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MIGRATION THEORY AND EVIDENCE: AN ASSESSMENT

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ABSTRACT

Migration Theory and Evidence: An Assessment*

This paper presents a critical survey of theories of migration, their welfare and policy implications and their empirical relevance. We also develop some extensions to the theory beginning with a general encompassing model of migration which treats the Harris and Todaro (HT) model as a special case. In particular, we show how standard policy, a reduction of the wage gap between an advanced and a backward region to reduce the rate of migration, follows from the standard model, but ceases to be valid if borrowing constraints on the potential migrant are introduced. The HT model is extended to examine risk-averse behaviour within families where the migration of members of families serves to diversify risk. The welfare implications of the individual migration decision and government intervention in the form of employment subsidies are also examined.

JEL classification: F22, J61, O15
Keywords: migration, Harris-Todaro, employment subsidies

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Todaro, M. P. (1969) 'A Model of Labour Migration and Urban Unemployment in Less Developed Countries', **American Economic Review**, 59 : 138-48

Todaro, M. P. (1976) **Internal Migration and Economic Development : A Review of Theory, Evidence, Methodology and Research Priorities** (ILO, Geneva)

Todaro, M (1980) 'Internal Migration in Developing Countries' in Easterlin, R. A. (ed) **Population and Economic Change in Developing Countries**, Chicago University Press, Chicago, Illi

Williamson, Jeffrey G. (1988) 'Migration and Urbanization' in Chenery, H and Srinivasan T. N. (eds) **Handbook of Development Economics**, Vol. I North-Holland

Willis, R.J. and S. Rosen (1979), 'Education and Self-Selection.' **Journal of Political Economy**,87, S7-S36.

World Bank (1988, 1989, 1990) **World Development Reports**, Oxford University Press, New York,/Oxford

Yap, L (1977) 'The Attraction of Cities : A Review of the Migration Literature', **Journal of Development Economics**, 4 : 239-264

Sabot, R (1982) (ed) **Migration and the Labour market in Developing Countries**, Boulder, Colarado, Westview Press.

Sabot, R.H. (1977), 'The Meaning and Measurement of Urban Surplus Labour,' **Oxford Economic Papers**, 29:389-411.

Shaw, E (1973) **Financial Deepening in Economic Development**, Oxford University Press, New York

Shukla, V. and O. Stark (1990), 'Policy Comparisons with an Agglomeration Effects-Augmented Dual Economy Model',**Journal of Urban Economics**, 27.

Simon, H (1959) 'Theories of Decision Making in Economics', **American Economic Review**, 49

Simon, H (1972), 'Theories of Bounded Rationality' in Mcguire, C. B. and Radner, R, eds, **Decision and Organisation, North Holland**, Amsterdam.

Sinclair, S. W. (1978),**Urbanisation and Labour Markets in Developing Countries**, Croom Helm, London.

Squire, L. (1981), **Employment policies in developing countries**: A survey of issues and evidence. Oxford University Press, Oxford.

Stark, O (1982), 'Rural-Urban Migration and Surplus Labour : reservations on Bhatia', **Oxford Economic Papers**, 34 : 3 : 569-73

Stark, O (1984), 'Rural to Urban Migration in LDC's : A Relative Deprivation Approach', **Economic Development and Cultural Change**, 32 : 475-86

Stark O, and Bloom, D (1985) 'The New Economics of Labour Migration', **American Economic Review**, 75 : 173-78

Stark, O., Gupta, M.R. and D. Levhari (1991),'Equilibrium Urban Unemployment in Developing Countries', **Economic Letters**, 37:477-482.

Stark O, and Levhari D (1982) 'On Migration and Risk in LDC's', **Economic Development and Cultural Change**, 31 : 1 : 191-96

Stark, O and Taylor, J. E. (1991) 'Migration Incentives, Migration Types : The Role of Relative Deprivation', **Economic Journal**, 101 : 1163-1178

Stark, O (1991) **The Migration of Labour**, Blackwell, Oxford.

Straubhaar, T. and K.F. Zimmermann, (1992), 'Towards a European Migration Policy,' Discussion Paper No.641: CEPR. London.

NON-TECHNICAL SUMMARY

Migration issues and related economic policies will certainly grow in importance with the liberalization and economic reform in Eastern Europe and the former Soviet Union. In this paper we offer a critical survey of theories of migration, their welfare and policy implications and their empirical relevance. In developed economies, migration of labour from the backward and less-productive to the modern and more-productive sector is considered a major instrument in the enhancement of economic welfare. Most trade theories emphasize labour and capital mobility as a key factor in the achievement of higher economic growth and efficiency. The promotion of factor mobility and improvement of the efficiency of the tradable sector is therefore essential to allow trade to be the engine of economic development. Recent evidence from the World Bank tends to validate the relative success of the export-led growth strategy for many less-developed countries (LDCs) due to its superior ability in transferring labour from low-productivity to high-growth areas.

In an influential paper, Harris and Todaro (HT) present a macroeconomic model which comprises a developed urban, and an underdeveloped rural sector. In this model migration equilibrium is achieved through unemployment in the developed urban sector due to the equalization of the actual wage in the rural sector and the expected wage in the developed urban sector. Further, HT show that the probability of a migrant's job opportunity in the modern sector is one minus the unemployment rate in the modern/urban sector. The predictions of the model are twofold: first, the lower the urban-rural wage gap, the lower is the rate of migration; and second, the higher the perceived probability of finding a job in the modern sector, the greater is the rate of migration. Hence, the policy of creating more jobs in the urban sector will increase the rate of migration.

Given these predictions, while development economists extend the HT model by relaxing the labour market assumptions, trade theorists concentrate on factor-market distortions in open economies. Some link the HT model with theories of trade and factor price equalization. Others extend the HT model for skilled labour. A large number of relatively uneducated and unskilled people do migrate and work, however, which the HT model cannot explain. Further, if more job creation in the modern sector leads to greater unemployment, markets are perverse, since migration decisions regarded as rational from the point of view of individuals appear disastrous for society. Surely migration is socially desirable as long as it transfers labour from low- to high-productivity areas.

In this paper we develop some extensions to the HT theory beginning with a general encompassing model of migration which treats the HT model as a special case. In particular, we show in the context of an imperfect credit market, how standard policy – a fall in the wage gap between an advanced and a backward

region to reduce the rate of migration – follows from a standard model but ceases to be valid if borrowing constraints on the potential migrants are introduced. The poor in backward regions cannot fully finance the full cost of migration by borrowing as they lack creditworthiness. Hence they lack incentives to migrate except during periods of war or natural disaster. For the very rich, migration is incentive incompatible because discounted benefits from migration fail to compensate the costs. In contrast to the HT model, a marginal reduction in the wage gap actually increases migration because it gives agents more resources to migrate. The growth of credit institutions, availability of credit and the pattern of income distribution could be major factors in explaining the rate of migration.

According to the new portfolio investment theory advocated by Oded Stark, families spread their risks in structurally different markets. After migration, members of the family combine and share their incomes. Such pooling is regarded as a form of insurance against uncertain income flows from specific markets to smooth the family consumption growth path. Thus, if future earnings are uncertain and imperfectly but positively related in a geographically specific area, the migration policy of a member of the income-pooling family diversifies risk. In a 'safety-first' or 'safety-fixed' framework, however, migrants will be more concerned with maximizing their chances of survival than maximizing their income. In the HT model migrants are risk neutral. If they are risk averse, they may wish to maximize the minimum income at some predetermined probability or confidence level rather than maximizing utility.

The welfare implications of the family model are similar to the HT case. Ignoring the welfare of the original urban population for individual family decision-making, the outcome could be Pareto-inefficient and a welfare-enhancing migration rate could be achieved by coordination. In the HT model urban employment is fixed. Since migration only reaches an equilibrium when there is no net gain for the migrants, any migration is socially inefficient as it generates a higher unemployment probability for the urban population. Thus the socially optimal migration rate is zero. If urban employment rose as a result of migration, however, because of some degree of real-wage flexibility, a non-zero migration rate emerges. Thus, even a small degree of real-wage flexibility can lead to substantial welfare benefits from migration provided the marginal productivity of labour in the urban sector is considerably larger than the rural sector. In the absence of subsidies any migration lowers social welfare unless there is some degree of real-wage flexibility in the urban sector. These results lead to the issue of policy-makers' urban bias. Migration could involve negative externalities, that may take the form of adjustment costs which tend to disappear in the long run. Besides, subsidies must be financed by any savings on unemployment costs and increased receipts from taxes of the newly employed. This introduces the notion of a 'budget constraint'. In general, the optimum schemes may not satisfy

Nakosteen, R.A. and M. Zimmer (1980) 'Migration and Income:The Question of Self-Selection',**Southern Economic Journal**,46,840-851.

Neary, J. P. (1981),'On the Harris-Todaro Model with Inter-sectoral Capital Mobility', **Economica**, 48:219-234.

Nelson,J. (1976), Sojourners versus new urbanites: Causes and consequences of temporary versus permanent cityward migration in developing countries,' **Economic Development and Cultural Change**, 24:721-757.

Papola, T.S. (1981), **Urban Informal Sector in a Developing Economy**: Vikas Publishing, New Delhi.

Radner, R (1972) 'Normative Theory of Individual Decisions : An Introduction' in Mcguire, C.B. and Radner, R eds. **Decision and Organisation**, North-Holland, Amsterdam.

Rempel, H. (1974),'The role of rural-to-urban remittances in rural development,' **The Journal of Development Studies, 1974:14**:324-341.

Rempel,H, and R.A.Lobdell, (1978)'The role of Rural to Urban Remittances in Rural Development,'**Journal of Development Studies**,14:324-341.

Rosenzweig, M.R. (1978),'Rural wages, labor supply and land reform: A theoretical and empirical analysis,' **American Economic Review**,68:847-861.

Rosenzweig, M.R. and K.I. Wolpin (1985),'Specific experience,household structure and the intergenerational transfers: Farm family land and labor arrangements in developing countries,'**Quarterly journal of Economics**, 100:961-988.

Roumasset, J. A. (1976) **Rice and Risk : Decision Making Among Low Income Farmers**, North Holland, Amsterdam.

Ryan, J.G. and Ghodake, R.D. (1984),' Labor market behavior in rural villages in South India: Effects of season, sex and socio-economic status,' in H.P.Binswanger et.al (ed.), **Contractual arrangements, employment and wages in rural South Asia**. Yale University Press,New Haven,CT.

Schmidt, C. (1991), **The earnings dynamics of immigrant labour**, CEPR. London.

