RURAL URBAN MIGRATION IN DEVELOPING COUNTRIES: A SURVEY OF ECONOMIC THEORY AND EMPIRICAL EVIDENCE

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Abstract

This survey focuses on the theoretical and empirical aspects of rural-urban migration as a determinant of the observed rapid urbanisation in developing countries.

The theoretical work covers the neo-classical as well as alternative economic theories of migration. The empirical component covers work on the determinants of migration and attempts to test the economic theories. The more recent modelling and simulation techniques of the computable general equilibrium models (CGE) are then discussed and their merits assessed.

The empirical evidence seems to confirm the economists' view that migration is in response primarily to differences in rural-urban opportunities or the prospect thereof, and the CGE models, though complex, offer a potentially powerful forecasting and analytical framework for the analysis of all aspects of the urbanisation process.

List of Tables:

List of Figures:

1. INTRODUCTION

Rapid urbanisation in the developing world and the impact it has on the development process in these countries has led to a proliferation of research and debate as how best to explain and manage the process of urbanisation. It is the perception that rapid urbanisation has led to and continues to lead to large scale unemployment, underemployment and poverty in the urban and rural areas that has prompted researchers to study the causes of migration and urbanisation in the developing world.

Current urbanisation trends in the developing world appear to have been following those of the already developed world following the Industrial Revolution. So why is it presently seen as such a problem for the developing world? The concern lies with the fact that while the urbanisation patterns are the same, the magnitude of the population shift is larger in the developing world today than was the case previously for the developed world. Large cities in the developed world also only appeared after high income levels and urbanisation had been achieved. It is these factors that make understanding the process important.

Explanations for the rapid urban growth patterns can be divided into two based on the following streams of thought:

a) those who believe that rapid population growth, accompanied by a shortage of agricultural land forces rural labour to the cities and

b) those who believe that the economic forces of the city pull rural migrants to the city.

While economists (and much of the empirical data) now seem to favour the idea of cities pulling migrants from the rural areas, classical Labour Surplus Models as developed by Lewis

(1954) rely heavily on the notion that land shortage and an oversupply of rural labour leads to rapid urban growth and in the case of developing economies the accompanying urban squalor.

The following discussion will help clarify what research has found to be the most likely causes of rapid urbanisation and whether policies aimed at stemming the rapid flow of migrants to urban areas in developing countries are effective or even desirable.

2. URBANISATION, POPULATION AND MIGRATION IN DEVELOPING COUNTRIES

Urban growth rates in less developed regions (described in Table 1) show a high but declining trend from the period 1965-1990, the slowdown coinciding with the OPEC oil shock in the 1970's. Growth rates are the highest in Sub-Saharan Africa, i.e. 5.2% for the period 1985-1990. Growth rates for the same period for low income Asia and the Middle East and North Africa were 4% and 4.2% respectively. The lowest rates were experienced in Latin America, i.e. 2.9% between1985-1990. In all regions the population growth rate is substantially exceeded by the urban growth rate. In terms of the total level of urbanisation reached by 1990, Latin America and the Middle East both reached 72.4% and North Africa 51.6%. Sub-Saharan Africa and low income Asia reached 28.6% and 70.4% respectively.

Table 1
Urban Population Growth Indicators for Larger Developing Countries[a]

Country	Percentage of Population Residing in Urban Areas					Average Annual Rate of Urban Growth (percentage)					Average Annual Rate of Growth of Total Population (percentage)					Total Population (millions)
	1970	1975	1980	1985	1990	1965-70	1970-75	1975-80	1980-85	1985-90	1965-70	1970-75	1975-80	1980-85	1985-9	1990
Cameroon	20.3	26.9	31.4	35.7	40.3	6.6	8.2	5.9	5.5	5.3	2.3	2.6	2.8	2.8	2.9	11.5
Ethiopia	8.6	9.5	10.5	11.5	12.3	4.9	4.2	4.4	4.3	4.2	2.4	2.3	2.4	2.5	2.8	47.4
Ghana	29.0	30.1	31.2	32.3	34.0	4.0	3.4	2.5	4.3	4.2	1.9	2.7	1.8	3.6	3.1	15.0
Ivory Coast	27.4	32.1	34.8	37.6	40.4	7.4	7.2	5.5	5.4	5.2	4.0	4.1	3.9	3.9	3.7	12.0
Kenya	10.3	12.9	16.1	19.7	23.6	6.9	8.1	8.2	7.6	7.1	3.3	3.6	3.8	3.6	3.4	23.6
Madagascar	14.1	16.1	18.3	20.9	23.8	5.0	5.1	5.6	5.8	6.0	2.4	2.5	3.0	3.2	3.4	12.6
Malawi	6.0	7.7	9.1	10.4	11.8	6.8	7.7	6.8	5.8	7.7	2.6	3.0	3.3	3.2	5.1	9.4
Mali	14.3	16.2	18.5	21.0	23.8	4.7	4.8	4.7	5.4	5.5	2.2	2.4	2.1	2.9	3.0	9.2
Mozambique	5.7	8.6	13.1	19.4	26.8	6.8	10.5	11.2	10.1	7.3	2.4	2.2	2.8	2.3	0.9	14.2
Nigeria	20.0	23.4	27.1	31.1	35.2	5.7	5.7	5.7	5.6	5.4	2.5	2.6	2.8	2.9	2.9	96.2
Senegal	33.4	34.2	35.9	37.9	39.8	3.2	3.3	3.8	3.9	3.8	2.7	2.9	2.8	2.8	2.8	7.3
South Africa	47.8	48.0	48.1	48.3	49.2	2.7	2.7	2.6	2.6	2.7	2.5	2.7	2.6	2.5	2.3	37.1
Sudan	16.4	18.9	20.0	21.0	22.5	6.9	5.8	4.1	3.8	4.1	2.3	2.9	3.1	2.8	2.7	24.6
Tanzania	6.7	10.1	14.8	17.6	20.8	7.9	11.2	10.7	6.7	6.6	3.0	3.0	3.1	3.2	3.2	25.6
Uganda	8.0	8.3	8.8	9.9	11.2	8.1	3.6	4.3	5.2	5.8	4.0	2.6	3.2	2.8	3.4	17.9
Zaire	30.3	29.5	28.7	27.9	28.1	5.9	2.2	2.5	2.7	3.4	2.9	2.7	3.0	3.2	3.3	37.4
Zambia	30.2	34.8	39.8	40.9	42.0	8.1	5.8	6.1	4.1	4.0	3.0	2.9	3.4	3.6	3.4	8.2
Zimbabwe	16.9	19.6	22.3	25.2	28.5	6.5	6.0	5.6	5.8	5.8	3.3	3.1	3.0	3.3	3.3	9.9
Sub-Saharan Africa	**19.2**	**21.5**	**23.8**	**26.0**	**28.6**	**6.0**	**5.9**	**5.6**	**5.3**	**5.2**	**2.7**	**2.8**	**2.9**	**3.0**	**3.1**	**419.1**
Bangladesh	7.6	9.3	11.3	13.4	15.7	6.7	6.7	6.8	5.6	5.0	2.7	2.8	2.8	2.2	1.9	108.1
China, PR	17.4	17.3	19.6	22.5	26.2	1.8	2.0	4.0	4.2	4.5	2.6	2.2	1.5	1.4	1.5	1155.3
India	19.8	21.3	23.1	24.3	25.5	3.3	3.8	3.7	3.2	3.0	2.3	2.2	2.1	2.2	2.0	850.6
Indonesia	17.1	19.4	22.2	26.1	30.6	3.9	4.9	4.9	5.3	4.9	2.3	2.4	2.1	2.1	1.8	182.8
Korea R. of	53.3	56.3	56.9	58.8	59.8	6.6	3.7	2.1	2.4	2.2	3.3	2.5	2.0	1.7	1.8	21.8
Malaysia	33.5	37.7	42.0	45.9	49.8	4.9	4.8	4.5	4.4	4.3	2.7	2.4	2.3	2.6	2.6	17.9
Myanmar (Burma)	22.8	23.9	24.0	24.0	24.8	4.0	3.3	2.2	2.1	2.8	2.3	2.3	2.1	2.1	2.2	41.8
Nepal	3.9	5.0	6.5	8.5	10.9	4.3	7.3	8.1	8.0	7.4	2.1	2.5	2.7	2.6	2.5	19.3
Pakistan	24.9	26.4	28.1	29.8	32.0	3.9	3.8	3.9	4.9	4.9	2.8	2.6	2.6	3.7	3.5	121.9
Philippines	33.0	35.6	37.5	43.0	48.8	4.0	4.2	3.4	5.2	4.6	3.2	2.7	2.3	2.5	2.1	60.8
Sri Lanka	21.9	22.0	21.6	21.1	21.4	4.2	1.8	1.3	1.2	1.6	2.3	1.7	1.7	1.7	1.3	17.2
Thailand	13.3	15.1	17.0	17.9	18.7	3.7	5.5	4.9	2.8	2.6	3.1	2.9	2.4	1.8	1.7	55.6
Low-income Asia	**22.4**	**24.1**	**25.8**	**27.9**	**30.4**	**4.3**	**4.3**	**4.1**	**4.1**	**4.0**	**2.6**	**2.4**	**2.2**	**2.2**	**2.1**	**2653.1**
Algeria	39.5	40.3	43.4	47.5	51.7	3.8	3.5	4.6	4.9	4.3	2.9	3.1	3.1	3.1	2.6	24.9
Egypt	42.2	43.5	43.8	43.9	43.9	3.0	2.5	2.6	2.6	2.5	2.2	1.9	2.4	2.6	2.5	56.3
Iran	41.9	45.8	49.6	53.2	56.3	4.8	5.0	4.8	5.8	4.8	2.8	3.2	3.3	4.4	3.7	58.9
Iraq	56.2	61.4	65.5	68.8	71.8	5.3	5.0	4.6	4.2	4.2	3.2	3.3	3.3	3.3	3.3	18.1
Morocco	34.5	37.7	41.0	43.9	46.1	4.4	4.2	4.0	3.7	3.2	2.7	2.8	2.5	2.3	2.4	24.3
Syrain Arab R.	43.3	45.1	46.7	48.4	50.2	4.8	4.2	3.9	4.2	4.3	3.2	3.5	3.1	3.5	3.5	12.3
Tunisia	44.5	49.8	51.4	53.0	54.9	4.4	4.1	3.2	3.2	2.9	2.0	1.8	2.6	2.6	2.1	8.1
Turkey	38.4	41.6	43.8	52.5	60.9	4.9	4.1	3.1	6.1	5.2	2.5	2.5	2.1	2.5	2.2	56.1
Yemen Arab R.	13.3	16.4	20.2	24.4	28.9	5.4	6.2	7.4	6.9	6.7	1.6	2.0	3.2	3.1	3.3	11.3
Middle-East and N. Africa	**39.3**	**42.4**	**45.0**	**48.4**	**51.6**	**4.5**	**4.3**	**4.2**	**4.6**	**4.2**	**2.6**	**2.7**	**2.8**	**3.0**	**2.8**	**270.4**
Argentina	78.4	80.7	82.9	84.8	86.5	2.0	2.3	2.1	2.0	1.8	1.5	1.7	1.5	1.5	1.4	32.5
Brazil	55.8	61.2	66.2	70.6	74.6	4.6	4.2	3.9	3.4	3.0	2.6	2.4	2.3	2.2	1.9	148.5
Chile	75.2	78.4	81.2	82.6	93.3	3.0	2.5	2.2	2.0	1.9	2.1	1.7	1.5	1.6	1.7	13.2
Columbia	57.2	60.7	63.9	67.0	70.0	4.2	3.3	3.2	3.1	2.7	2.9	2.1	2.2	2.1	1.8	32.3
Ecuador	39.5	42.4	47.0	51.1	54.8	4.2	4.3	4.9	4.4	3.8	3.0	2.9	2.8	2.7	2.4	10.3
Guatemala	35.5	36.7	37.4	38.1	39.4	3.7	3.4	3.1	3.2	3.6	2.8	2.8	2.8	2.8	2.9	9.2
Mexico	59.0	62.8	66.3	69.6	72.6	4.6	4.3	3.7	3.3	3.1	3.1	3.1	2.6	2.4	2.3	84.5
Peru	57.4	61.5	64.6	67.3	69.8	4.8	4.2	3.7	3.2	2.8	2.8	2.8	2.7	2.4	2.0	21.6
Venezuela	72.4	77.8	83.3	87.3	90.4	4.0	4.9	4.8	3.5	3.3	3.3	3.4	3.4	2.5	2.6	19.5
Latin America	**58.9**	**62.5**	**65.9**	**68.7**	**72.4**	**3.9**	**3.7**	**3.5**	**3.1**	**2.9**	**2.7**	**2.5**	**2.4**	**2.2**	**2.1**	**371.5**
More developed regions[a]	**67.5**	**69.8**	**71.3**	**72.5**	**73.6**	**1.7**	**1.5**	**1.1**	**0.9**	**0.9**	**0.8**	**0.8**	**0.7**	**0.6**	**0.6**	**1143.4**
Less developed regions[b]	**25.1**	**26.7**	**29.2**	**31.8**	**34.7**	**3.6**	**3.6**	**3.9**	**3.8**	**3.8**	**2.5**	**2.4**	**2.1**	**2.1**	**2.1**	**4141.5**
Least developed countries[c]	**12.6**	**14.2**	**16.1**	**17.8**	**19.9**	**5.6**	**4.9**	**5.0**	**4.5**	**4.8**	**2.5**	**2.5**	**2.6**	**2.4**	**2.6**	**499.7**

