOR LEISURE

Consider two types of families: a 'Todaro-type' family (the T-family) whose aim is to maximise total income, and a leisure-desiring 'net utility' type family (the L-family) whose aim is to maximize the difference between utility from income and disutility from effort. Both maintain the same sharing arrangements, consist of homogeneous members, and engage in rural-to-urban migration. The equilibrium number of migrants coming from each type of family is denoted by M_T and M_L , respectively.

Assuming risk-neutrality,⁵ and ignoring intersectoral transfer costs, it can easily be shown that if the agricultural production function is homothetic and depends on labour input alone, $M_L > M_T$. For the T-family, the equilibrium condition is that agricultural income per family labourer be equal to the expected urban income, $W_A = P_T W_M$, with $P_T < 1$ denoting the equilibrium level of the probability of urban employment, $P_i = P_i(M_i)$ $P'_i(M_i) < 0$, $i = T, L$, and with W_A , W_M denoting wages per a standard unit of work-time in agriculture and urban employment, respectively. The institutionally determined W_M is assumed constant throughout the analysis. However, for the L-family, P_T implies that, on average, only one of the $1/P_T$ member labourers who are located in the urban sector works and incurs the disutility from effort per the standard unit of work-time, whereas the other $(1/P_T) - 1$ do not. But taken together, the contributions to family income of the $1/P_T$ labourers are exactly the same as they would have been if all the family members had stayed behind and worked in the rural sector. Therefore, on average, net utility per urban family member is higher than net utility per rural family member. If the drudgery associated with the standard unit of work-time is greater in agriculture than in urban employment, the difference will be even larger. Consequently, total net utility is not maximized, implying that rural-to-urban migration must continue past the M_T level associated with P_T , say, to $M_L > M_T$. Note that due to the homogeneity assumption and the resultant absence of selectivity, the choice of a family migrant is random: urban migrant members may be assumed to rotate and interchange: and if there is perfect substitution, everyone's leisure and income is the same. As intersectoral transfer costs are negligible, intersectoral interchange also occurs. Therefore, all family members should be perfectly willing to participate in such an equal-chance, Pareto-improving game.

The result $M_L > M_T$ easily carries over to the case where the agricultural production function depends on labour and a fixed input, and exhibits diminishing returns to labour over the relevant range. A simple proof is presented elsewhere.⁶

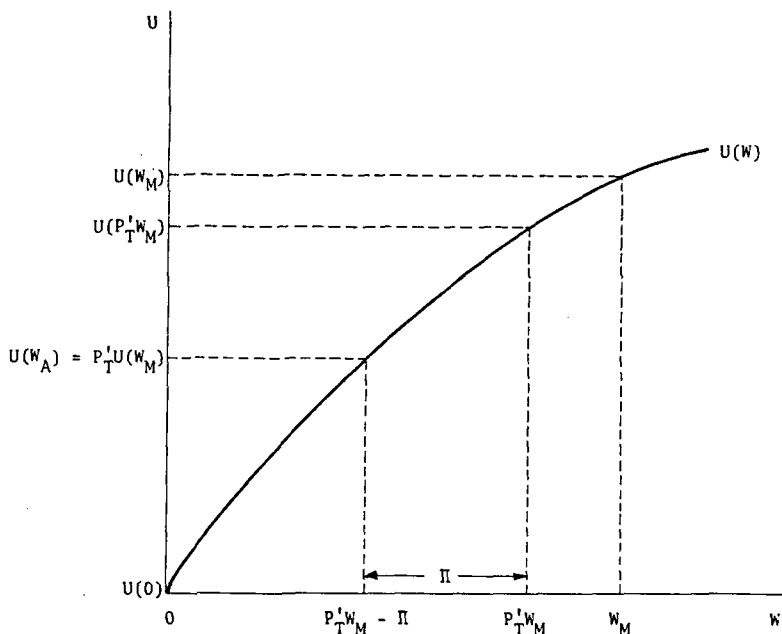
III. MIGRATION, THE FAMILY, AND AVERSION TO RISK

Assume a risk-neutral, Todaro-type individual who considers only the period immediately following his migration to the urban sector. He will be indifferent between receipt of W_A and W_M with probability P_T . However, if the individual is risk-averse, he will be indifferent between receipt of

$W_A + \Pi$ and W_M with probability $P'_T > P_T$ where $\Pi > 0$. To see why, note that since risk aversion implies $P'_T U(W_M) < U(P'_T W_M)$, taking $U(0) = 0$, the equilibrium condition is $U(W_A) = P'_T U(W_M)$. Thus, there exists some positive Π such that $U(W_A) = U(P'_T W_M - \Pi)$, or $W_A = P'_T W_M - \Pi$ is the certainty equivalent equilibrium condition. These relationships are depicted in Figure 1.