Schuh,G.E. (1982),'Outmigration,rural productivity and distribution of Income,' in R.Sabot (ed.), **Migration and the Labour Market in Developing Countries**, Boulder,CO: Westview Press.

Schwartz, A. (1976),'Migration,age and education,'**Journal of Political Economy**, 84:701-720.

Discussion Paper, University of Leicester.

Levy, M. and Wadycki, W. (1973),'The influence of family and friends on geographic Labour Mobility: An International Comparison,' **Review of Economic and Statistics**,55(2):198-203.

Levy, M. and W.Wadycki (1974),'Education and decision to migrate: An Econometric analysis of migration in Venezuela,' **Econometrica**,46:377-388.

Lewis, W.A. (1954),'Economic Development with Unlimited Supplies of Labour,' **Manchester School of Economic and Social Studies**: 22: 139-91.

Lipton,M. (1968), 'The theory of the optimising peasant,'**Journal of Development Studies**,3:327-351.

Lipton,M. (1977), **Why Poor People Stay Poor: A Study of the Urban Bias in World Development**, Temple Smith,London.

Lucas, R (1988), 'On the Mechanics of Economic Development', **Journal of Monetary Economics** . 3-42

Lucas, R (1985), 'Migration from Botswana', **Economic Journal**, 95:378:358-382.

March J. G. and Simon, H. A. (1958), **'Organisations'**, John Wiley & Sons, New York.

Mazumdar, D.(1977), 'Analysis of dual labour markets in LDCs,' in: S.Kanappan ed. **Studies in labour market behaviour in developing areas**, International Institute for Labour Studies: Geneva.

Mazumdar, D.(1981), **The Urban Labour Market and Income Distribution: a study of Malaysia**, Oxford University Press: Oxford.

McKinnon, R. I. (1973) **Money and Capital In Economic Development**, The Brookings Institute, Washington, D.C.

Maddala, G.S. (1983) **Limited-Dependent and Qualitative Variables in Econometrics**, CUP.

Molle, W. and A. van Mourik (1988) 'International Movements of Labour under Conditions of Economic Integration: The Case of Western Europe', **Journal of Common Market Studies**, Vol. XXVI, No. 3: 317-339.

Mundlak, Y. (1979),**Intersectoral Factor Mobility and Agricultural Growth**, International Food Policy Research Institute.

Nabi, I.(1984), Village and considerations in rural-urban migration,' **Journal of Development Economics**,14:129-145.

this constraint and a 'second-best' solution must be sought with a lower welfare improvement.

Within Europe a prosperous economic environment and greater job opportunities within the European Community (EC), coupled with its declining and ageing population, provide powerful incentives for migration from the non-EC countries, particularly with the current political and economic liberalization of Eastern Europe. To combat excessive migration from the non-EC countries, a number of strategies have been proposed which stem from the HT class of models:

- a reduction of the wage gap.
- the creation of new employment opportunities in the home countries of potential migrants.
- support efforts to stabilize the political systems in the home countries of the potential migrants.

To assess the welfare impact on the EC, the following points need to be emphasized:

- a clearer estimation of the size of the potential migration flows.
- an assessment of the marginal benefits from accepting migrants *vis-à-vis* their marginal costs of adaptation.
- identification of the specific sectors/industries where the complementarities between home and foreign workers could yield optimal benefits.
- an analysis of the costs of changing both labour and capital.
- an examination of the composition of migrants (skilled, unskilled, highly educated or undereducated), and human capital and its impact on economic growth (which could be endogenous).

Human capital accumulation is likely to play a major part in explaining the rate of migration and assessing the welfare and policy implications. Besides, the flow and dissemination of information at the point of origin of migration regarding availability of public goods could also influence migration decisions.

Gregory, P (1980), 'An Assessment of Changes in Employment Conditions in Less Developed Countries', **Economic Development and Cultural Change**, 28 : 673-700.

Grossman,J.B.(1982),'The substitutability of natives and immigrants in production,' **Review of Economics and Statistics**,64(4):596-603.

Hamermesh,D.S. (1987),'The Demand for labour in the Long Run,' in **Handbook of Labour Economics**,3(4):463-489.

Hamilton, B. and J. Whalley (1984), 'Efficiency and Distributional Implications of Global Restrictions on Labour Mobility', **Journal of Development Economics**,14:61-75.

Harris, J and Todaro M (1970), 'Migration, Unemployment and Development'. **American Economic Review**, 60 : 126-14.

Hay,M.J. (1980), 'A Structural Equations Model of Migration in Tunisia,' **Economic Development and Cultural Change**,28 (2):345-358.

Heckman, J.J. (1979), 'Sample Bias as a Specification Error', **Econometrica**, 47, 153-161.

House, W. J. and Rempel, H (1980), 'The Determinants of Inter-Regional Migration in Kenya, **World Development**, : 8 : 1 : 25-35.

Ichina,J.(1991),'Immigration and Earnings,' CEPR Discussion Paper on Migration Workshop: London.

Kanappan, S (1985) 'Urban Employment and the Labour Market in Developing Nations', **Economic Development and Cultural Change**, 33 : 669-730.

Kanbur, S. M. R. (1981) 'Short-run Growth Effects in a Model of Costly Migration with Borrowing Constraints : Will Rural Development Work?, in Currie D. et.al (eds) **Microeconomic Analysis**, Croom Helm, London

Katz, E and Stark, O (1986) 'Labour Migration and Risk Aversion in Less Developed Countries', **Journal of Labour Economics**, 4 : 134-149.

Knight,J.B. (1972),'Rural-Urban Migration Comparisons and Migration in Ghana,'Oxford Bulletin of Economics and Statistics:34:199-228.

Kuznets,S.(1982),'The pattern of shift of labor force from agriculture,' in Gersovitz,M. et.al (ed.), **The theory and experience of economic development**, George Allen and Unwin: London.

Kwok,V, and H.Leland,(1982),'An Economic Model of Brain Drain,' **American Economic Review**,72(1):91-100.

Levine, P.L. (1992), 'The Welfare Economics of Migration', Department of Economics

Corden, M and Findlay, R (1975) 'Urban Unemployment, Inter-sectoral Capital Mobility and Development Policy', **Economica**, 42 : 59-78.

De Vanzo, J, J.P. Habicht et.al. (eds.)(1980), **Quantitative Studies of Mortality decline in the Developing World**, World Bank : Washington D.C.

Ethier.E.J.(1985), International Trade Theory and Inernational Migration,'**American Economic Review**,75(4):691-707.

Emerson, R.D. (1989), 'Migratory Labor and Agriculture', **American Journal of Agricultural Economics**, vol 71, no 3, 617-629.

Fields, G (1975), 'Rural-Urban Migration, Urban Unemployment and Job Search Activities in LDC's', **Journal of Development Economics**, 2 : 165-187.

Fry, J. (1979), 'A Labour Turnover Model of Wage Determination in developing Economies,' **Economic Journal**,89:353-369.

Fry, M (1988), **Money,Banking and Economic Development**, John Hopkins Press, Baltimore, U. S. A.

Gehrig, A., C.M. Schmidt, K.F. Zimmermann,(1992),'Mass Migration, Unions, and Fiscal Migration Policy,' Discussion Peper No. 727: CEPR. London.

Georgescu-Roegen, N (1985) 'The Nature of Expectations and Uncertainty', in Bowman, J ed. **Expectations, Uncertainty and Business Behaviour**, Social Science Research Council, New York.

Ghatak, S (1981), **Monetary Economics in Developing Countries**, MacMillan, London

Ghatak, S (1986), **An Introduction to Development Economics**, Unwin Hyman, London/New York, 2nd ed.

Ghatak, S (1991), 'Development Economics : A Survey', **British Review of Economic Issues**, 13 : 1-60

Glytsos, N. P. (1977), 'Determinants of Wage and Price Changes in Less Developed Countries', **Journal of Development Economics**, 4 : 315-342

Greenwood, M.J. (1975), **Journal of Economic Literature**, vol 13, no 2, 397-433.

Greenwood, M.J. (1978), 'An Econometric Model of Internal Migration and Regional Economic Growth in Mexico', **Journal of Regional Studies**, 18 : 17-31

Greenwood, M.J., G.L. Hunt, D.S. Rickman and G.I.Treyz (1991), Migration, Regional Equilibrium, and the Estimation of Compensating Differentials, **American Economic Review**, vol 81, no 5, 1382-1390.

1.Introduction.

Migration issues and associated economic policies will grow in importance in the next few years as a consequence of political liberalisation and economic reform in Eastern Europe and the former Soviet Union. In the theories and policies of economic growth and development, migration of labour from one sector (usually less productive, e.g. agriculture) to another (generally more productive, e.g. manufacturing industry) is regarded as a key instrument to promote economic welfare. Similarly, most trade theories emphasise factor (labour and capital) mobility as an important policy to achieve a higher level of economic development. Recent evidence from less developed countries (LDCs) seem to underline the case for adopting economic policies which would (a) re-allocate labour from low productivity to high productivity areas; and (b) promote factor mobility and improve efficiency of the tradeable sector so that trade could be regarded as an engine of economic growth. Indeed, the World Bank Reports (1988, 1989) suggest that countries which adopted the above mentioned policies fared better (in terms of aggregate and per-capita growth rate) than those which followed inward-looking policies which failed to affect labour transfer rapidly enough to high growth areas. In contrast to this prescription, is a widespread view in the development literature that urban growth in the LDCs has been excessive and policy should be addressed at curbing an 'urban bias' (Lipton 1968,1977).

In a seminal contribution, Harris and Todaro (1970), henceforth abbreviated to HT offer a macroeconomic model which comprises a developed urban and an undeveloped rural sector and where a migration equilibrium is achieved through unemployment in the developed urban sector. This event occurs due to the equalisation of the actual wage in the rural sector and the expected wage in the developed modern sector. HT argue that one minus the unemployment rate in the modern/urban sector yields the probability of a migrant's job

opportunity in the modern sector. The positive predictions of the model are:

(a) the lower the urban (w_u)-rural (w_r) wage differential, the lower is the rate of migration; and

(b) the higher the perceived probability of finding a job in the modern sector, the greater is the rate of migration. Hence, the policy of creating more jobs in the urban sector will increase the rate of migration.