[a]The more developed regions comprise all regions of North America. Australia-New Zealand and Japan.

Source: World Urbanisation Prospects, 1994

How do urbanisation levels and rates compare to the developed countries during the industrial revolution?

Williamson (1992, p.243) shows that the rate of urbanisation in developing countries is similar to that of the now developed countries during the Industrial Revolution. From 1875-1900 the percentage of population residing in urban areas in the industrial countries rose from 17.2 to 26.1 percent, and in the now developing countries the percentage of the population residing in urban areas rose from 16.7 to 28 percent during the period 1950-1975. The rates of urbanisation may have been similar, but the rate of city growth has not. For example: between 1875 and 1900 the population of cities in the now industrial countries increased by around 100 percent. The populations in cities in the developing world increased by about 188 percent during the period 1950-1975. It is this almost doubling of urban populations in the developing world in such a short time, that has led to the concern over the implications of such rapid growth and the pressures placed on developing countries by this process. The pressures commonly recognised are those associated with poverty and urban squalor as well as substantial concomitant increases in costs *inter alia* pertaining to the provision of infrastructure and social services.

2.1 Costs of Urbanisation

A survey by Linn (1981) shows the implications of rapid urbanisation on costs to developing countries. He categorizes the costs of urbanisation in developing countries as follows:

1) Fiscal and financial costs of urbanisation.

2) Economic costs and efficiency of urbanisation.

Research shows that local governments in urban areas tend to have higher per capita expenditures than local governments in rural areas. Linn (1981, p.627) points to the example of Colombia, where per capita expenditure in 1971 by the local government in Bogata (2,5 million inhabitants) was almost seven times the average per capita spending by local governments of four municipalities with populations falling between 50,000 and 90,000 inhabitants.

Costs of supplying public services in urban versus rural areas are discussed in some detail by Linn; some of these are: (a) The supply of water and sewage services - Linn (1981, p.638) concludes on this point that, "there are some indications that rural village water and sewage supply costs per dwelling are lower than those in urban areas, mainly because lower quality services are acceptable to policy makers and users in rural locations"; (b) Electricity - on balance urban electricity supply is cheaper than rural due to technological economies of scale; (c) Solid-waste disposal - the need for solid waste disposal is largely absent in low-density rural settlements, whereas for reasons of health urban areas obviously require waste-disposal systems. Therefore the higher density urban areas are faced with a higher cost in disposing of solid waste, than is the case in the rural areas; (d) Transportation - increased urbanisation leads

to a greater burden on the transportation system and therefore requires large public investments in infrastructure; (e) Education and health services - Lynn finds that education and health costs are essentially the same in rural and urban areas; and (f) Other public services including public markets, abattoirs, urban administration and planning, need not be provided in rural areas and therefore urban costs are higher than rural costs.

However, on balance the urbanisation process places a higher fiscal burden on governments that have to meet the rapidly rising demands for urban services.

With regard to the second category-economic costs and the efficiency of urbanisation, Linn maintains that economic costs are different to fiscal and financial costs in that they generally derive from the high levels of congestion and pollution observed in large cities. It is argued that because public service costs are higher in the urban than in the rural areas, and because congestion and pollution are approaching excessive levels, current Third World urbanisation is inefficient in that cities are growing too large. (Linn, 1981, p. 643).

The Linn survey, however does not take into account the now recognised positive side of city growth, which has historically been the engine of growth in developed countries. Larger cities offer economies of scale and specialisation in manufacturing. The appropriate policy instrument for controlling any negative externalities associated with urbanisation would most likely be to price the externalities through pollution and congestion charges.

2.2 The Effect of Migration on City Growth

The phenomenal growth of cities in the developing world has been attributed to high population growth rates and rural to urban migration. Measurement of the proportion of urban growth attributable to population growth (natural increase) and to rural -urban migration is difficult given the lack of reliable and comparable data available on migration rates in developing countries.

A rough measure of migration rates can, however, be obtained by calculating the difference between the urban growth rate and the national population growth rate.[1]

Table 2 shows estimates of net migration as a percentage of urban growth for a number of selected developing countries. The contribution of migration typically accounts for between 30 and 55 percent of urban growth, with migration rates between 1980-1990 being the highest in Sub-Saharan Africa and Low Income Asia, the average for the period 1965-1990 in Sub-Saharan Africa being 47 percent, in Low Income Asia 45 percent, Middle East and North Africa 36 percent and in Latin America 30 percent.

These results may well be a rather crude measure of migration rates, but more detailed studies by Sinclair (1978) and Preston (1988) show a similar trend. The sixteen developing countries surveyed by Sinclair (1978, p. 15) showed an average city growth rate of 5.4 percent for the period 1950-1975. During the period 1950-1960 migration accounted for 58 percent of city growth for eleven of the largest cities; this decreased to around 40 percent in the early 1970s.

Interestingly a similar migration trend was followed by the industrial nations during the Industrial Revolution, with migration accounting for 58 percent of city growth between 1776-1811, and 46 percent during 1811-1846 (Williamson 1990, p.28).

The migrants' contribution to city growth may also be higher than is represented by the above estimates as migrant labourers may have higher fertility rates than the rest of the population given that most migrants are of childbearing age. (Rodgers and Williamson 1982).

[1] This is a measure of net migration , and while it fails to take into account the differences that may exist in fertility rates between urban and rural populations it is often used in the absence of a better measure (Yap 1977, p240).