Thus, Todaro's model adjusted for *individual* risk aversion predicts a higher equilibrium level of employment probability than the original

FIGURE 1



model. Because of the inverse relationship between this probability and the level of migration, migration in this case stops short of the level predicted under *individual* risk neutrality. Put differently, in equilibrium $W_A < P_T W_M (< P'_T W_M)$.

Assume now that the family is the decision-making unit; assume, further, *familial* risk aversion, and retain the assumption that only the period immediately following migration – say, by one family member – is considered. The family wishes to maximize its expected level of utility and in pursuing this objective considers the alternative sectoral allocations of its working members. We can view this as a problem of selecting the optimal investment portfolio. If we now assume that the urban ‘investment’ (that is, urban earning activity) is distributed independently of all other ‘investments’ and has a mean which is at least as large as that of any other, we can prove that, for the risk-averse family, it is mandatory to enter the urban ‘investment’ in

the optimal portfolio regardless of the variance of each investment – provided only that it is finite (and non-zero).⁷ This implies that as long as $P_T W_M > W_A$ family members will migrate and that migration will cease (equilibrium will obtain) when $W_A = P_T W_M$. Hence, once again, the predicted level of migration with the *family* as the migration decision-making entity is higher than the predicted level of migration when the *individual* makes the decision on his own.

The intuition behind the last result is that more opportunities are open to a family and larger benefits accrue to it than to an individual in exploiting a given intersectoral wage differential. Whereas an individual who avoids risk captures a higher expected income at the cost of a larger income variance (a source of displeasure), the family unit which consists of several labourers can capture both higher returns to labour and, through diversification which is not open to the individual, a small *overall* risk. Thus, the family – unlike the individual – is not deterred even by a large variability associated with earning urban income.

Interesting policy implications emerge from these arguments. Although rural-to-urban migration is taking place *in the presence* of a positive urban-rural expected-incomes differential, the motive is not expected-income maximization as such. Maximization of familial leisure – given the family's expected income – is the motivating force; familial aversion to risk is another. This distinction should matter for policy. Take, for example, the latter point on risk-avoidance as an underlying cause of rural-to-urban migration. Assume further that an institutional interference aimed at reducing migration is deemed desirable. Under these circumstances, it would be efficient to shift away from exclusive (so far, largely futile) attempts to narrow down the intersectoral wage differential towards the creation and/or perfection of rural insurance markets.

This point ties up neatly with the issue raised in Section II. The observed variables are rural-to-urban migration and urban-rural expected incomes differentials, but the latter may not capture the decision variables that generate the former, especially desire for leisure and aversion to risk. Because of market imperfections or non-existence of markets it is not always possible to buy more of one 'good' when there is much of the other. Yet as all these variables enter the migrant's objective function, 'cross-substitutions are likely to prevail. Hence it is possible, and may be both necessary and optimal to influence the 'migrate-or-stay-put' decision – should such interference be deemed desirable – through use of policy instruments which reduce risk rather than affect desire for leisure or expected returns to labour. This may be a sufficiently promising area to merit further careful analysis and critical empirical research.

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NOTES

1. Michael P. Todaro, 1969, 'A Model of Labour Migration and Urban Unemployment in Less Developed Countries,' *American Economic Review*, 59, No. 1, March.
2. For references see Michael P. Todaro, 1980, 'Internal Migration in Developing Countries: A Survey,' in *Population and Economic Change in Developing Countries*, ed. Richard A. Easterlin, National Bureau of Economic Research, Report No. 30, Chicago: University of Chicago Press.
3. See Oded Stark, 1978, *Economic-Demographic Interactions in Agricultural Development: The Case of Rural-to-Urban Migration*, Rome: UN Food and Agriculture Organization; Oded Stark, 'Towards a Theory of Remittances in LDCs,' Harvard Institute of Economic Research, Discussion Paper Series, March 1983. (Presented at the 1982 Joint Meeting of the Econometric Society and the American Economic Association, New York, 28-30 December 1982.)
4. In viewing the family unit as the *migration* decision-making entity, it is possible to gain fresh insight into a wide range of issues such as fertility decisions, educational decisions, the distribution of income by size, the shadow wage rate, the optimal choice of capital intensity, the magnitude of urban-to-rural remittances; I have studied these topics elsewhere.
5. The $M_L > M_T$ result easily carries over to the non-risk-neutrality case, provided that both types of families associate similar differential risks with rural and urban income-earning activities and hold similar attitudes towards risk.
6. Oded Stark, 1982, 'Rural-Urban Migration and Surplus Labour,' *Oxford Economic Papers*, 34, No. 3, November.
7. A formal proof is provided in Oded Stark, *Economic-Demographic Interactions in Agricultural Development: The Case of Rural-to-Urban Migration*, Appendix II.