Given such interesting predictions, while development economists extend the HT model by relaxing the labour market assumptions (eg., Todaro, 1976, and Fields, 1975), trade theorists concentrate their attention on factor market distortions in open economies (Bhagwati and Srinivasan, 1974; Corden, 1974; Corden and Findlay, 1975; see also, Ethier, E.J.1985). While some looked at the welfare gains and losses of the HT model in the context of factor market distortions others relaxed a key assumption of the HT model about the lack of capital mobility (eg. Corden & Findlay, 1975), thereby linking the HT model with the Samuelson - Heckscher - Ohlin theories of trade and factor price equalization. Neary (1981) also allows for inter-sectoral capital mobility and derives the dynamic behaviour of the model. After all, urban - rural migration and inter-sectoral capital allocation are 'dynamic phenomena'. Neary argues that with sector specific capital, the HT model is always stable; however, if capital is intersectorally mobile, the stability condition is violated. As regards supply response, the Neary (1981) model predicts that a rise in minimum wage in manufacturing (modern) sector can raise manufacturing output. Other extensions of the HT model for skilled labour (eg. by Fields, 1975) suggest:

i)the higher probability of employment of an educated person;

ii)the different types of impact on the rate of migration due to different attitudes towards risk among migrants (note that HT assume risk-neutrality among migrants) and the

Bhagwati, J & Srinivasan, T. N. (1974), 'On Re-Analysing the Harris-Todaro Model : Policy Ranking in the Case of Sector Specific Sticky Wages', **American Economic Review**, 64 : 502-508

Berry A and Sabot R, (1984), 'Unemployment and Economic Development', **Economic Development and Cultural Change**, 33 : 99-116

Bhattacharya, P. C. (1991), 'Rural Urban Migration in a Dynamic Model of LDC', Discussion Paper No. 11 : Heriot-Watt University, Edinburgh, Scotland

Bhattacharya, P. C. (1992), 'Rural Urban Migration in India : The Influence of Caste', Discussion Paper No. 18 : Heriot-Watt University, Edinburgh, Scotland.

Borjas, G.J. (1989), 'Economic Theory and International Migration',**International Migration Review**, vol 23, no 3 457-485.

Borjas,G.J.(1985),'Assimilation,changes in cohort quality and the earnings of immigrants,'**Journal of Labour Economics**,3(4):463-489.

Borjas,G.J. and M.Tienda (1987),'The Economic Consequences of Immigration,' **Science**:235:643-651. 6 Feb.

Borjas,G.J.(1987),'Self-selection and the earnings of immigrants,' **American Economic Review**,77(4):531-553.

Burda, M. and M. Funke, (1992),'Trade Unions,Wages and Structural Adjustment in the New German States,' CEPR Discussion Paper No. 10-92. London.

Brecher, A. and E.U. Choudhri (1987), ' International Migration Versus Foreign Investment in the Presence of Unemployment', **Journal of International Economics**, 23 : 329-342.

Burda, M and Wyplosz, C (1991), 'Human Capital Investment and Migration in an Integrated Europe', Centre for Economic Policy Research: Discussion Paper No. 614 : London.

Carraro, C and A. Soubeyran, (1991), The Demand for Migration under Perfect Wage Discrimination,' CEPR paper on Migration, Nov. 1991: London.

Charemza, W. W. and Ghatak, S (1990) 'Demand for Money in a Dual-Currency, Quantity-Constrained Economy : Hungary and Poland, 1956 - 1985', **Economic Journal**, 100 : 1159-1172

Cole, W. E. and Sanders, R. D. (1985) 'Internal Migration and Urbanization in the Third World', **American Economic Review**, 75: 481-493

Connell, J et.al (1976), '**Migration from Rural Areas**', Oxford University Press, New Delhi.

Corden,W.M.(1974),**Trade Policy and Economic Welfare**,Clarendon Press,Oxford.

extraction of funds for such public services from the general revenue account instead of levying an urban property tax. Unfortunately, there has been little empirical investigation into the individual or joint impact of these variables.

Finally, our review has briefly discussed some of the very recent and rapidly developing research on migration, human capital and endogenous growth. This work is very much at the pioneering stage and future research into migration will be linked to progress in the area of endogenous growth.

References

Abowd, J.M. and R.B. Freeman (1991),ed. **Immigration, Trade and The Labor Market**, NBER Project Report, University of Chicago Press.

Abraham,K, G.Farber,S.Henry(1987),'Job Duration,Seniority,and Earnings,'**American Economic Review**,77:278-297.

Anand,S(1971), 'Rural Urban Migration in India: An Econometric Study,' Harvard University,(mimeo).

Banerjee,B,(1983),'The Role of Informal Sector in the Migration process,'**Oxford Economic Papers**:399-422.

Banerjee, B and Kanbur, S. M. R. (1983), 'On the Specification and Estimation of Macro Rural-Urban Migration Functions : With an Application to Indian Data'. **Oxford Bulletin of Economics & Statistics**, pp. 7-34.

Bardhan,P.K., (1979), 'Labor Supply Functions in a Poor Agrarian Economy,' **American Economic Review**, 69:501-514.

Barnum, H.N. and R.H.Sabot (1977), Education, Employment Probabilities and Rural-Urban Migration in Tanzania,' **Oxford Bulletin of Economics and Statistics**,39:(2):109-126.

Barro, R (1991), 'Economics Growth in a Cross-Section of Countries', **Quarterly Journal of Economics**, May 407 - 443

Bartlett, W (1983), 'On the Dynamic Instability of Induced Migration Unemployment in a Dual Economy'. **Journal of Development Economics**, 13 85-95.

Basu, K. (1983),'The emergence of isolation and interlinkage in rural markets,' **Oxford Economic Papers**,35:262-280.

rate of labour turnover in the modern sector;

iii)the presence of underemployed workers in the modern informal sector and the lower probability of their obtaining a job in comparison with those who are wholly occupied in job-search (Bhattacharya, P 1991,1992). Bartlett (1983) points out that if the share of rural population in an economy is large, then its growth rate will dominate the change in unemployment rates which calls for a sectoral allocation of labour. Such allocation is expected to be sluggish.

It is useful to point out that a large number of relatively uneducated and unskilled people do migrate and work which cannot be explained by the HT model (Bardhan, P.K. 1979; see also, Hamermesh, D.S. 1987; Borjas, G.J. 1985,1989). Further, the model predicts that policies to promote industrialisation and urban job creation will lead to urban unemployment. Ironically, the market must be perverse because "decisions that are rational from the point of view of individuals appear disastrous for society" (Cole and Sanders, 1985). Many unskilled people could migrate to the cities due to excessive pressure of population on fixed land or because of a rise in the demand for urban exports resulting in a big difference between the urban and rural subsistence wage. Migration is socially desirable as long as it transfers labour from low (rural) to high productivity (urban) areas (Ghatak 1991). However, in the HT model urban employment is fixed and no net transfer of employed labour occurs.

Unlike the HT model, where a marginal amount of rural development reduces the rate of migration, it may be argued that the short-run effects of rural development are more complex than the literature suggests. Indeed, it can be shown that policy makers may encounter increased rates of migration, at least in the early stages of rural development projects because such programs will give some people the resources with which to migrate

while a marginal rural development may not provide enough incentive for some people to stay behind. People who wish to migrate generally face liquidity/borrowing constraints and a marginal rise in rural income simply eases such constraints and raises the rate of migration (Kanbur, 1981). Thus, as far as migration policy is concerned, a marginal improvement of real wages in the rural sector, w_r (ie, a reduction of the differential between w_u and w_r) as suggested by the HT model, is not good enough to reduce the rate of migration. What is necessary is to impact a 'big-push' to the investment projects in the rural/backward sector.

Three major points stand out prominently from the recent substantial research work on migration by O. Stark (1991). First, Stark shifts the focus of migration research from individual independence (as in the HT class of models) to mutual interdependence. Remittances from migrants to their families at home and a number of overt and covert inter-family exchanges are thus results of **collective** migration decisions. Thus the activities of the migrants in the recipient areas can mostly be explained not only by their endowments and characteristics, but also by the preferences and constraints of their families (on the intergenerational capital transfer constraints,see e.g. Rosenzweig,M.R. and Wolpin,K 1985).

Next, migration in the absence of significant wage-gap between the advanced and the backward region, or the lack of migration in the face of a substantial wage-gap, does **not** mean irrationality. Decisions to migrate could depend on wage uncertainty and relative deprivation at home which could force families to pool risks and alter the pattern of human capital investments in children.

Finally, migration could be the product of imperfect and incomplete markets and financial institutions, particularly in LDC's. Informational asymmetries and lower income variance aid gains from migration and the 'established' inverse correlation between distance and migration can weaken considerably.

properly assessed before policy prescriptions can be made. These are clearly important areas for future research.

Our survey and assessment has, by and large, stayed within the HT framework of analysis. The analysis of migration within Europe however requires us to go beyond this framework and, in particular, to consider interactions between labour markets all of which do not clear and to incorporate the movements of physical capital.

There are other important aspects of the migration behaviour which should concern policy-makers. For instance, it is well known that although internationally, capital is supposed to be more mobile than labour, yet the migration of highly educated and skilled labour has accounted for a significant proportion of migration. Human capital accumulation is likely to play a major part in explaining the rate of migration and assessing the welfare and policy implications. (see, for example, Burda and Wyplosz ,1991). Besides, the flow of information and the dissemination of information at the point of origin of emigration regarding availability of public goods, schooling of children, medicare etc, quality of life etc could also influence migration decisions. At a macro-level, regions which suffer losses in terms of trade tend to be more impoverished and net suppliers of migrants.

It is straightforward to show from the HT model that migration from the rural areas can be a function of a change in domestic terms of trade against agriculture and a subsequent fall in relative rural income, ie, highly overvalued exchange rates which favour imports (mainly for the urban workers) and penalises exports (mainly from the agricultural sector). Other important issues for migration include the scarcity of arable land in the face of population growth;the existence of financial repression (ie, artificially held very low real rate of interest) which favours urban consumers, a disproportionately higher allocation of public expenditure to finance public services in the cities rather than in the rural areas and the

drain can unambiguously reduce inequality in source countries and increase it in host countries. Which possibility is relevant for a particular source or host country depends on the relative factor intensities of imports and exports of that country. What is crucial to the effects of labour migration is whether skilled and unskilled labour are 'friends' or 'enemies' of production. In the former case, labour immigration generally increases and emigration reduces inequality. In the latter case, an outflow of skilled labour will harm unskilled workers, increasing inequality and an inflow will do the reverse.

6. Conclusions

In this paper, we began by developing a general encompassing model of migration which treats Harris and Todaro model as a special case. We have shown how the standard policies, eg. a reduction of the wage gap between an advanced and a backward region to reduce the rate of migration follows from a general model. We have also shown how these results cease to be validated if borrowing constraints are introduced and the changes in the real wages in the backward regions are only marginal.