Table 2 : Estimates of Net Migration as a percentage of Urban Growth

Country	Net Migration as a Percentage of Urban Growth*				
	1965-70	1970-75	1975-80	1980-85	1985-90
Cameroon	64.6	68.4	52.7	48.9	45.3
Ethiopia	51.2	46.9	44.9	42.4	31.9
Ghana	52.4	21.6	29.0	16.6	24.7
Ivory Coast	46.3	43.8	29.4	28.6	28.2
Kenya	52.1	56.0	53.4	53.0	51.3
Madagascar	52.3	51.5	45.8	45.2	44.1
Malawi	62.4	61.5	51.8	44.8	33.2
Mali	54.1	51.4	55.0	47.6	45.3
Mozambique	64.6	78.9	74.8	77.7	87.3
Nigeria	56.8	54.3	51.7	49.0	45.8
Senegal	14.1	13.5	25.7	27.4	27.0
South Africa	8.5	2.6	2.7	2.7	13.9
Sudan	66.6	50.1	25.4	27.0	34.1
Tanzania	61.7	73.3	70.9	52.5	50.9
Uganda	51.2	25.9	24.7	45.8	40.8
Zaire	50.9	-24.0	-22.0	-20.3	2.3
Zambia	63.5	49.9	44.0	13.3	12.9
Zimbabwe	49.5	48.3	46.6	43.3	42.6
Sub-Saharan Africa	**54.2**	**52.2**	**47.2**	**42.1**	**40.4**
Bangladesh	60.0	58.9	58.1	60.1	63.3
China, PR	-48.3	-11.6	63.4	66.8	66.3
India	30.3	40.4	43.2	32.7	32.2
Indonesia	40.1	51.0	56.1	61.4	64.0
Korea R. of	50.5	31.9	6.7	28.2	15.8
Malaysia	45.7	49.2	48.7	40.4	38.2
Myanmar (Burma)	42.6	28.8	1.9	1.9	21.8
Nepal	51.9	66.5	67.0	66.9	66.1
Pakistan	28.5	31.6	31.8	24.6	29.2
Philippines	21.3	35.7	31.1	52.9	54.2
Sri Lanka	45.8	8.7	-33.6	-35.5	15.8
Thailand	17.4	46.6	49.8	34.5	36.0
Low-income Asia	**38.6**	**43.5**	**46.1**	**46.2**	**47.9**
Algeria	25.4	12.1	31.6	37.2	39.3
Egypt	24.9	23.2	7.0	0.8	0.8
Iran	40.7	35.9	32.5	24.5	22.9
Iraq	39.5	35.1	28.1	22.9	20.8
Morocco	37.9	33.8	38.4	38.5	25.5
Syrain Arab R.	33.1	18.4	18.7	17.4	16.9
Tunisia	54.0	55.4	19.4	18.6	25.2
Turkey	48.7	38.9	32.8	59.1	58.1
Yemen Arab R.	70.0	67.9	56.2	54.9	50.8
Middle-East and N. Africa	**43.0**	**38.2**	**32.9**	**34.6**	**32.5**
Argentina	28.9	26.1	25.4	23.4	22.5
Brazil	44.4	43.4	40.9	37.3	36.7
Chile	31.8	32.5	32.0	17.4	8.6
Columbia	31.7	35.7	32.0	31.0	32.0
Ecuador	29.0	32.1	42.0	38.9	36.6
Guatemala	24.5	19.1	11.8	11.6	19.6
Mexico	31.4	28.3	30.1	28.3	27.4
Peru	42.0	33.0	27.1	25.5	26.5
Venezuela	18.4	29.5	28.4	27.2	21.3
Latin America	**32.0**	**31.4**	**30.9**	**27.9**	**26.7**
More developed regions[a]	**52.9**	**45.6**	**38.5**	**37.1**	**35.6**
Less developed regions[b]	**29.6**	**34.2**	**46.3**	**45.6**	**45.2**
Least developed countries[c]	**55.1**	**49.3**	**48.5**	**46.1**	**46.4**

Source: Calculated from World Urbanisation Prospects 1994

* Calculated as the difference between the urban growth rate and the population growth rate as represented in Table 1.

It is the significant contribution of migration to city growth that has led economists to develop explanations for the migration decision as well as developing policies to manage rapid urbanisation.

3. ECONOMIC THEORIES OF MIGRATION

3.1 The Lewis Model

Lewis (1954) formulated the best-known early theoretical work on development.

Lewis's work was primarily concerned with economic development in a dual economy, i.e. the relationship between the capitalist and non-capitalist sector of the economy.

Lewis sought to explain economic development under what he called situations of unlimited labour supply, where an expanding capitalist sector (urban) draws labour from the non-capitalist (rural) sector. The model therefore implies rural-urban migration and was one of the first models to draw attention to the effects of rapid urbanisation and the accompanying problem of urban unemployment in developing economies.

In the Lewis model, the underdeveloped economy consists of two sectors: (a) a traditional, overpopulated rural subsistence sector, characterised by very low marginal productivity of labour (b) a high-productivity modern urban industrial sector into which labour from the subsistence sector is gradually transferred.

The model is primarily concerned with the transfer of labour from the traditional to the modern (capitalist) sector (rural to urban) as well as with the growth of output and employment in the modern sector. The level of wages in the modern sector is assumed to be constant at a level above the fixed average subsistence level of wages in the subsistence (agricultural) sector. According to Lewis (1954, p.150), "there is usually a gap of 30 percent or more between capitalist wages and subsistence earnings". This difference is explained by Lewis in several ways; part of the difference is illusory because of the higher cost of living in the capitalist sector, part is due to higher rents and transport costs encountered in the modern (capitalist) sector, and part is due to the higher modern sector wage,"...the higher wage may be a recognition of the fact that even the unskilled worker is of more use to the capitalist sector after he has been there for some time than is the raw recruit from the country," or the higher wage, "may itself represent a difference in conventional standards, workers in the capitalist sector acquiring tastes and social prestige which have conventionally to be recognized by higher real wages."

Central to the Lewis model is the zero marginal product of labour hypothesis and its related notion of excess supply of labour in the agricultural (rural) sector. The observed phenomenon, in many developing countries, of rapid population growth in the agricultural sector in conjunction with unchanged capital techniques means that there is an excess supply of labour on the limited land stock. The zero marginal product of labour therefore stems from the fact that, given this excess supply of labour, labour could be withdrawn from the rural sector and not make any difference to agricultural output.

The obvious question then arises: If these people have zero marginal products then why would anyone employ them and if they produce nothing how do they sustain themselves?
The answer lies in the fact that in many of these developing countries farming is carried out as subsistence family farming and not as a wage-labour, and the families sustain themselves by sharing the total product of the farm equally.

With the above in mind, at the constant urban wage, the supply curve of rural labour is considered to be perfectly elastic, that is, the supply of labour at the capitalist wage from the traditional sector is unlimited.

The two sector Lewis model of a developing economy's growth is illustrated by Figures 1(a), 1(b) and 1(c).

Figure 1(a)

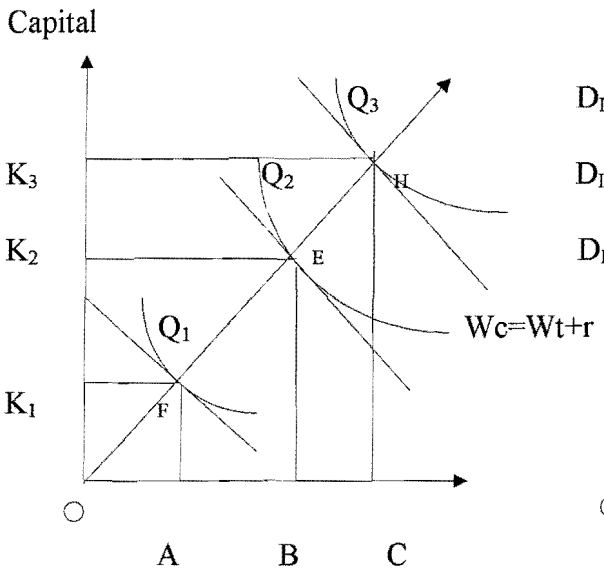

Figure1(b)

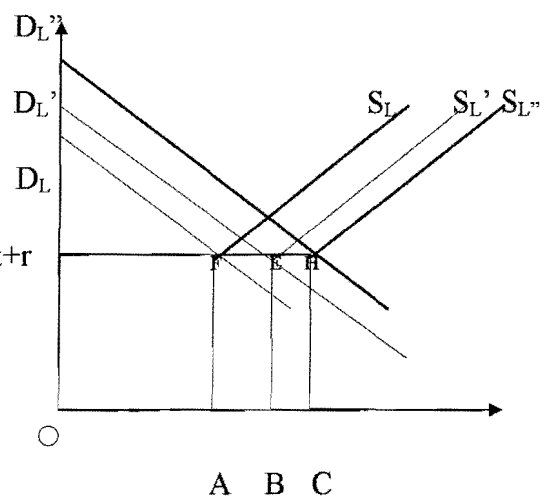

Figure 1(c)

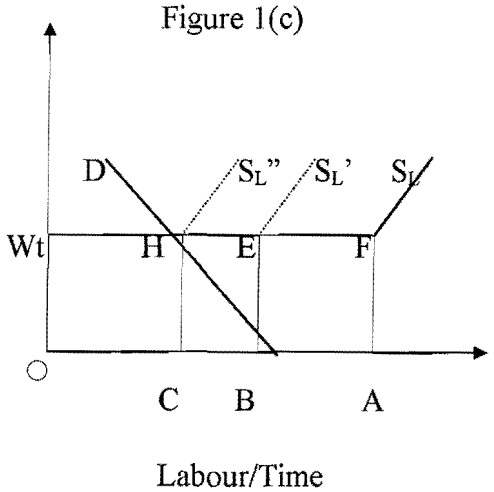

Figure 1: The Lewis Model of a Developing Economy's Growth

Source: Philip Black, (1990) adapted from unpublished lecture notes, University of Stellenbosch.

On the vertical axis of Figure 1(c) (traditional sector) we have the real subsistence income and in Figure 1(b) (capitalist sector) the real wage and marginal product of labour (MPc); the real wage and MPc are assumed to be equal in the competitive capitalist (modern) sector labour market. On the horizontal axis of both Figure 1b and 1c we have the quantity of labour and time. Segment OWt in Figure 1(c) represents the average levels of real subsistence income in the traditional sector (i. e., where there is non-competitive factor and product pricing). Segment OWc in Figure 1(b) represents the real wage in the modern capitalist sector, - Wc is equal to the real subsistence income (Wt) in the traditional sector plus a premium r; at this wage the supply of rural labour is assumed to be unlimited, or perfectly elastic. This is shown by the horizontal labour supply curve WcH in Figure 1(b).

Given a fixed supply of capital, in the initial stage of modern sector growth, the demand for labour is determined by labour's declining marginal product shown by curve D_L in Figure 1(b). The economy is initially at point F, in Figures 1(a), 1(b) and 1(c), with OA labourers employed in the capitalist sector and producing an output equal to the area OD_LFA. The share of total output paid to workers in the form of wages is equal to the area OWcFA and the remaining area WcD_LF is the profit that would accrue to the capitalists.

Lewis (1954) assumed that all of the profits would be reinvested; therefore the capital stock in Figure 1(a) would rise from k1 to k2. This larger capital stock causes the total product curve of the modern sector to rise, which in turn induces a rise in the marginal product demand curve for labour - the effect of this is illustrated by the shift of the demand curve to D_L' in Figure 1(b).