We have also extended the HT model to examine risk averse behaviour within families where the migration of members of families serves to diversify risk. For all these extensions we have examined the welfare implications under both laissez-faire and government intervention in the form of subsidies. An unconstrained subsidy programme does exist which supports the first best outcome. The latter is characterised by an increase in migration compared with laissez-faire ,a result which questions concern for 'urban bias'. However subsidy programmes should be designed taking into account the government budget constraint and further distortions following a rise in taxation to finance the subsidies. Furthermore there are externalities arising from a rapid change in the urban population which need to be

In order to examine further the issues raised in this introduction, the next section will set out a more general model which encompasses the HT model and incorporates some extensions. In particular section 2.2 examines a generalised HT model where the investment into migration becomes a choice variable. This setup is then used in section 2.3 to examine migration where the potential migrant faces a liquidity constraint. In section 2.4 family decision-making and risk-averse behaviour, key aspects of the 'new' economics of labour migration (Stark, 1991), are formalised. Section 2.5 discusses a number of alternative approaches to migration including 'safety-first' rules.

Section 3 considers the welfare implications of the migration models. Since migration (or immigration) controls are sometimes partly justified on the basis of the overall interests of migrants themselves, the Pareto-inefficiency of migration decisions is examined both from collective standpoint of migrants as well as society. We then consider the use of government subsidies to eliminate these inefficiencies as highlighted by a number of studies (e.g., Bhagwati and Srinivasan (1974), Shukla and Stark (1990)). The section concludes with some remarks about policy options against the background of economic reform in Eastern Europe and possibly of a greater labour mobility between East and West Europe.

In section 4 we provide an overview of the more recent empirical studies of migration and the final section concludes with some remarks about migration policy and directions for future research.

2. Models of Migration.

In Figure 1, we present a standard HT class of models which exemplify the gap between the urban real wage w_u and the rural real wage w_r. Let the rural, agricultural and urban, industrial sectors demand curve for labour be D_r D_r^1 and the $D_uD_u^1$ respectively. At

C, wages are equalised at w' and the process of labour allocation between the two sectors is optimal. (We ignore costs of migration for the time being). However, if wages in industry are set at w_u, a wage gap of AB arises. Wages in the agricultural sector will be depressed to w_r, say and 'surplus labour' of L'L occurs. The 'Harberger' triangle ABC shows the efficiency loss to the economy due to labour misallocation. This 'wage gap' can be as much as 30% according to Lewis (1954).However, a more recent survey of deadweight loss (ie Δ ABC) has been found to be an insignificant proportion of the GDP (Williamson, 1988).

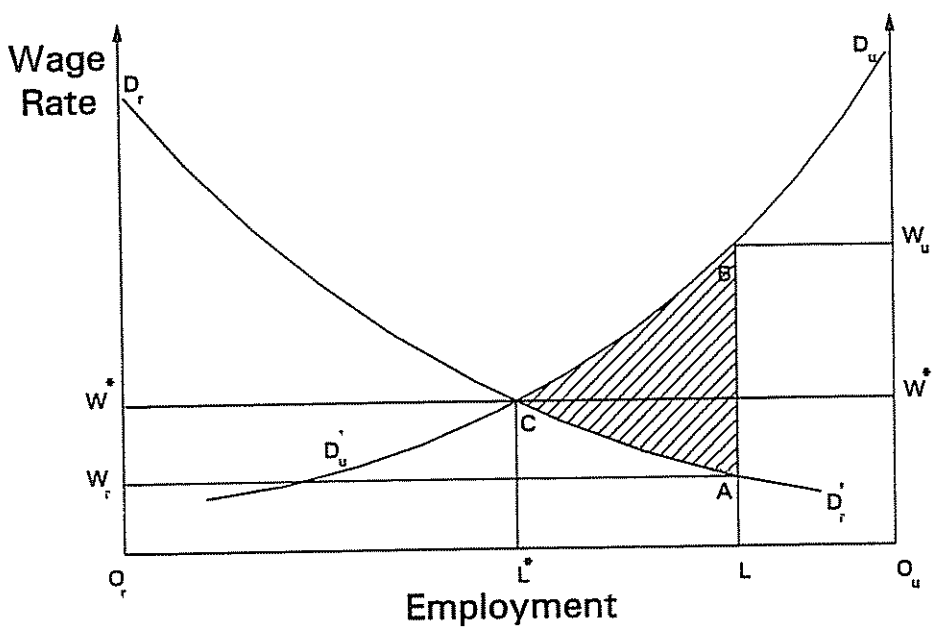

Figure 1. The Harris-Todaro Model.

both learning- by- doing and retraining incentives are probably better achieved by direct tax and subsidy policies rather than by distorting the price of labour (Burda,M. and M.Funke,1992). Others have used game- theoretic models to analyse the demand for migrants in the presence of international oligopolistic competition in the product market where wage setting is characterised by the firms' attempt to perfectly discriminate among different types of workers (Carraro C. and A. Soubeyran,1991). The recent evidence based on a panel of developed countries, Europe, North America and Australia contradicts the idea that the flows of migration reduce home wages and indicates that the impact might indeed be opposite (Ichina, 1991). However, immigrants may suffer from an initial earnings disadvantage compared to observationally equivalent home workers; but their earnings tend subsequently to rise faster than native earnings, a phenomenon which is explained by human capital argument. There are other reasons (Schmidt, 1991) e.g. (a) the wage-growth is the result of a number of possible self selection mechanisms; (Borjas J.G. 1985; 1987; Borjas, J.G. and M. Tienda, 1987;); (b) imperfect information about migrant worker's true ability at the beginning of employment and its subsequent inter-temporal revision in the light of the observed output of migrant labour. Thus immigrant earnings might increase more than native earnings simply because immigrant abilities are more uncertain at the start of employment. An exogenous shift in the composition of the immigrant flow regarding the re-emigration propensities might yield a natural experiment to discriminate among the alternative hypothesis in a country like Germany after the unification (Schmidt, 1991).

Another important issue is the impact of migration on inequality. Economic theory suggests that unskilled emigration reduces inequality in source countries and increases it in the hosts. The 'brain-drain' phenomenon however, does the opposite (see also, Kwok, V and H.Leland,1982). Davies and Wooton(1992) show that other outcomes may occur. The brain-

(see other studies as well: e.g., Connell, J. et.al. (1976); Hay, M.J. (1980); Knight, J.B. (1972); Levy,M. and Wadycki, W. (1973); Schuh,G.E. (1982). The HT model shows that in certain parametric ranges, job creation in the advanced regions may aggravate the problem of unemployment and even reduce the national product. Thus, the model really highlights the fact that in the advanced sector, the social opportunity cost of labour may not be small despite growing unemployment.

Another strand of the empirical literature sets out to estimate macroeconomic migration flows. Some estimates of macro-migration equations have included average unemployment rates, usually in DC contexts, with fairly mixed results.(See, for example, Mundlak (1979) and Molle and van Mourik (1988)). Very few micro migration response functions are available for LDC's (e.g. Kanappan, 1985) This perhaps, highlights the problems of dealing with unobservable variables. In most surveys, for those people who remain in the backward areas, the earnings they would obtain in the advanced regions are not actually observed; for those who migrated to the cities, the prior low wages in the backward regions are not always known. Similarly, employment probabilities in alternative areas are also unobservable.

Economic theory does not always predict a negative impact of immigration on native wages, even with some degree of real wage responsiveness. An inflow of migration could positively affect labour productivity, economic growth and real wages of the skilled home workers as long as they are complementary inputs to foreign workers. However, collective bargaining and high wage policies could retard necessary structural change. The rapid wage increases observed in East Germany over the past two years have significant implications for structural changes in that region. It is noteworthy that the results of immigration on human capital formation partly depends on the shape of the labour demand function. Some argue that

The actual empirical measurement of a gap like AB has been difficult (Kanappan, 1985; Williamson, 1988). Others have shown that the inclusion of educational quality differences to the standard factors which account for the difference between w_u and w_r leads to the elimination of wage gaps (see,e.g. Barnum, H.N. and R.H.Sabot, (1977), Levy, M. and W. Wadycki,(1974); Ryan. J.G. and Ghodake,R.D.,(1984); Sabot, R. (1982); Schwartz, A. (1976); Squire, L. (1981)). Indeed, the presence of a wage gap, so crucial to the HT model has been questioned by some (Kanappan, 1985; Glytsos, 1977).

2.1 A Generalised Harris-Todaro Model.

The following is a model of migration which encompasses the HT model and incorporates some extensions. We adopt the following notation: w_r=rural wages (in real terms) and $w_u=w_u(C)$=urban wage. Thus the urban wage depends on the costs of moving, training etc (C). Let $w_u'(C)>0$ which captures the idea of a segmented labour market in the urban sector. As investment into moving increases, this allows access to higher productivity industries and brings a higher real wage. We also assume diminishing returns to migration investment C, so that $w_u''(C)<0$.

For each segment of the labour market (indexed by C) assume that the urban labour force consists of a pool of unemployed equal to the number of migrants, plus the employed[1]. Let L_u be the urban employment taking the value $L_u=\bar{L}_u$ prior to any migration. Let N_u be the total urban labour force and $M.\bar{N}_r$ the number of migrants in equilibrium where M is the

[1] This is not a drastic simplifying assumption and it does permit a clearer exposition. The more general case is considered in section 3.2.

migration rate, defined as the number of migrants as a proportion of the initial rural population, $\bar{N}_r$. Then $N_u=L_u+M.\bar{N}_r$.

For particular labour markets (ie a particular value for C), w_u is fixed determined by insiders to achieve a particular employment target. Urban employment L_u is therefore fixed for each part of the labour market and we can write $L_u=\bar{L}_u$. The rural real wage, w_r may be market clearing but is independent of the migration rate M. In other words we assume that M is not so large as to have an effect on the rural labour market. In section 3 we relax this assumption when the full HT two-sector general equilibrium model is set out; but for the time being the focus is exclusively on the migration decision.

The HT class of models emerge if we fix C and abstract from urban labour market diversity/segmentation. For C fixed, the future expected income from migration is given by

$$\int_0^{\infty}[pw_u+(1-p)w_b]e^{-rt}dt-C=\frac{1}{r}[pw_u+(1-p)w_b]-C \qquad (1)$$

where r is the migrants' discount rate, p is the probability of employment and w_b is the real income received if unemployed or employed in the informal sector .The would-be migrants compare (1) with the future income from remaining in the rural sector.

$$\int_0^{\infty}e^{-rt}w_r\,dt=\frac{1}{r}w_r \qquad (2)$$

Migration takes place only if there are gains from moving on the basis of certain employment prospects (ie p = 1),i.e., only if

Lucas (1985) used this methodology to test the predictions of the HT model for migration from Botswana. The use of a multi-nominal logit model in Botswana produced results which validated the predictions of the HT model, i.e. wage gaps and the probabilities of finding jobs are the two most significant determinants of the rate of migration from Botswana. More specifically, the bi-nominal and multinominal logit equations relate the dependent variable (the decision to migrate) to various explanatory factors comprising three classes of measures: (a) personal characteristics, e.g. sex, age, years of schooling, marital status etc; (b) household factors - e.g. size of the family, cattle owned etc; (c) locational factors - e.g. region, catchment area type etc. Most of these factors enter linearly (expect region and village type) in the migration equations. The internal migration equation contains daily wages in the backward areas and in towns and employment probabilities in different locations.

The micro-evidence from Botswana lends considerable support to a Todaro type of model. Education tends to increase urban migration, not by altering tastes, but by relative rises in the expected wages in advanced areas. Similarly the 'bright lights' tend to attract the young to the cities, lending credence to the argument that the young have a longer life horizon over which to maximise returns from migration. Earnings tend to rise substantially the longer one has been in the cities of the advanced regions. In short, additional jobs indeed attract extra employment seekers.

Banerjee and Kanbur's empirical study (1983) in India, however, indicates that change in the urban risk variable measured by the rate of unemployment (rather than the expected income differential) suggested in the HT model could have significant effects on migration (see also, Banerjee, B.,1983). Besides, their argument that rural inequality could be another important determinant of the rate of migration, is validated in their empirical study on India

where ϕ is the normal pdf for the **probit** model or

$$Pr[Migration]=Pr[M_i=1]=\frac{e^{\gamma' w_i}}{1+e^{\gamma' w_i}} \qquad (52)$$

for the **logit** model.(See Maddala P22). The solution to the censored data problem is to use a maximum likelihood method of estimation (Maddala chapter 9) although an alternative two-step procedure due to Heckman (1979) is also popular.

Figure 5, taken from Emerson (1989), presents a typical output from these cross-sectional studies of migrants and non-migrants. It relates the Pr[Migration] to the migrant/non-migrant earnings ratio (i.e., the ratio of the earnings of the migrant to that the migrant would have earned had she not migrated) and provides a test of the HT proposition that this wage-gap is a main determinant of migration. The point that should be stressed is that the econometric procedures we have described enable us to determine the impact of this wage-gap on migration even though the latter is unobservable.

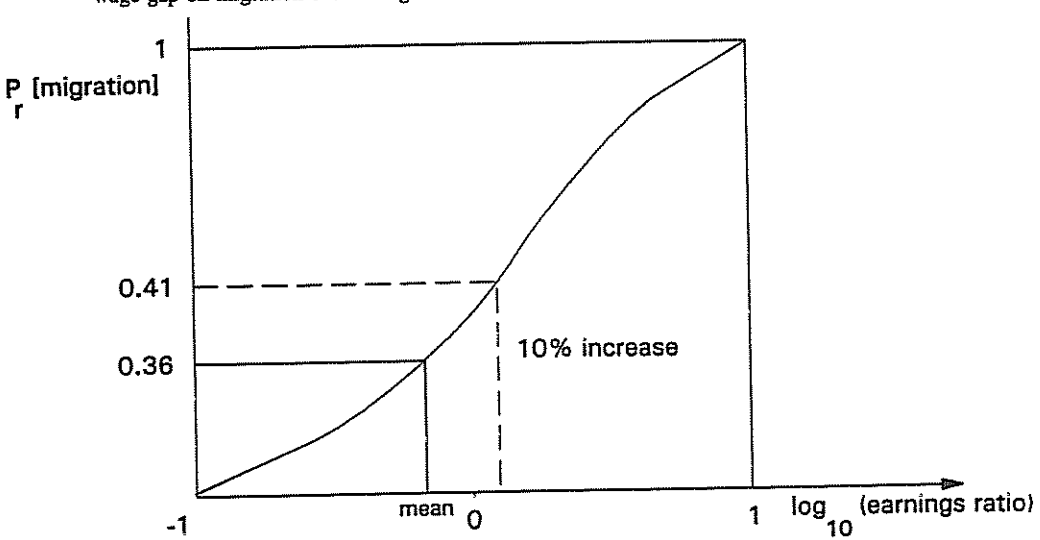

Figure 5. Probability of Migration.

$$\frac{1}{r}w_u - C > \frac{1}{r}w_r \quad \text{or} \quad w_u - w_r > rC \qquad (3)$$

The probability of obtaining employment is given by

$$p=\frac{\bar{L}_u}{N_u}=\frac{\bar{L}_u}{\bar{L}_u+M.\bar{N}_r} \qquad (4)$$

which assumes that migrants compete on equal terms with the incumbent urban employed population.[2] Thus as M rises, p falls and migration continues until the returns from (1) and (2) are exactly equal. Hence, the equilibrium migration rate M is given by

$$pw_u+(1-p)w_b-w_r=rC \qquad (5)$$

with p given by (4). Substituting (4) into (5) and solving for M gives the equilibrium migration rate.

$$M=\left[\frac{w_u-w_r-rC}{rC-w_b+w_r}\right]\frac{\bar{L}_u}{\bar{N}_r} \qquad (6)$$

Note that along with (3), we require that $w_b-w_r<rC$ for $M>0$ which implies that there is no incentive to leave rural areas for urban unemployment.

From (6), we get the familiar results.

$$\frac{\partial M}{\partial w_u}>0 \; ; \; \frac{\partial M}{\partial w_r}<0 \; ; \; \frac{\partial M}{\partial \bar{L}_u}>0 \; ; \; \frac{\partial M}{\partial C}<0 \qquad (7)$$

Inequalities (7) states that any marginal increase in urban wage (w_u) or decrease in the rural

[2] Todaro(1969) considers an alternative selection process in which urban employment is growing and entry into employment by the migrant is permanent.

wage (w_r) will increase migration. Paradoxically any policy to increase employment in the advanced urban sector will raise the migration rate and may increase urban unemployment.[3] Hence, as predicted in the HT models, a policy of creating more employment opportunities in the advanced regions could only enhance the rate of migration from the backward region. Also, any decrease in the cost of migration will enhance the rate of migration. The policy implications of the HT model are clear: to reduce the flow of migration, it is necessary to raise the opportunity cost of migration w_r+rC.

2.2 Migration with a Choice of Urban Labour Markets

Now reconsider the decision facing the potential migrant. Put $w_u=w_u(C)$ and allow C to become a choice variable. The maximum gains from migration are obtained by maximising G where

$$rG=pw_u(C)+(1-p)w_b-w_r-rC \tag{8}$$

with respect to C given p. The first order condition is

$$\frac{d(rG)}{dC}=pw_u'(C)-r=0$$

and the second order condition is

$$\frac{d^2(rG)}{dC^2}=pw_u''(C)<0$$

which holds since $w_u''<0$ by assumption. Hence, the individually optimal investment into migration is given by $C=C^*$ where

[3] Stark, Gupta and Levhari (1991) point out that for the 'paradox' to hold, it must be assumed that the real wage is fixed or changes by a negligible amount.

with the observable characteristics of individuals. This is expressed as

$$C_i=\beta_c^{\prime}z_i+e_{ci} \tag{49}$$

Following the HT line of reasoning, the individual migrate if and only if the benefit in terms of the wage gap $w_{ui}-w_{ri}$ exceeds the cost C_i. i.e., if and only if

$$M_i^*=w_{ui}-w_{ri}-C_i=(\beta_u-\beta_r)^{\prime}x_i-\beta_c^{\prime}z_i-e_i>0 \tag{50}$$

where $e_i=e_{ui}-e_{ri}-e_{ci}$. Then for individual i the Pr[migration]=Pr[$M_i^*>0$].

If we define a binary variable $M_i=1$ if the individual migrates and $M_i=0$ otherwise then from (50) writing $M_i^*=\gamma^{\prime}w_i+e_i$, where $w_i=[x_i^{\prime}z_i^{\prime}]^{\prime}$, we have that Pr[Migration]= $=E(M_i)=\gamma^{\prime}w_i$. A simple way of proceeding is to regress M_i on w_i and deduce Pr[Migration] conditional on w_i from the regression equation. There are a number of reasons why this is an inappropriate procedure. A relatively minor problem is that e_i is heteroscedastic (Maddala P16). More fundamental problems are first, if e_i is $N(0,\sigma_i^2)$ then we cannot insure that the probability will lie between 0 and 1. Second, in the equations of primary interest (47) and (48) we have unobservable data for the whole sample of migrants. What we do observe is migration or non-migration and w_{ui} (but not w_{ri}) for the migrant and w_{ri} (but not w_{ui}) for the non-migrant. This is the problem of 'censored' data because the earnings of migrants as nonmigrants are unobservable and vice versa.

The solution to the first of these problems is to write

$$Pr[Migration]=Pr[M_i=1]=\int_{-\infty}^{\gamma^{\prime}w_i}\phi(x)dx \tag{51}$$

also do not support the theory that the LDCs necessarily suffer from high and increasing urban or informal sector unemployment (Gregory 1980; Berry and Sabot, 1984; Bhattachrya, P 1991, 1992 Kanappan, 1985). Indeed urban unemployment rates among the migrants particularly in the urban informal areas are found to be low in Ahmedabad (India), Colombia, Tanzania and Malaysia (Berry and Sabot, 1985;Barnum and Sabot,R. 1977; Bhattacharya, P. 1991, 1992; Papola, 1981). The duration of job-search is also rather short amongst the immigrants in the urban areas (Yap, 1977, Sinclair, 1978). As Williamson, (1988) says: "Todaro's job - lottery and high unemployment view of the urban labour markets in the Third World simply fails to pass the test of evidence".

Following the pioneering work on estimating discrete choice models by McFadden (1974) a considerable volume of empirical work on migration using cross-sectional survey data has developed. Much of this literature applies the methodology to the US (e.g., De Vanzo et al (1980), Willis and Rosen(1979), Nakosteen and Zimmer (1980), Emerson (1989)) but Lucas (1985) applies this type of analysis to a LDC.