Now the exact demand for labour AB in Figure 1(b) is satisfied by workers drawn from the traditional sector, BA in Figure 1(c), (in which there is an excess supply of labour at the wage rate Wt in Figure 1(c)). The excess supply of labour is drawn to the capitalist sector by the higher wage Wc offered in that sector but only to the number of AB labourers. The capitalist sector now produces at point E with OB worker's employed (at the same wage rate Wc) and total output is now $OD_L'EB$, with profits increasing to $WcD_L'E$ and wages to OWcEB. The profits are again reinvested, increasing the capital stock to k3 and shifting the demand curve to D_L" in Figure 1(b). BC labourers are then attracted from the traditional sector and employed in the capitalist sector, leaving the capitalist and traditional sectors at point H in both Figure 1(b) and 1(c). At point H all the surplus labour has been absorbed in the capitalist sector. Workers therefore can only be withdrawn from the traditional sector at a higher cost of lost food production; at this point the declining labour/land ratio means that the marginal product of rural labour is no longer zero. Modern sector wages must then increase in order to draw workers from the traditional sector so that the modern sector can continue growing.

The model therefore implies rural-urban migration, with labour moving from the traditional (rural) sector to the capitalist (urban) sector of the country.

The assumptions of the Lewis model have been criticized on various points. Todaro (1987, pp. 69-71) mentions three of these:

1) "the model implicitly assumes that the rate of labour transfer and employment creation in the modern sector is proportional to the rate of modern sector capital accumulations. " This is clearly not true if profits are reinvested in labour-saving

capital equipment rather than just duplicating the existing capital (as is assumed in the Lewis model).

2) The second questionable assumption of the model is the notion that surplus labour exists in rural areas while there is full employment in the urban areas. Todaro (1987,p. 70) points to the fact that most research in recent years indicates the opposite to be true; ". . . by and large, development economists today seem to agree that the assumption of urban surplus labour is empirically more valid than the opposite Lewis assumptions of a general rural surplus labour."

3) The third questionable assumption is the notion of a competitive modern sector labour market that guarantees the existence of constant real urban wages until the point where the supply of rural surplus labour is exhausted.

In most developing countries wages do rise over time due to institutional factors such as trade unions, civil service wage scales, and multinational corporations' hiring practices.

The above three points serve to indicate that although the Lewis model of development provided an early valuable means of portraying the development process it requires considerable modification in order to fit the reality of the developing world of today.

3.2 The Harris-Todaro Model

"The Third World today is faced with a situation of increasing rural-urban migration despite rising levels of urban unemployment, and it is this that lessens the Lewis model of development's validity" (Todaro, 1987, p. 253).

Todaro (1969) and later Harris and Todaro (1970) developed a model that attempts to explain the phenomena of rising rural-urban migration in the context of rising urban unemployment.

Todaro starts the motivation for his migration model with the assumption that labour migration is primarily an economic phenomenon. The decision of the potential migrant to move from his rural home to an urban area is based on a rational decision making process. The Todaro model postulates that migration proceeds in response to urban-rural differences in expected rather than actual earnings. The decision of the migrant to migrate is taken even though he knows beforehand that high unemployment exists in the urban areas.

The basic hypothesis of the Todaro model is that the decision to migrate does not only depend on the wage differential between the rural and urban sectors, but also on the probability of finding wage employment in the urban sector within a given time period. According to Harris and Todaro (1970, p. 127) the model can be described as a two sector internal trade model with unemployment.

The two sectors are the urban sector, which specialises in the production of a manufactured good, (part of which is exported in exchange for agricultural goods) and the rural sector, which uses all available labour to produce a single agricultural good, some of which is exported to the urban sector.

The model as formulated by Harris and Todaro (1970) is presented below:

Agricultural Production Function:

(1) $Xa = q(Na, L, Ka), \quad q'>0, q'' <0$

Where:

Xa = output of the agricultural good,

Na = the rural labour used to produce the good,

L = the fixed availability of land,

Ka = the fixed capital stock,

q'= is the derivative of q with respect to Na.(the only variable factor).

The Manufacturing Production Function:

(2) $Zm= f(Nm, Km), \quad f' >0, f' <0$

Where:

Zm = the output of the manufacturing good,

Nm = the labour required to produce this output,

Km = the fixed capital stock,

f' is the derivative of f with respect to Nm.

Price Determination:

(3) $P = \rho(Xm/Xa), \qquad \rho'>0$

Where:

P, the price of the agricultural good in terms of the manufactured good is a function of the relative outputs of agriculture and manufacturing when the manufactured good serves as a numeraire[2].

Agricultural Real Wage Determination:

(4) $Wa = P.q'$

Where:

Wa = the agricultural real wage, i.e. the value of labours' marginal product expressed in terms of the manufactured good.

Manufacturing Real Wage:

(5) $Wm. = f'' >= \overline{Wm}.$

Where:

[2] This assumption is made for analytical convenience, see Harris and Todaro (1971, p128).

Wm = the marginal product of labour in manufacturing (following the neo-classical conditions for profit maximisation in a competitive market). The wage is constrained to be greater than or equal to the fixed minimum wage $(\overline{Wm})$ in the urban area.

Urban expected wage:

$$(6)\ W^e_u = \overline{Wm}Nm/Nu, \quad Nm/Nu \leq 1,$$

Where:

W^e_u = the expected real urban wage; this is equal to the real minimum wage adjusted for the total urban labour force employed, Nm/Nu (Nu is permanent urban plus migrants).

Labour endowment:

$$(7)\ Na + Nu = \overline{Nr} + \overline{Nu} = \overline{N}$$

The total labour employed in agriculture (Na) plus the total labour force in the urban sector (Nu) must equal the sum of the initial endowments of rural $(\overline{Nr})$ and permanent urban $(\overline{Nu})$ labour, and this in turn equals the total labour force $(\overline{N})$.

Equilibrium condition:

$$(8)\ Wa = W^e_u$$

So migration to the urban area is a positive function of the urban-rural *expected* wage differential; this is shown in equation (9) below.

(9) $\dot{N}u = \Psi(\overline{W}m\overline{N}m/Nu - P.q'), \quad \Psi' > 0.$

Where:

$\dot{N}u$ is a time derivative.

So as the model is constructed migration only ceases when the expected income differential is zero.

The model clearly shows that any increase in the *expected* wage results in an increase in migration to the urban sector; this may be due to an increase in manufacturing growth or an increase in the urban wage.[3] Todaro and others after him have also expressed the above model and migration process in terms of the *probability* of finding employment in the manufacturing sector where the probability of finding employment is equal to the ratio of new manufacturing sector employment to the number of job seekers in the manufacturing sector.[4]

Graphically the migration process might be represented as follows:

Let:

Mr = rate of rural-urban migration

Wr = the real agricultural wage, as shown above.

Wm = the real urban/manufacturing wage, as shown above.

λu = the probability of finding wage employment in the urban sector.

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[3] For a complete analysis of the stability of the above equations see Harris and Todaro (1971, p130).
[4] See Todaro 1969.

Rural Sector

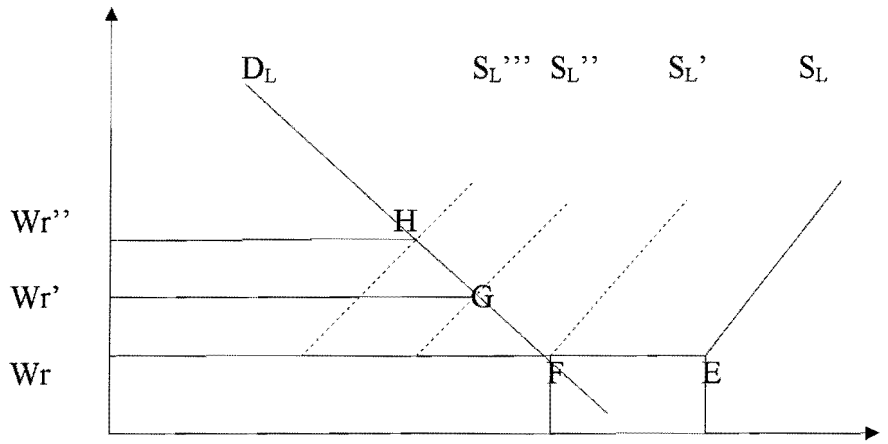
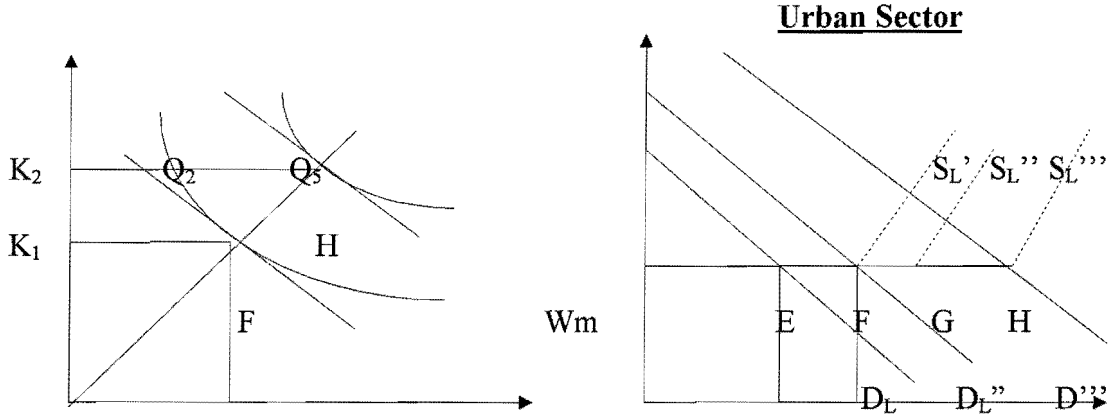


Figure 2(a)

C B A

Labour/Time

Urban Sector



A C

Labour/Time

Figure 2(c)

A B C

Labour/Time

Figure 2(b)

Figure 2: The Harris-Todaro Model of Migration

Source: Philip Black, (1990) adapted from unpublished lecture notes, Stellenbosch University.