The general structure of this empirical work is as follows: at the core of the model is an earnings equation expressing earnings as a function of individual characteristics. Thus for individual i the wage they could earn in their present rural location is given by

$$w_{ri}=\beta_r^1 x_i+e_{ri} \tag{47}$$

where x_{ri} is a column vector of explanatory variables such as education and experience, β_r is a vector of fixed parameters and ϵ_{ri} is a random term. If the individual migrates to a new location his or her wage would be

$$w_{ui}=\beta_u^1 x_i+e_{ui} \tag{48}$$

using an analogous notation to (47). Migration entails costs C_i (per period) which also vary

$$w_u'(C^*)=\frac{r}{p} \tag{9}$$

As in the HT model migration continues until their are no net gains from migration and G=0. The resulting migration rate is

$$M(C^*)=\left[\frac{w_u(C^*)-w_r-rC^*}{rC^*-w_b+w_r}\right]\frac{\bar{L}_u}{\bar{N}_r} \tag{10}$$

at which point $G(\bar{C})=0$. Equation (9) equates the expected marginal rate of return from investment into migration $pw_u'(C)$, with the cost of borrowing. (10) is the HT migration rate with $C=\bar{C}$. Equations (4),(9) and (10) determine $\bar{C}$,p and M in equilibrium.

The model can be illustrated with a diagram (figure 2). Consider a concave function $w_u(C)$ with $w_u(0)=0$, $w_u'(C)>0$ and $w_u''(C)<0$.

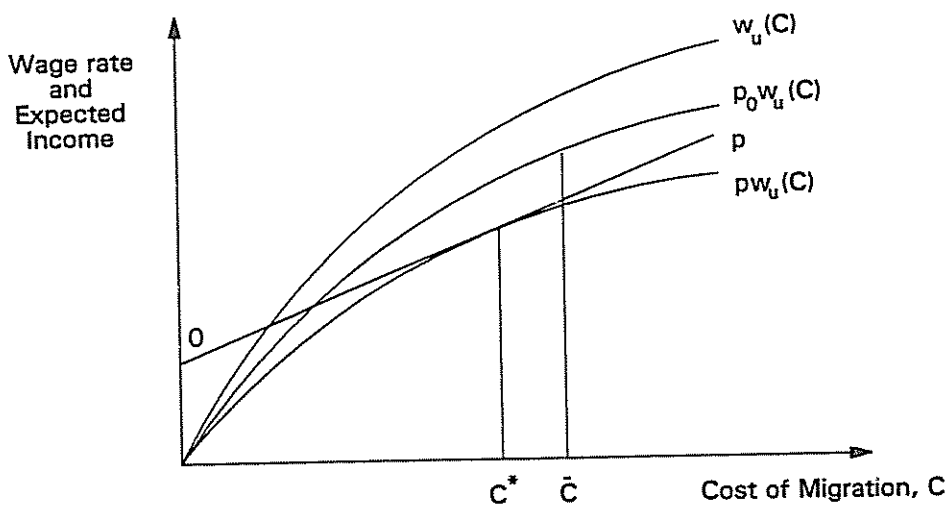

Figure 2. Migration and Investment.

To make the diagram clearer consider the case where $w_b=0$ so that the expected urban wage is $pw_u(C)$. The line OP represents the opportunity cost of migration w_r+rC. Consider an initial **disequilibrium** probability of employment in the urban sector p_0 higher than the equilibrium probability. Then the net gains from migration are positive and maximised at $C=\bar{C}$ .At this level of overinvestment $G(\bar{C})>0$ and migration continues lowering the probability of urban employment. Eventually an equilibrium is reached at $C=C^*<\bar{C}$ at which point $G(C^*)=0$.

There are cases where migrants could face liquidity or borrowing constraints. Both producers and consumers experience credit shortage. In response to such phenomena, producers mainly depend on self-financing of investment funds. Real money demand then rises along with the demand for more investment. Consumers, including migrants, tend to depend significantly upon the unorganised ('Curb') credit market, given credit rationing in the organised credit market (see, e.g. Basu, K., 1983; McKinnon, 1973; Shaw, 1973; Ghatak,1981; Fry, 1988; Charemza and Ghatak, 1990). In the next section we discuss the implications of the existence of liquidity and borrowing constraints on the behaviour of the migrants.

2.3 Migration with Borrowing Constraints

As before, let $w_u=w_u(C)$ where C is the migrant's investment in moving. Suppose now that the migrant faces a borrowing constraint with C constrained to be below some upper limit $\bar{C}<C^*$ where C^* is the optimal choice of C which may now be unobtainable.

For those who cannot fully finance by borrowing the entire cost of migration due to a lack of 'creditworthiness', migration ceases to be an attractive option. Thus, those who are very poor in the backward areas lack an incentive to migrate except during periods of natural

(c) given the usually favourable impact of migrants (acting as complementary inputs) on the production of home workers, more research is needed to identify the specific sectors/industries where such complementarity could yield optimal benefits.

On the theoretical side, the analysis of migration between European countries (and within Germany) must go beyond the HT framework, which has been used in a LDC rural-industrial context, in a number of respects. First, European migration largely takes place between industrial sectors which are characterised by large differences in the initial capital stocks. The costs of changing both capital and labour are an important component of the analysis (Burda and Wyplosz (1991), Burda and Funke (1992)). Second, neither sector has a labour market that clears, unlike the HT case of a market-clearing rural sector. Indeed there is likely to be higher unemployment in the donor than in the host country. Third, human capital considerations are of crucial importance. If the composition of migrants is biased towards more highly skilled and better educated workers, then migration may have a seriously negative impact on the growth of the donor countries. The new endogenous growth literature will play an important role in understanding these phenomena (See Lucas (1988)).

4. Empirical Evidence on Migration

Empirical evidence from the LDCs available so far has provided some support to the HT hypothesis that one of the crucial determinants of migration is the wage gap between developed and underdeveloped regions. However, labour market data invalidate the view that urban labour markets can be clearly divided into "capitalistic" and "traditional" sectors (Kanappan, 1985). Nor is there much evidence to assume that the modern sector wages are considerably higher than those in the informal sector. Wages in manufacturing have not always exceeded agricultural wages in the LDCs (Gregory, 1977, Glytsos, 1977). The data

incentives for migration from the non-EC and LDCs. Recently, the East-West migration 'waves' within a 'free' Europe has gained considerable attention from the policy-makers and concern has been expressed about the economic and political impact.

A large group of potential immigrants for the West European countries could exist for reasons which are apparent from the HT-class of models, namely the wage gap between the West European and other countries and the greater probability of finding a job within the West European countries. However, the greater incentives to labour mobility from outside into the Western European countries has raised concerns analogous to those associated with the 'urban bias' school of thought in the LDC's. To combat excessive migration a number of strategies have been proposed. First, to reduce income gaps via increased economic growth in the potential emigration countries; second, to create new employment opportunities in the countries of potential immigrants; third and perhaps most problematic, to support efforts in stabilising the political systems in the home countries of the potential immigrants.

With regard to the welfare impact on the EC at least three points need to be emphasized (Straubhaar,T. and Zimmermann,K.,1992):

(a) the size of the migrant potential is unclear and needs to be defined more clearly;

(b) due to a declining and sometimes stagnating or ageing population in West European countries, a certain amount of immigration in Western Europe will be beneficial as long as the marginal benefits (i.e. marginal productivity) from accepting immigrants exceed their marginal costs of adaptation[5];and

[5] Hamilton and Whalley (1984) calculate large efficiency gains from lifting world-wide immigration restrictions. A key assumption in their analysis is that of full employment. By contrast Brecher and Choudhri (1987) examine labour mobility assuming a fixed real wage and show that immigration then reduces welfare for the host country. These studies again highlight the crucial role of real wage flexibilty in assessing the welfare implications of migration.

calamities, eg flood, drought and famines. On the other hand, the very rich do not have enough incentives to migrate simply because discounted benefits from migration fail to compensate the costs. In contradistinction to the HT model, a marginal reduction in wage-gap increases migration because it gives agents more resources to migrate. In addition the growth of credit institutions, and a greater access to credit facilities for the potential migrants allows more people to migrate. Thus credit availability and the pattern of income distribution in the backward region could be major factors in explaining the rate of migration.

These ideas can be formalised as follows. Suppose that $\bar{C}=\bar{C}(w_r)$ where $\bar{C}'>0$. This expresses the idea that the creditworthiness of a would-be migrant depends upon her labour income. In the vicinity of $C=C^*$ the constraint must bind and as in the HT model the equilibrium migration rate is given by

$$M=\left[\frac{w_u(\bar{C}(w_r))-w_r-r\bar{C}(w_r)}{r\bar{C}(w_r)-w_b+w_r}\right]\frac{\bar{L}_u}{\bar{N}_u} \tag{11}$$

Now consider a change in the migration rate as a result of a change in w_r. From (11) we have

$$\frac{dM}{dw_r}=\left[\frac{w_u'\bar{C}'(r\bar{C}-w_b+w_r)-(1+r\bar{C}')(w_u-w_b)}{(r\bar{C}(w_r)-w_b+w_r)^2}\right]\frac{\bar{L}_u}{\bar{N}_r} \tag{12}$$

Thus migration increases as the rural wage increases if and only if

$$w_u'\bar{C}' > \frac{(1+r\bar{C}')(w_u-w_b)}{(r\bar{C}-w_b+w_r)} \tag{13}$$

up to the point where $\bar{C}(w_r)=C^*$ and the borrowing constraint ceases to bind.

This 'perverse' effect may exist if the marginal return on certain urban employment $w_u'(\bar{C})$ and the marginal increase in credit with respect to the rural wage $(\bar{C}'(w_r))$ are sufficiently large. Since diminishing returns have been assumed for the urban wage and a reasonable assumption is that $\bar{C}(w_r)$ is also concave it follows that the condition (13) is most likely to hold where the rural wage is low. Thus we expect migration to initially increase as the rural wage increases but to subsequently start to fall as either (13) ceases to hold or the borrowing constraint no longer binds.

2.4 Migration, Risk Aversion and Family Decisions.

Recently, an alternative theory questions the established HT type of view that the migration decision is mainly a response to an urban-rural wage differential. Naturally, the policy implications of the HT models have also been doubted. According to the new portfolio investment theory, **families** spread their labour assets over geographically dispersed and structurally different markets to reduce risks. Evidence suggests that after migration, members of the family combine and share their incomes. Such pooling is regarded as a form of insurance against uncertain income flows from specific markets to smooth the family consumption growth path. Thus, if future earnings are uncertain and imperfectly but positively related in a geographically specific area, the migration policy of a member of the income-pooling family diversifies risk (Stark 1991 (a), 1991 (b)).