The economy is assumed to be at point E, in Figures 2(a) and 2(b) capital formation is, k1 (in 2c) and the urban economy faces the demand curve for labour D_L. AB labourers are employed (in 2b), but the jobs created initially through the reinvestment of profits (capital formation) cause the probability of finding a job in the urban sector to rise for those in the rural sector (λu rises); Wm at point E is also greater than Wr. The combination of these two factors causes AB labourers to migrate from the rural sector to the urban sector (all of which find employment), but an additional amount, BC labourers, migrates at the same time also expecting to find employment. They cannot and as a result, λu drops, stopping the migration process at point F. BC can be regarded as a sort of induced migration, and these migrants are seen to find ` employment in the so-called informal sector of the economy. The process continues with further reinvestment of profits and hence an increase in capital formation to, k2 (figure 2(c)), shifting the demand curve to D_L'', this creates additional jobs BC, in Figure 2(b). Urban unemployment drops causing, λu to rise and hence Mr to rise (induced migration therefore increases) - the labour supply curve SL', in Figure 2(a), contracts to SL'' resulting in a drop in the, Wm\Wr. Although, Wr has risen and the wage differential, Wm\Wr has dropped, the Wm is still higher than Wr. This combined with the fact that unemployment, has dropped (the unemployed BC from the previous stage have now found jobs and have moved out of the informal sector) and hence the probability of finding a job (λu has risen), results in a further FG labourers migrating to the urban sector. The increased migration, FG causes the shift in the supply curve SL' to SL"; the urban sector now faces an excess supply of labour, FG and hence, FG labourers remain unemployed, urban unemployment increases and therefore the probability (λu) drops. The drop in λu causes the migration process to stop and equilibrium is at G. The process continues until capital formation and job creation have caught up with labour migration

at a point such as H in both Figures 2(a) and 2(b); at this point the rise in the rural wage, Wr' to Wr''' in figure 2(a) is just enough to offset the urge of the rural labour to find a job in the urban sector. As a result the probability λu and the wage differential, Wm\Wr offset each other and migration stops.

In the model the migrant is assumed to go through a waiting period before he finds formal employment in the urban sector. However, in order for him to survive he must find an alternative source of income during this waiting period. The employment, which he finds, is invariably in the so-called urban informal sector. The informal sector is usually characterized by a large number of small-scale production and service activities that are either family or individually owned; these activities are labour-intensive and use simple technologies. Due to the lower educational and skill levels of the informal sector workers in this sector are often less productive and wages lower than in the formal sector (Todaro, 1987). Most of the informal sector inhabitants live in shacks, which they build in squatter or informal settlements or slums.

What are the implications of the informal sector for the migration process? Should the informal sector be encouraged or discouraged? There is no doubt that the promotion of the informal sector may serve to provide income and employment for many migrants coming to the cities and may in fact be able to do this on a larger scale than is possible for the formal sector. The disadvantage, however, of promoting the informal sector (within the Todaro-Model) lies in the strong relationship that exists between rural-urban migration and labour absorption in the informal sector. The existence of informal sector employment lowers the urban unemployment rate, therefore raising the probability of finding urban wage employment (the waiting period is thus shortened). This clearly could

result in an increase in the migration rate to the urban areas and hence lead to an exacerbation of an already serious problem of over-crowding in the cities.

3.3 Modifications to the Harris-Todaro Model

The basic model of Harris and Todaro has been modified by a number of authors most notably Bahagwati and Srinivasen (1974) whose modifications mainly pertain to policy options and the ranking thereof. Corden and Findlay (1975) extend the Harris -Todaro model by introducing capital mobility between the rural and urban sectors in response to differing returns on capital in the two sectors and Fields (1975) extended the Harris-Todaro model by a) making allowances for a more generalised job search behavior, (b) introducing an urban traditional sector, (c) allowing for the fact that migrants with higher education levels may obtain preference in hiring and d) making allowances for labour turnover in the model.

Marjit (1991) however, using a Harris-Todaro structured model, argues that, in countries where primarily agricultural goods are used as raw materials in industry a wage subsidy to the urban sector can increase urban employment. In the model proposed by Marjit a wage subsidy to the urban sector leads to an increase in *total* employment, both rural and urban. Such a result clearly would require that the urban-based industry would have to be primarily agro-based. Agro-based industries are indeed important in some less developed countries, and such extensions of the Harris-Todaro model, by incorporating industry-agriculture linkage effects, may prove useful in the determination of optimal development policies in the less developed countries.

Lundborg (1990) extends the model to a three sector model, arguing that migration takes place from a backward agricultural region to a more commercial agricultural region near the cities or to the cities themselves: as is the case in the modern western economies, the backward sectors will disappear as both food (commercial farms near the cities) and manufactured goods are produced in the modern sector.

Heady (1988) extends the Harris-Todaro model to a three-sector model namely agriculture, manufacturing and an unorganised sector. In the model the migrant maximises expected utility rather than expected wages, which allow for the inclusion of risk aversion and the non-pecuniary advantages and disadvantages of urban residence. The model is largely concerned with optimal taxation policies within a Harris-Todaro model of migration.

Panagariya and Succar (1986) build a Harris-Todaro model to include economies of scale in manufacturing and follow the Corden and Findley formulation of the Harris-Todaro model. They show that if economies of scale are strong enough an increasing value of marginal product labour curve in manufacturing might be produced and that in such a case a Harris-Todaro equilibrium may not exist.

3.4 Policy Implications of the Harris-Todaro Model

Harris and Todaro (1970) analyse two policies within the context of their model; (a) a wage subsidy in the modern sector, (b) a labour mobility restriction policy.

A wage subsidy in the manufacturing sector, it is argued, will encourage private employers to hire more labourers (use more labour intensive techniques) and thus reduce the serious unemployment problem associated with rapid urbanisation.

The effect of a wage subsidy to manufacturing as postulated by Harris and Todaro is illustrated in Figure 3 below:

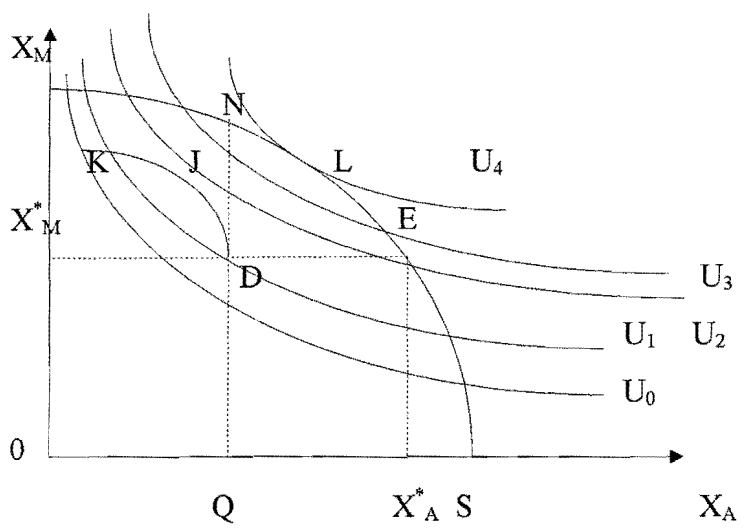


Figure 3: The Effect of a Wage Subsidy to Manufacturing
Source Harris and Todaro (1970 p. 133)

In the above Figure 3, point D is the initial equilibrium, given the minimum urban wage, with the corresponding output of the manufactured good equal to OX^*_M.

Without migration as a result of wage differentials between agriculture and manufacturing, the economy could produce at point E, but agricultural output is reduced to OQ as a result of migration. The aim of a wage subsidy would then be to move the

economy to a point such as L, which is the optimum position in the above diagram, thus increasing welfare from U_1 to U_4.

Within the Harris- Todaro model the implementation of such a wage subsidy will result in an increase in production of the manufactured good. At the same time the creation of an additional job at the minimum wage will induce additional migration from the rural sector, causing agricultural output to fall. Point L in the figure is therefore unattainable; movement from D can only be in a northwest direction, the line DK is the locus of all attainable points with a point such as,K, being the only point where all the economy's labour resources are employed. At point K the expected wage equals the minimum wage (there is no urban unemployment), and is a point inside the production possibilities frontier. This is because a wage subsidy to manufacturing means that the marginal product of labour in manufacturing will be lower than in agriculture, forcing the economy to an equilibrium point inside the production possibility frontier.

Harris and Todaro (1970 p. 134) conclude that because conditions for a general optimum can only be met at point L, " [The] implementing [of] a shadow wage criterion to the point that urban unemployment is eliminated will not generally be a desirable policy."

However, some level of wage subsidy may be justified, if point, J, could be reached, a point on a higher welfare curve than point D.

The second policy of migration restriction, as shown by Harris and Todaro, would indeed raise welfare in the economy, as without migration from the rural areas point E can be reached. The policy, however, apart from its ethical undesirability would

probably require that the rural sector be compensated for the loss of the opportunity to migrate in order not to make that sector worse off.

Harris and Todaro, as a result of the restrictions of using either of these policies on their own advocate the use of a combination of both policies to obtain a first best solution for effective economic planning.

The policy issues and their effects within the Harris-Todaro model have been studied by many other authors, the most significant are discussed below.

Stiglitz (1974, pp. 214-216) builds a model, which he calls the `labour turnover model'. In this model he contrasts three different equilibria namely, a first best solution, where government controls migration directly, a second best solution where government cannot control migration directly but can control urban wages and unemployment and a third best solution where government indirectly controls the urban sector through wage subsidies to the private sector and shadow prices for employment in the public sector that differ from market prices. Stiglitz draws the following conclusions about the effectiveness of various policies on national output, urban unemployment, and urban unemployment rates: (a) If the government could control wages, as in the second best solution, and although the competitive wage is still likely to be greater than the wage government sets to control the urban sector, the wage which government sets will still be higher than the rural wage and therefore there will still be urban unemployment (there will still be rural-urban migration). (b) The shadow price of labour may still equal the urban wage even if there is urban unemployment and the government directly controls the urban sector. (c) A wage subsidy is always partially shifted and it always increases the unemployment rate, and may also result in a decrease in national output. Stiglitz

(1974, p. 214) has the following to say about wage subsidies: "In our endogenous model of wage determination, we can always show that a wage subsidy leads to increased urban wages, and hence, not only does the number of unemployed individuals increase, but the unemployment rate in the urban sector actually increases as a result of the wage subsidy." (d) An urban income tax (the revenue from the tax may be used to subsidise workers in the rural sector) is always partially shifted, increases total labour costs and decreases the unemployment rate; this may also lead to increased national output.

Bhagwati and Srinivasan (1974) and Bhagwati (1985 pp. 250-267) build a model, which solves the Harris- Todaro problem of having to use two policies to obtain a first best solution and also shows that the unethical use of migration restrictions is not necessary to obtain a first best solution. Bhagwati and Srinivasan (1974) show that, (a) a uniform wage subsidy, regardless of the sector of employment, will yield the optimal first best solution, (b) that a combined wage subsidy to manufacturing and a production subsidy to agriculture will yield the optimal first best solution, (c) in both cases no restriction of migration is necessary. Bhagwati (1985) further analyses various other wage/production subsidies and taxes to *both* manufacturing and agriculture in both *open* and *closed* economies and again shows how the simultaneous combination of a wage subsidy to manufacturing and a production subsidy to agriculture can yield the first best solution. In all of the above studies the Harris-Todaro conclusion that a wage subsidy to the manufacturing sector alone will lead to an increase in urban unemployment by inducing migration from the rural sector is accepted.