Again these ideas can be formalised by the following generalisation of the HT model. Let the utility of a representative family be u(Y) where Y is income and u is a concave utility

the unemployed by (w_{ub},w_{rb}). Then the HT migration equilibrium is given by

$$p_u w_u+(1-p_u)w_{bu}-rC=p_r w_r+(1-p_r)w_{br} \tag{45}$$

It is easy to see given fixed wage rates (w_u,w_r) the social optimum with no unemployment and certain employment in both sectors requires a **migration tax or subsidy** paid by or to migrants addition to the previous employment subsidies (paid to the firms). Denote the tax by τ (if $\tau<0$ it becomes a subsidy). Then the cost per migrant C is replaced with $C+\tau$ in (45). Then $p_u=p_r=1$ is compatible with (45) if we set

$$\tau=\frac{w_u-w_r-rC}{r} \tag{46}$$

giving a tax or subsidy as appropriate depending on whether $w_u>w_r+C$ or $w_u<w_r+rC$.

An important limitation of the employment subsidy proposal is that there is no consideration of the public financing aspects except the comparison of expensive versus less expensive schemes. Suppose, for example, the transition from the laissez-faire outcome to the subsidy supported outcome has to be self-financing. The subsidies must then be paid for out of any savings on unemployment costs and increased receipts from taxes (paid at the old rates) of the newly employed. This introduces a **budget constraint**. In general the optimal schemes we have considered will not satisfy this constraint and a 'second best' solution must be sought with a lower welfare improvement. (See Levine (1992)).

3.3 A European Migration Policy:

The prosperous economic environment and greater job opportunities within the European Community (EC) coupled with its declining and ageing population provided powerful

subsidies. However as we have seen in the absence of subsidies any migration lowers social welfare unless there is some degree of real wage flexibility in the urban sector. These results leads one to question the concern of policymakers with urban bias.

Of course migration could involve negative externalities in the form of congestion, pollution in shanty towns etc. Some of these externalities are of the form of **adjustment costs** which disappear in the long-run. A social welfare function that reflects these costs would be intertemporal in character and could take the form

$$S=\int_0^{\infty} e^{-rt}[Y_u(t)+q(t)Y_r(t)-(\bar{N}-N_r(t))(rC+\alpha)-\beta\dot{N}_r(t)^2]dt \qquad (44)$$

where static externalities per period are given by the term $(\bar{N}-N_r(t))\alpha$ and dynamic externalities by $\beta(\frac{d}{dt}(\bar{N}-N_r(t))^2=\beta\dot{N}_r^2$. Quantifying these additional effects is intrinsically difficult but essential if the case for urban bias is to be established. Maximising (44) with respect to a path for instruments $(s_u(t),s_r(t))$, $t=0,\infty$ would lead to a more **gradual** transition displaying migration **flows** and to a lower long-run migration equilibrium rate than before. Just how much lower depends on the tricky calibration of the parameters α and ß.

An assumption of the HT model that has often been questioned is that of full-employment in the rural sector (e.g.,Mundlak (1979)). Suppose that we relax this assumption and treat the rural wage w_r in the same way as the urban wage w_u. There is now a possibility of unemployment in the rural sector as well as the urban sector. Let the probabilities of employment in the two sectors be p_u and p_r. Similarly denote the income of

function with $u'>0$, $u''<0$. Let the family choose a proportion M of the family to emigrate. As before let $\bar{N}_r$ be the rural labour force so that $M.\bar{N}_r$ is total migration.

As in the HT model we examine the case where the urban wage is independent of the total cost C per person of migration. The family then must choose a proportion M of its members to migrate at a cost rC per period who obtain employment with probability p at an urban wage w_u or are unemployed (or employed in the 'informal sector') with probability (1-p) with per period income w_b. The proportion that remains, 1-M, receives a certain rural wage w_r.

Let $\tilde{w}_u=w_u-rC$ be the net urban wage after paying for migration costs. Similarly define $\tilde{w}_b=w_b-rC$. Then the family maximises its **expected** per period income

$$E(u(Y))=pu(M\tilde{w}_u+(1-M)w_r)+(1-p)u(M\tilde{w}_b+(1-M)w_r) \qquad (14)$$

The first order condition for an internal solution $M\epsilon(0,1)$ is

$$p(\tilde{w}_u u'(M\tilde{w}_u+(1-M)w_r)+(1-p)(\tilde{w}_b-w_r)u'(M\tilde{w}_b+(1-M)w_r)=0 \qquad (15)$$

and the second order is

$$p(\tilde{w}_u-w_r)^2u''(M\tilde{w}_u+(1-M)w_r)+(1-p)(\tilde{w}_b-w_r)^2u''(M\tilde{w}_b+(1-M)w_r)<0 \qquad (16)$$

which holds by the concavity assumption. Hence the internal solution to (15) maximises expected utility.

To proceed further we need to specialise the utility function. We choose a logarithmic function

$$u(Y)=\log Y \qquad (17)$$

Then substituting into (15) and solving for M we arrive at

$$M=\left[\frac{p(\bar{w}_u-w_r)-(1-p)(w_r-\bar{w}_b)}{(w_r-\bar{w}_b)(\bar{w}_u-w_r)}\right]w_r \tag{18}$$

provided that the right-hand-side of (18) lies in the interval [0,1]. As in the HT model we require that $w_r>\bar{w}_b$ and $\bar{w}_u>w_r$. Then migration takes place (i.e., $M\geq 0$) if and only if

$$p(\bar{w}_u-w_r)\geq(1-p)(w_r-\bar{w}_b) \tag{19}$$

Rearranging (19) leads to

$$w_r\leq(1-p)w_b+pw_u-rC \tag{20}$$

as the condition for any migration. The condition for exactly zero migration ((20) with an equality sign) is precisely the HT arbitrage condition which equates the gain and loss from migration.

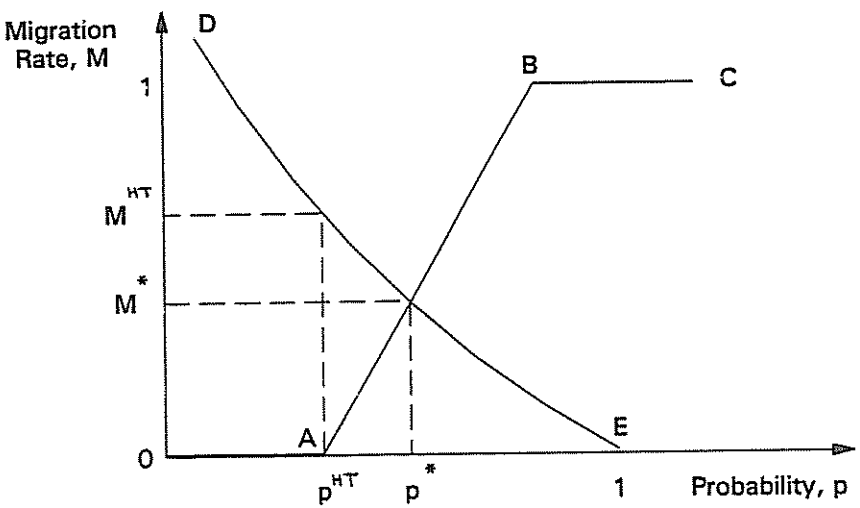

Figure 3. Migration as a Family Decision.

directly but must use subsidies (s_u,s_r) such that private sector behaviour by firms and migrants captured by the model summarised above results in this outcome. From (34), (35) and (36), the global efficiency condition is satisfied at $L_u=L_u^*$ if and only if

$$Ag(L_u^*)f'(L_u^*)=w_u-s_u \tag{40}$$

for the given fixed wage rate w_u and

$$s_u-s_r=Ag'(L_u^*)f(L_u^*) \tag{41}$$

In the absence of scale economies $g'=0$ and $s_u=s_r$ resulting in equal subsidies supporting the social optimum (Bhagwati and Srinivasan (1974)). If scale economies exist then from (41) a **higher** subsidy is needed in the urban sector (Shukla and Stark (1990)).

How does the socially optimal urban workforce L_u^* compare with that under laissez-faire, L_u^l say? For the latter, from (39) and the labour demand equations (34) and (35) we have that

$$\frac{dS}{dL_u}=Ag'(L_u^l)f(L_u^l)+w_u-w_r-rC \tag{42}$$

Using the HT arbitrage condition (36) we then arrive at

$$\frac{dS}{dL_u}=Ag'(L_u^l)f(L_u^l)+(1-p)(w_u-w_b)>0 \tag{43}$$

since the HT condition assumes that $w_u>w_r+rC>w_b$. Thus the laissez-faire level of urban population (and hence migration rate) is less than the social optimum reached by appropriate

market clears. It should be noted that to simplify the analysis a little we earlier assumed that $\bar{L}_u=\bar{N}_u$ i.e., there was no unemployment prior to migration. We also assumed that migration was negligible relative to the size of the rural workforce so that its impact on the rural wage could be ignored. We now relax these assumptions and consider the more general model.

We now prove the result due to Shukla and Stark (1990) that there exists a pair of subsidies (s_u^*,s_r^*) that will support the socially optimal allocation of labour between the two sectors and hence the optimal rate of migration. The social planner would choose labour allocations to maximise total income minus the costs of migration, i.e.,

$$S=Y_u+Y_r-(\bar{N}-N_r)rC \tag{37}$$

In the 'first best' social optimum there cannot be any unemployment (because the marginal product of the unemployed, zero, is less than that in the rural sector). Putting $N_u=L_u$ and using the global labour resource constraint (29) we can then write S as

$$S(L_u)=Ag(L_u)f(L_u)+qBh(\bar{N}-L_u)-L_urC \tag{38}$$

The first order condition for a maximum is

$$A(g'(L_u)f(L_u)+g(l_u)f'(L_u))-qBh'(\bar{N}-L_u)-rC=0 \tag{39}$$

This condition equates the marginal product of labour in the urban sector **taking into account the economies of scale externality** minus the cost per migrant of moving with the marginal product of the rural worker. The concavity of the production functions ensures that the second order conditions are satisfied. The solution to (39) (if it exists) gives the optimal labour allocation $L_u^*,L_r^*=\bar{N}-L_u^*$.

Unlike the mythical social planner, the government cannot choose this allocation

As in the HT model the probability of obtaining employment is given by (4). Substituting (4) into (18) gives the equilibrium migration rate. Figure 3 illustrates the model. OABC is the family decision given the probability of employment. The line AB is the (M,p) relationship given by (18) and OA and BC are the corner solutions M=0 and M=1. The curve DE is the (p,M) relationship in the HT model, equation (4). Our risk-averse family arrives at an equilibrium migration rate $M=M^*$ and probability of employment $p=p^*$. In the HT model with risk-neutral individuals $p=p^{HT}$ is the equilibrium probability of urban employment resulting in a **higher** migration rate $M=M^{HT}$.