4 ALTERNATIVES TO THE HARRIS-TODARO MODELS

4.1 Risk Aversion strategies

Stark and Levhari (1982) criticize the Todaro-model on the grounds that it does not contain any decisional risk content (risk does not appear as a variable in the Todaro model) and go on to explain risk as an explanatory variable in the rural-urban migration process in less developed countries (LDCs).

> "In a nutshell, it is suggested that an optimising, risk averse small-farmer family confronted with a subjectively risk-increasing situation manages to control the risk through diversification of its income portfolio via the placing of its best-suited member in the urban sector, which is independent from agricultural production" (Stark and Levhari 1982, p.192).

The process is seen to work as follows. A small farmer, who has a strong desire to innovate (e.g. introduce a new technology into his farming process), but is deterred from adopting a new technology because he (subjectively) perceives it to have a high risk content, must in order for him to carry out the technological transformation, overcome the aversion to risk. To do this the initial risk of lost income in the family's portfolio must be lessened or overcome. No insurance market exists for the family, which means that the family has to resolve the above problem internally.

In the Stark and Levhari explanation of the ensuing process the objectively perceived higher risk entailed in pursuing the new technology is rewarded by higher expected output, but this is not how the farmer thinks; for him it is the subjective risk that counts. Figure 4 shows the farmers' risk-expected return plane:

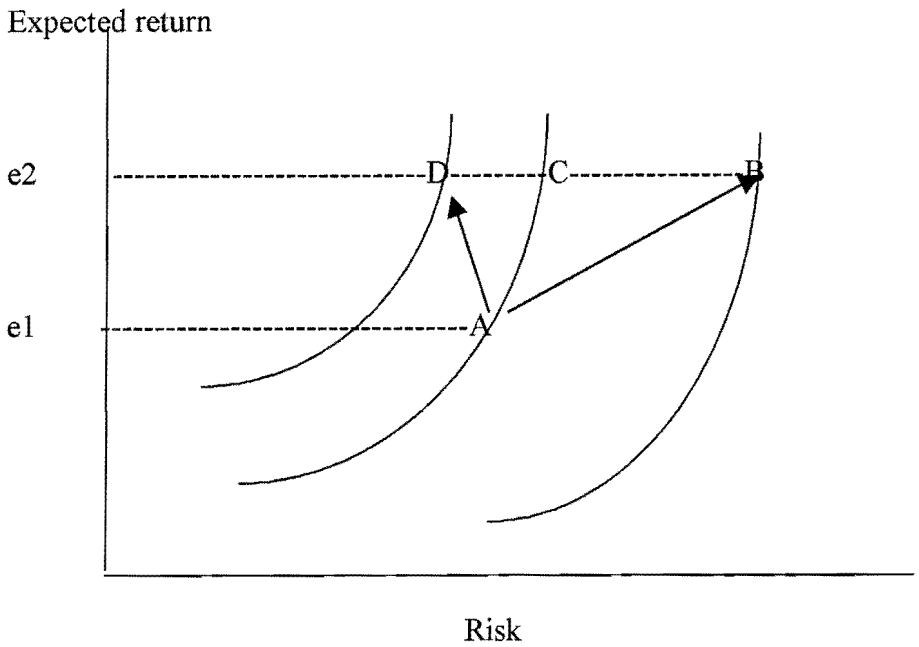


Figure 4: Small Farmers Risk-Expected Return Plane

Source:Stark,et.al. (1982,p.193).

The introduction of a new technology involves an initial objective move from point A to D in Figure 4, but the farmer subjectively considers his new position to be at point B, whereas the position which he is willing to bear (at the worst) is point C. Now for the farmer to avoid point B (which has a very high risk) and for him to locate on C, he must adopt a risk-depressing strategy before he introduces the new technology. He therefore will attempt to diversify the family's income portfolio. Such a diversification, as argued by Stark and Levhari, could be achieved by allowing one member of the family to migrate to the urban sector, hence diversifying the income portfolio of the family with the resulting drop in perceived risk associated with the introduction of the new technology (the income obtained by the urban family member serves to lessen the unreliable loss of income and hence risk of introducing a new technology). So in the explanation of rural urban migration, "...the motive [to migrate] may not be expected -

income maximization per se. A strong aversion to risk - which prevailing explanations do not capture [notably the Todaro model], may be churning beneath the surface." (Stark and Levhari, 1982, p.194).

As noted earlier, under adaptations to the Harris-Todaro model, the addition of risk as a determinant within the Harris-Todaro model has been achieved by Heady (1988), by reconstructing the model to assume that migrants maximise expected utility rather than expected wages.

4.3 Relative Deprivation Theory

Stark (1984) develops another explanation of rural-urban migration process. The basic premises of the Stark approach are:
(a) given a person's own (current) income, his satisfaction or deprivation is some function of income statistics other than his income (e.g., a statistic based on the incomes of some other persons) and (b) that rural-urban migration is undertaken in order to improve a person's position in terms of the latter statistic.

Premise (a) is built on the notion that people compare their personal income with that of others (e.g. in the village) and that this generates psychic costs or benefits, frustration or elation, relative deprivation or satisfaction. Premise (b) builds on the fact that the factors in (a) motivate locational decisions (rural-to-urban migration). According to Stark (1984), "relative deprivation is an important factor affecting people's choices which has been overlooked by the received migration theory [Todaro model]."

After looking at a number of village studies Stark (1984) observed a number of unexplained occurrences, these being;

1) "rural-to-urban migration rates are not highest in the poorest villages"; (2) "migration rates are higher from villages where the distribution of income by size is more unequal"; and (3) "from these villages, it is the very poor whose propensity to migrate is highest."

The Stark approach to rural-urban migration works as follows: A small rural village where everyone compares his income, (Y), to the community's average income (Y'), is considered, the income distribution is assumed to be uniform over a range Yl,Yh, the lowest and highest incomes in the village. Those people whose incomes are below (Y') will now perceive themselves to be relatively deprived and will migrate to the urban sector where they assume they will be able to secure an income closer to (Y'). But now the average income of the village has risen higher than (Y') (due to the lower income population moving to the urban sector), leaving a further group of the village in a position of perceived relative deprivation in comparison with the remaining villagers (due to the average income (Y') having risen through the loss of some of the lower income population through migration). Those whose incomes are now below the new average income (Y') also migrate to the urban sector in the hope of obtaining employment at the income level (Y'). The process continues until Y = Yh, when only those with the highest income are left in the village.

The relative deprivation approach of Stark (1984) is as he himself points out, relatively untested empirically. Stark and Taylor (1991) have empirically tested the model of relative deprivation for migrants moving from Mexico to the United States.

The study shows that in the Mexican case, if absolute income is controlled for, then relatively deprived households are more likely to migrate than those more favourably located in the village's income distribution. Much more research is necessary to analyse the validity of these theories before reaching any final conclusions. Specific studies relating to internal migration rather than the immigration case of movement from Mexico to the USA might generate more interesting and comparative results. For example, would the above results hold true for internal migration within Mexico? While much of the same economic reasoning for internal migration might hold for immigration decisions, other factors such as political freedoms may also influence immigration decisions. This may make it difficult to apply the relative depravation theory to immigration without controlling for any non-economic benefits that immigration might hold.

5. THE NON-NEOCLASSICAL VIEW

Some authors have questioned the neo-classical notion of a stable equilibrium, notably, Ragnar Nurkse (1953), in his Vicious Circle thesis, and Gunnar Myrdal (1957) in his theory of Cumulative Causation. Myrdal (1957,p.228.) argues that the so -called backwash effects in LDCs outweigh the so-called spread effects, resulting in one region of the country becoming richer at the expense of another. This so-called vicious circle of poverty was first recognised and developed by Ragnar Nurkse (see Nurkse, 1953,p4.) and has since been further developed by Myrdal along with other writers of the `dependency' and `neo -Marxist' schools.

According to Meier, (1984, p.190), Myrdal claimed that: "Contrary to what the equilibrium theory of international trade would seem to suggest, the play of market forces does not work toward equality in the remunerations to factors of production and, consequently in incomes. If left to take its course, economic development is a process of circular and cumulative causation which tends to award its favours to those who are already well endowed and even to thwart the efforts of those who happen to live in regions that are lagging behind".

In the context of rural-urban migration the backwash effects which Myrdal refers to include the destruction by multinational companies (which establish so called enclave economies within the developing country and which later become completely integrated with the international capitalist system) of the traditional (rural) handicraft industries through their obsession with profit maximisation.

The destruction of the rural industries leaves the rural worker little option but to migrate to the urban sector in order to find employment. The primary reason for migration, within the Myrdal- theory, would therefore be that it is due to the destruction of the rural sector in favour of the urban sector.

Myrdal has however been criticised in his failure to recognise that as the development process reaches the advanced stages the spread effects tend to balance out the regional inequalities that develop in the initial stages of a country's development. (See Seligson, 1984, p.324 for empirical evidence).

6. SELECTED EMPIRICAL RESULTS OF MIGRATION STUDIES

One of the most comprehensive early surveys of empirical work on migration studies is provided by Yap (1977). The results of some of the studies covered by Yap are summarised in Appendix 1, and include Barnum and Sabot (1975) for Tanzania, Greenwood (1971) for India, Huntington (1974)[5] for Kenya and Levy and Wadycki (1972) for Venezueala. Two other studies not included in Yap (1977) are noted here: namely, Garrison (1982) for Mexico and Banerjee and Kanbar (1981) for India.

The migration function usually takes the following form:

All of the studies are `macro' studies and are typically expressed in a logarithmic form, the basic general formulation being:[6]

$$\frac{M_{ij}}{P_i} = (Y_i, Y_j; U_i, U_j; Z_i, Z_j; d_{ij}; C_{ij}) \qquad \begin{matrix} i = 1,...n \\ j = 1,...n \end{matrix}$$

where,

$\frac{M_{ij}}{P_i}$ = Rate of migration from i to j expressed in terms of the population in i,
Y = wage or income levels,
U = unemployment rates,
Z = degree of urbanisation,
d_{ij} = distance between i and j, and
C_{ij} = friends and relatives of i in destination j.

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[5] In Yap (1977)
[6] Adapted from Yap (1975 p.242) and Todaro (1976 p.68).

The research confirms that people move from lower income areas to higher income areas. In a number of the studies, i.e. Barnum and Sabot (1977), Levy and Wadycki (1972), Spear (1971) and House and Remple (1976), the expected wage was found to be a better explanatory variable than the wage rate (as predicted by the Harris and Todaro model)[7] Garrison (1982) shows that the Todaro mechanism is important, but that improvements can be made in estimation by including the probability of finding a job in the informal sector and earnings in the informal sector. Other studies show that the importance of other variables such as distance from the city, i.e. Huntington (1974)[8], Greenwood (1972), Levy and Wadycki (1973) and education are also important. Banerjee (1991) shows that unemployment duration for those migrants in India who migrate without a pre-arranged job, depends on marital status, and contacts and information gathered before migration.

Yap also points out a number of problems that are encountered when using the standard estimation techniques. The first is that the level of aggregation masks differences in patterns within groups. Secondly, the studies do not measure the directional gross flows from one area to another; it is argued that this may be substantial given that a migrant may easily move again having moved once before. Measuring gross flows may in fact not be possible as very little data is collected that would supply such information. Since the Yap survey, attempts to include gross flows and non-primary moves have been carried out, notably Pessino (1991) for Peru. Thirdly, the income variables may also be poor, as income estimation is often poor in the rural areas.

[7] The data on these studies was obtained from Yap (1977).
[8] In Yap (1977)

The studies by and large also do not include the influence of other attractions to cities, such as better services, piped water and electricity. These may hold great importance for policy formulation and the management of city growth.

The response of migration to unemployment is a crucial dimension in the Todaro model. Research by Fields (1982) and Schultz (1982), however, showed that the rate of employment was not nearly as significant as the Todaro Model suggests. Fields (1982) found little support for the importance of the employment rate in Colombian migration and Schultz (1982) found one of the essential features of the Harris - Todaro-model, namely that inflexibilities in wage rates across labour markets induce compensating variations in employment rates, not to be true in the case of Venezuela. For the less educated groups in the labour force the traditional wage gap appears to be the predominant determinant of urban labour force growth and inter-regional migration. This is, however, not true for those with some secondary education in Venezuela. For men with some secondary or higher education the elasticity of migration with respect to unemployment is greater than that with respect to wages.

Both Schultz and Fields suggest that there is no Latin American trade-off in the migration decision between unemployment and wage rates among the less educated (Rogers and Williamson, 1982). The wage gap alone is a sufficient condition for the less educated to make their migration decision.

In the Todaro-Model the migrant moving to the urban sector may accept informal sector employment at a wage below the prevailing rate in the rural area so that he may remain in the labour queue until he finds employment in the formal high-wage urban sector.

Yap (1976), however, has shown that recent migrants to Brazilian cities did not have lower income than they would have received in the rural areas, which they had left. They also did not appear in the informal sector with much greater frequency and improved their relative income position very quickly after arriving in the city.

Lipton (1986, pp. 45) gives some insight into the effectiveness of a policy of migration restriction with evidence from South Africa. Lipton shows that the movement of Africans (Blacks) into the urban areas (largely white) lagged behind all other population groups (through influx-control and the pass law system) and that the growth rate of African urbanisation slowed from 6,4 percent in 1946-50 to 3,9 percent in the 1960's. From 1960-70, while the absolute number of Africans in the white areas continued to grow, the proportion there declined from 63 to 54 percent. "In the absence of the controls, rising population growth in the Bantustans (largely rural), and the growing gap between rural and urban wages, would normally have led to increased migration into the white areas, particularly the towns. " (Lipton, 1986, p. 4). Given this, the absolute number of Africans legally in the white areas still increased from 6,8 to 8 million (the illegal increase would probably make that figure much larger) during the 1960's when the controls where at their strongest.

In the South African case it would therefore seem that such direct restrictions on migration may have slowed the rate down considerably, but migration to the urban areas could not be stopped. Such a policy on its own will not serve to stop migration and hence urban unemployment, and will only serve to create a huge bureaucracy needed to enforce such measures resulting in unacceptable high costs in implementation. In similar vein, Liang and White (1997) show the ineffectiveness of physical labour restrictions in

China for the period 1983 –1988, with China now 'unofficially' moving away from the labour movement restrictions as the new market reforms take root.

A limited body of work is now also emerging specific to Sub-Saharan Africa. High urbanisation growth rates in Sub-Saharan Africa seem to happen despite there being very low growth rates in city manufacturing and technological advancement. This trend is both counter to the historical trends in the developed world as well as the other developing regions. Becker and Morrison (1988) show that in Sub –Saharan Africa the so called 'push' factors may be more important than the 'pull' factors that seem to be the primary source of city growth in other regions. They conclude that policies aimed at improving the rural areas may be a viable policy for reducing the 'push' effects in this region. Problems with the use of a Harris-Todaro model for the Sub-Saharan region are shown by Jamal and Weeks (1988) who highlight the fact that in Sub-Saharan Africa wage gaps between rural and urban areas have narrowed substantially, yet migration rates have increased.

The empirical evidence seems to lend support to the Harris-Todaro formulation, but the results also point to the need for careful formulation of the models in order to take into account differences in education and the operation of labour markets of the region studied. The research also points to a greater need for studies specifically designed for Sub-Saharan Africa, where the Harris-Todaro model (unmodified) may not perform well.

7. ADVANCES IN MODELING AND ESTIMATION TECHNIQUES

Recent developments in empirical and theoretical work on rural- urban migration and the urbanisation process have, while still being strongly neo-classical in nature, tried to build computable general equilibrium (CGE) models of the urbanisation process based on previously developed theory, observed history and demographic factors. Empirical results to date indicate that these models account fairly well for previous migration and urbanisation patterns in a number of developing countries and therefore might be useful in forecasting, policy development and simulation.

7.1 Historical Development of the Models and their Underlying Assumptions

One of the first and most comprehensive attempts to model the urbanisation process was that of Kelly, Williamson and Cheetham who propose a model for dualistic economic development (Kelly, et al 1972). Their study examines a two sector, dualistic, model of a developing economy. The model constructs both demand and supply sides of the economy, which then allows further analysis of subsequent market clearing equilibria.

Migration in the model is a function of the expected net income differential and does not follow the earlier dualistic models of Fei-Ranis and Jorgensen. These models viewed migration solely as a response to the rural-urban wage differential. The Kelly, Williamson and Cheetham model recognizes that the difference in wages is not the only determinant of migration and that other determinants would include expected income, cost of migration, age, education, information, urbanisation, population density and distance. The expected net income differential is then the difference between the income differential expected in the next period and the cost of migration. This is not unlike the

Harris-Todaro model, but a fundamental difference lies in the fact that wage rates are not always expected to equalise. The *rate* of migration in the Kelly, Williamson and Cheetham model is determined by the previous rate of migration, the expected labour income differential and the cost of migration (Kelly, et al, 972, p.251). Migrants' responses to the expected wage differences are lagged and this coupled with the existence of migration costs might lead to a persisting wage gap. The Kelly, Williamson and Cheetam model, unlike the Harris and Todaro model also allows for flexible capital flows between sectors and technological advancement. These adjustments to the Harris-Todaro interpretation are consistent with observed econometric data in developing countries.

The models are complicated multi sector neo-classical models built around a Harris and Todaro migration mechanism, but take into account the constraints of the real world, i.e. migrants incur costs when moving, firms face capital scarcity, factor markets are imperfect and governments do not always follow optimal resource allocation patterns. More significantly, the models include variables that influence city growth that are not included in other migration and urbanisation models, squatter housing and formal urban housing for example (Williamson 1992).

The models are complex in that they attempt to model all aspects of the developing economy by allowing for the analysis of the major factors contributing to urbanisation in the developing countries, including the decomposition of factors influencing the rate of urbanisation as well as measurement of their relative importance. More significantly, they allow for the forecasting of future city growth rates.

7.2 Description, Performance and Conclusions of the Models

The models take five groups of variables as exogenous to city growth (Williamson 1992), these being:

1. The prices of imported fuel, imported raw materials, manufactured goods and exports of primary products. This allows, for example, an assessment to be made of the impact of fuel prices on city growth.

2. The growth in arable land stock. This allows an analysis of the effect of land scarcity on movement to the cities to be assessed.

3. The rates of total factor productivity growth. This allows an analysis of productivity advances that favour city growth to be analysed.

4. The aggregate rate of population and labour force growth. Would a slow down in population growth mean a slow down in city growth?

5. The effects of economic reforms, for example: Tariff and exchange rate reform may protect urban industry at the expense of agriculture.

The model estimation then allows for the determination of the rate of capital accumulation, investment in dwellings, skill development, and patterns of resource allocation, income distribution, rate of industrialization, rural-urban migration and city growth.

A benchmark year is decided on and the model solved for that year, making sure that the model replicates the national accounts, labour force distribution and all other points of the social accounts matrix. Once the model has been estimated for that year all the exogenous variables that drive the economy are documented, i.e. price of tradeables, demographic change, productivity growth, growth in land stock. These estimates are then embedded in the model and estimates for the following years obtained.

The model has been used to simulate the urbanisation process in forty developing countries (Kelly and Williamson 1984) and later to simulate Indian city growth and migration (Becker, et al, 1986). Table 3 summarizes the results of the Kelly and Williamson study of forty small, open and deregulated economies.

The forty -country simulations capture the rapid city growth in the 1970's quite well and the subsequent slowdown since then. By comparing the actual growth figures in column one to the counterfactual figures corresponding to pre-OPEC conditions it is then possible to deduce what factors had the biggest impact on the slowdown in growth and therefore what factors affect city growth most.

Table 3. Simulated Annual Urban Growth Rates in Developing Countries under Varying Economic Scenarios 1973-79.