2.5 Other Approaches to Migration Decisions.

Expected utility maximisation neglects the principal role of decision and search costs. Thus, agents are 'supposed' to be logical to have potentially unlimited capacity for computation ..... the very complexity of a real-world decision problem will typically prevent the decision maker from satisfying the criteria for rational choice. We have not taken into account of the limited capacities of an individual decision maker for imagination and computation, (Radner, 1972). In other words, in the presence of a substantial search and information costs, it is not always rational migrant to act consistently with his underlying preferences. Decisions to migrate can, thus, be characterised by 'bounded rationality'. (March and Simon, 1958). Thus, simple rules can be used as choice indicators when 'Satisficing replaces Optimising' (Georgescu - Roegen, 1958).

An alternative approach to modelling risk-averse decision-making behaviour switches from expected utility maximisation to maximising the **minimum** income at some predetermined probability or confidence level. Two variants of this principle are the 'safety-first' and 'safety-fixed' rules (Roumasset,1976). The rationale of this approach is that

corresponding to each possible migration choice there is a frequency distribution of possible income levels. The potential migrant's overriding concern is to avoid a disastrously low income. In the presence of risk no income level can be attained with certainty. But, given the distribution of income the probability of falling below some minimum income level can be determined from the cumulative frequency distribution of income levels.

Under the safety-first rule, the objective is to maximise the expected income $E(\pi)$ subject to

$$Pr(\pi<d)\leq\alpha \tag{21}$$

where d is a specified disaster level of income and α is a probability or confidence level. If f(x) is the frequency distribution of possible returns from various migration choices then (21) becomes $F(d) \leq \alpha$ where $F(d)=\int_0^d f(x)dx$ is the cumulative frequency distribution.

Under the safety-fixed rule the objective is to make a migration choice which maximises d subject to (21) given α. Another safety-fixed rule involves the minimisation of F(d) with respect to migration choice given d. These safety -first and safety-fixed rules may be demonstrated using figure 4. Two hypothetical migration decisions A and B are depicted where the expected income for A exceeds that for B. Under the safety-first rule we note that $F(d_1) \leq \alpha$ for decision A but not for B. Hence A is chosen even though the expected income is less. Under the safety-fixed rule given α, the disaster level income d is maximised at $d=d_2$ again resulting in decision A. Finally given $d<d_3$, F(d) is minimised at decision A. For all three rules even though the expected income under B exceeds that under A, migration decision A is chosen.

best social optimum and we now show that this indeed is the case.

The HT two-sector model can be summarised by the following equations.

Urban Output: $Y_u=Ag(L_u)f(L_u)$ $g',f'>0$; $g'',f''<0$ (30)

where L_u denotes urban employment.

Rural Output: $Y_r=qBh(L_r)$ (31)

where L_r denotes rural employment and q the rural/urban terms of trade.

Labour Resource Constraint: $\bar{N}=\bar{N}_u+\bar{N}_r=N_u+N_r$ (32)

where $\bar{N}_u,\bar{N}_r$ denote initial workforce allocations before migration. Thus if M is the migration rate introduced earlier, $N_u=\bar{N}_u+\bar{N}_rM$, $N_r=\bar{N}_r(1-M)$ (33)

Labour Markets: $N_u=L_u+U$; $N_r=L_r$

where U is urban unemployment.

Labour Demand: $Ag(L_u)f'(L_u)=w_a-s_u$ (34)

$$qBh'(L_r)=w_r-s_r \tag{35}$$

HT Migration Equilibrium: $pw_u+(1-p)w_b-w_r=rC$, $p=L_u/N_u$ (36)

Equations (30) and (31) are concave production functions for the two sectors with the term $g(L_u)$ capturing the urban economies of scale effect. This is a macroeconomic phenomenon which is ignored by the atomistic firm giving rise to a first order profit-maximising condition (34) which is socially inefficient.

Equation (32) follows from the assumption of a globally inelastic labour supply. Equation (33) says that there is unemployment in the rural labour market but the rural labour

$$S(C,M)=M(p(M)w_u(C)+(1-p(M))w_b-w_r-rC)$$

$$+p(\bar{w}_u u'(M\bar{w}_u+(1-M)w_r)+(1-p)(\bar{w}_b-w_r)u'(M\bar{w}_b+(1-M)w_r)$$
$$+\frac{dp}{dM}(u(M\bar{w}_u+(1-M)w_r)-u(M\bar{w}_b+(1-M)w_r))=0 \quad (28)$$

where from (4)

$$\frac{dp}{dM}=-\frac{pR}{E+RM}<0 \quad (29)$$

Hence since $u(M\bar{w}_u+(1-M)w_r)>u(M\bar{w}_b+(1-M)w_r)$, at the competitive equilibrium $\frac{dE(Y)}{dM}<0$

and M*, although less than in the HT model, is again too large. For both the HT and family models laissez-faire migration is excessive from the viewpoint of both migrants as a whole and society. In the absence of subsidies, considered next, migration controls to lower migration are welfare-enhancing in both senses.

3.2 Optimal Subsidy Policies.

We now consider the role for government intervention in the form of subsidies to reach the first best, or at least a more efficient outcome than that under laissez-faire. To examine this possibility we need to set out the full two-sector HT model. Following Bhagwati and Srinivasan(1974) we introduce employment subsidies s_u and s, for the urban and rural sectors respectively. We also add an externality in the form of an external economies of scale effect in the urban sector as emphasised by Shukla and Stark (1990). We retain the HT assumption of a fixed urban real wage so that we have two instruments to alleviate one labour market distortion and one externality. In principle this should be sufficient to achieve the first

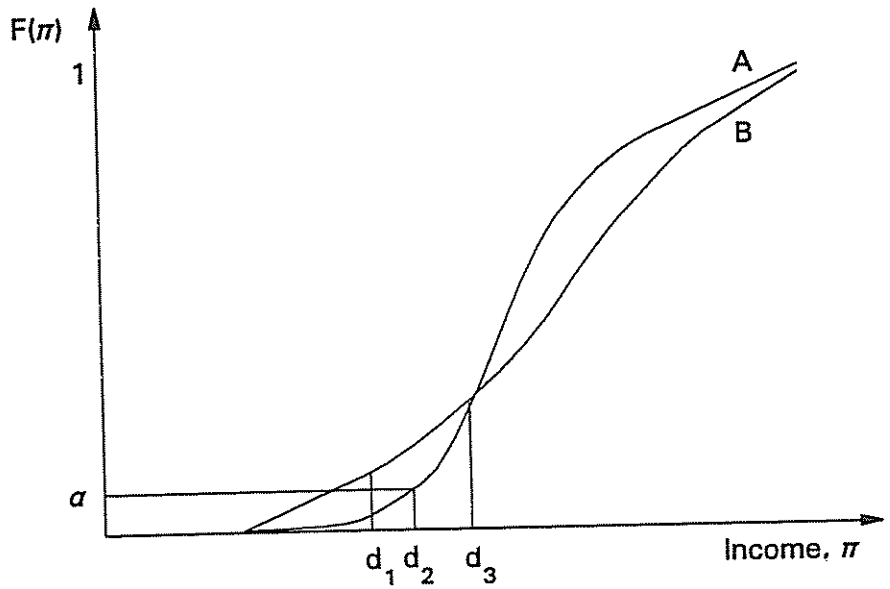

Figure 4. Safety-first and Safety-fixed Rules.

There are other decision rules which are really special cases of these rules. For instance a simple rule of thumb that migrants may follow is

$$Min \quad \frac{d-E(\pi)}{s} \quad (22)$$

over the migration choices where s is the standard deviation of the household's income.

It is noteworthy that in the safety-first or safety-fixed framework, migrants will be more concerned with maximising their chances of survival ('the survival algorithm,'see,e.g. Lipton,M.1968) than maximising their income. It is, by adherence to such rules that we can largely explain the 'mass migration' phenomenon witnessed in many sub-Saharan countries like Ethiopia and Sudan in recent times.

3. The Welfare Economics of Migration and Policy Options.

3.1 The Inefficiency of the Individual Migration Decision

Consider first the generalised HT model with a choice of investment into migration. The choice $C=C^*$, $M=M^*$ by migrants acting individually is Pareto-inefficient both from their collective viewpoint and for society as a whole. The former proposition can be shown as follows. The optimal decision for migrants as a whole (in the absence of any tax or subsidy intervention considered below) is found by maximising their total net gain from migration given by

$$S(C,M)=M(p(M)w_u(C)+(1-p(M))w_b-w_r-rC) \tag{23}$$

with respect to C and M. Note that the migrants' social planner takes into account the relationship p(M) given by (4) a **macroeconomic** relationship ignored by the individual migrant. The first order conditions are

$$\frac{\partial S}{\partial M}=p(M)w_u(C)+(1-p(M)w_b-w_r-rC)+M(p'(M)(w_u-w_b))=0 \tag{24}$$

and

$$\frac{\partial S}{\partial C}=M(p(M)w_u'(C)-r) \tag{25}$$

Differentiating (4) and using the HT arbitrage condition (5) we have at $C=C^*$ and $M=M^*$, the outcome of individual decision-making, that

$$\left(\frac{\partial S}{\partial M}\right)=-\frac{ERM^*}{(E+RM^*)^2}(w_u(C^*)-w_b)<0 \tag{26}$$

It follows that migration is excessive at $M=M^*$ and coordination amongst migrants would lead to a lower level of migration. However for a **given migration rate** from (9) and (25) we

have that

$$\frac{\partial S}{\partial M}=0 \tag{27}$$

at $C=C^*$ and the choice of investment does not need coordination. More trivially, the 'competitive' migration rate is Pareto-inefficient from the viewpoint of society as a whole. Given the HT assumption of fixed employment in the urban sector, migration lowers the probability of employment for the initially fully employed urban population. Since migration only reaches an equilibrium when there is no net gain for the migrants **any** migration is socially inefficient because it inflicts a higher unemployment probability on the urban population. In the HT class of models the socially optimal migration rate is zero. However if urban employment rose as a result of migration, because of some degree of real wage flexibility in response to unemployment, then a non-zero optimal migration rate emerges.[4]

The welfare implications of the family model are similar to the HT case. Ignoring the welfare of the original urban population, for individual family decision-making the outcome is Pareto-inefficient and a welfare-enhancing migration rate can be achieved by coordination. The reason for this is that a globally optimal solution to their problem would take into account the downward-sloping (p,M) curve DE. Then the first-order condition (15) is replaced with

[4] Even a small degree of real wage flexibility can lead to significant welfare benefits from migration provided that the marginal productivity of the urban sector is considerably greater than the rural sector.(See Levine (1992)).