	"OPEC watershed" counterfactuals						Other counterfactuals		
	1	2	3	4	5	6	7	8	9
Year	"Actual" 1973-79	Total pre-OPEC environment	Pre-OPEC fuel abundance only	Pre-Opec world prices only	Pre-OPEC land expansion only	Pre-OPEC population pressure only	Population growth rates equal those of developed countries	Stable world prices	Technological slow down
1973	5.72	5.72	5.72	5.72	5.72	5.72	5.72	5.72	5.72
1974	5.10	5.75	5.35	5.59	5.09	5.06	4.46	5.95	5.10
1975	4.48	5.92	4.91	5.67	4.51	4.50	4.03	6.46	4.27
1976	5.03	6.03	5.28	5.90	4.95	4.96	4.37	6.51	4.60
1977	4.52	6.14	5.13	5.91	4.47	4.48	3.72	6.64	4.22
1978	4.47	6.23	5.05	5.96	4.36	4.36	3.68	6.63	3.93
1979	4.29	6.16	4.83	5.79	4.27	4.28	3.57	6.76	3.82
Average	4.65	6.04	5.09	5.80	4.61	4.60	3.97	6.49	4.32
Assumptions about underlying exogenous variables (annual growth in percent)									
Relative price of fuels and raw materials	5.20	0	0	5.20	5.20	5.20	5.20	5.20	5.20
Relative price of manufactures	-1.60	-0.70	-1.60	-0.70	-1.60	-1.60	-1.60	0	-1.60
Agricultural land stock	0.50	1.00	0.50	0.50	1.00	0.50	0.50	0.50	0.50
Labour force	2.70	2.50	2.70	2.70	2.70	2.50	0.90	2.70	2.70
Foreign capital inflow (annual percentage share of GDP)	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Economy-wide total factor productivity	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.00

Note: The boxed figures are those that depart from the 'actual' figures in column 1
Source: Kelly and Williamson (1984, table 5, p.435).

Column two shows the growth rates that could have been expected had conditions not changed from the pre-OPEC conditions; the following columns break this growth down into components in order to distil the factors which most influence city growth.

Column three shows the effect the relative price of imported fuel and natural resources would have had on city growth and column four shows the terms of trade between urban manufactured goods and rural primary products. The results show that the urban-rural terms of trade have a greater influence on city growth than do the prices of fuel and natural resources. This is emphasized further by column eight which shows that had the terms of trade between manufacturing and primary products remained stable after 1973 then urban annual growth would have been 6.49 percent rather than 4.65 percent.

Column five shows that arable land stock expansion has very little effect on city growth. The contraction in arable land stock growth from 1 percent, pre –OPEC, to 0.5 percent during the 1973-1979 period results in a very small difference in city growth figures, i.e. 4.61 pre-OPEC and 4.65 'actual'. One would have expected that a slower growth in the arable land stock would have resulted in a higher city growth rather than the lowering between 1973 –1979 we see in column one.

Column nine shows the effect of technological slowdown on city growth. A decrease in economy wide factor productivity of 1.8 percent in column one to 1 percent in column nine would have resulted in growth rates of 3.82 rather than the actual rate of 4.29. Kelly and Williamson (1984) are able to show in their monograph that it is an imbalance in technological growth that has the greatest effect on city growth and that it is industrial productivity that acts as the main engine of economic growth.

Column seven shows that even if population growth rates in the developing countries were to have followed the rates of the developed countries, urban growth would still have been 4 percent per year.

The simulations show that technological change and productivity growth along with price factors in the economy have the greatest influence on city growth and that population growth and the scarcity of arable land have a far smaller role to play. Forecasts from the model indicate that urban growth will decline to about 3.5 percent per year by the end of the 1990's, with the 'equilibrium' urban size of 85 percent being reached by 2020, and migration to cities reaching zero in 2030.

Becker, Mills and Williamson (1986) later extended the above model to an analysis of the Indian economy, the difference between the earlier forty-country study and the Indian study being that India has a relatively large closed economy. India was also chosen because its urbanisation process seems to differ from most other developing countries. A decrease in employment growth in manufacturing still led to high urban growth. Between 1965 and 1979 India's urban population growth was twice that of its rural growth, with manufacturing growth being lower than the population growth rate. Indian city growth was still, however, slower than most of the developing world (Becker, et al, 1986, p.1). What then accounts for Indian city growth?

The model essentially seeks to test the conventional wisdom of manufacturing providing the 'pull' forces and land scarcity providing the 'push' forces. The estimated model accounts well for Indian migration and city growth between the period 1960 to 1977,

which makes identifying some of the causes of city growth from the model seem plausible.

Again one of the fundamental driving forces of city growth is shown to be productivity growth in manufacturing. Scarcity of agricultural land and changing world conditions do not seem to have a significant effect on urban growth. The influence of foreign capital inflows (or lack thereof) is also shown to have a very strong effect on city growth. One third of the slowdown in Indian city growth is attributable to the drop in capital inflows.

The model also analyses what the effect of a number of policies aimed at urban growth control and management might have produced. Policies aimed at reducing rural-urban migration are shown to be ineffective, inefficient and inequitable and would only serve to increase the rural-urban wage gap; the policies are also shown to discourage capital formation. This is a significant result because India places significant emphasis on such policies.

As would be expected, policies aimed at improving the living conditions of the urban poor by the provision of low cost housing through heavy public investment result in greater in-migration. This is in response to the increase in real unskilled urban wages generated by the increased employment demands in the construction industry. An unexpected spin off of such a policy is that living costs of the urban poor are substantially reduced, so they are better off because of increased nominal wages, but also because of lower living costs. The model in fact finds that nominal wages decrease, making the urban labour intensive industries more profitable. This would have a positive impact on the competitiveness of export-based industries.

The above models are therefore interesting in that they are able to break down the various effects of urban growth based on economic history and current economic theory. The models show the significant influence that unequal manufacturing productivity growth has on urban growth, i.e. 'pull' factors seem to outweigh the 'push' factors (land scarcity). The models also show that while high population growth rates have an effect on the overall urbanisation pressures their effect on the city growth rate is small compared to technological change. The models are also interesting in that through 'counterfactual' analysis the effects of various policies aimed at urban growth control can be tested.

The models are therefore not a theory of migration, but rather a means of testing what factors have the most influence on city growth and of measuring their relative importance in the developing world. They still, however, use a Harris-Todaro migration mechanism.

Much of the criticisms of the above models have centred on their complexity. The models are difficult to interpret and authors such as Mohan (1992) and Breukner (1990) have argued that while their results are impressive, simpler models may still offer easier to understand and empirically testable models of third-world urbanisation.
Much of the criticism also lies with the fact that the models are difficult to test with standard empirical tests, since they rely on simulation exercises.

While the CGE models may offer good explanations of the urbanisation process, they do not offer an explanation of the effects on wage rates and the demand for labour of

urbanisation and the accompanying demographic transition. An understanding of these factors may be more important for development and policy formulation.

As already mentioned the simulations of past history in both models produced results very close to those actually observed. The Becker, Mills and Williamson study predicted urbanisation levels for India of between 27 and 27.5 percent by 1991. Figures from the World Bank (1999) show India having reached the 27 percent level only in 1999. This would indicate that the model has underestimated the slowdown in urban growth that has occurred in India. The ability of these models to predict may only be useful as a general guide as to what might be expected, under the limiting assumption that current economic and demographic trends continue in the future. Their strength however lies in their powerful ability to decompose the factors affecting urbanisation, and therefore their use in policy formulation might be of importance. The challenge may be to develop more simplified versions of models in order to improve empirical testing and intuitive understanding of the models. Bruekner (1990), for example, shows that a simple (non CGE) model of third-world urbanisation can be constructed and tested using readily available cross-section data. Gelb, Knight and Sabot (1991) show how a simple CGE model can be used to investigate specific aspects of growth i.e. the phenomena of surplus labour in the public sector.

8 CONCLUSION

Urbanisation in the third world is following a similar trend to the historical patterns of the already developed world. A combination of rapid city growth and the low income levels is, however, creating huge burdens on these countries. The burden lies with the massive increase in costs (housing, physical and social infrastructure) associated with accelerated city growth as well as the poverty implications of neglected rural areas.

Rural-urban migration it has been shown makes up a very large proportion of this observed rapid urbanisation, with theoretical and empirical evidence pointing to the perceived difference in income between rural and urban areas as the major motivating factor for migration. The Harris-Todaro model remains the seminal work on internal migration. This is reflected in the regularity with which various formulations of the model are still used in studies of urbanisation today. Weaknesses in the original Harris-Todaro model are constantly being addressed to fit new evidence and changing circumstances but the basic concept remains the same.

The CGE models offer to date the most comprehensive attempts to model urbanisation processes. They show that 'pull' rather than 'push' factors, as Harris-Todaro predicted, are indeed the most important determinants of migration, and that policies should take these into account.

Concerns, however, remain as to the appropriateness of the use of the Harris-Todaro model in Sub-Saharan Africa, in the light of the apparent counter to theory observation,

that rural push rather than urban pull dominates. This may serve as a concern about the common practice of using generalised models for all developing countries and suggests that specific models need to be built to take regional differences into account.

While continued development of comprehensive models such as the CGE models are useful there are still very few studies which seek to study the migrant decision making process in more detail. For example, who is the migration decision maker? Does one individual make the decision or is it a result of a family decision? How important are remittances for the maintenance of the rural households? Such studies are becoming more and more possible as more integrated family and household surveys are conducted in developing countries. These surveys allow complex intra-household linkages and decision-making processes to be analysed.

The relatively recent availability of household surveys in South Africa is also making it possible to study migration and urbanisation patterns in much greater detail than was possible prior to the democratic elections of 1994. The labour market distortions created by the apartheid job reservation and pass law policies and the lack of accurate data on African households in South Africa and in the then homelands, made application and testing of migration theories in South Africa very difficult. Household surveys such as the project for Statistics on Living Standards and Development (SALDRU, 1993), the October Household Surveys 1994-1999 (Statistics South Africa, 1994-1999) and a recent Southern Africa Labour and Development Research Unit (SALDRU) integrated

family survey of 1500 people in 300 households in the Southern Cape Region[9] all contain questions on migration along with the standard labour market and demographic data.

These data along with some regional migration specific studies such as that completed by Catherine Cross, et al (1999) on migration and settlement patterns in the Cape Metropolitan Area now make it possible to examine these South African migration data in the context of the theories discussed and may lead to the formulation of South African specific migration and urbanisation theories and policies in the future.

What seems to be central to the study of migration is the acceptance that models need to focus on the complex interrelatedness of motivational factors involved. It is in this context that the CGE models seem to offer considerable promise for future study and research into this phenomenon.

[9] Ongoing research at SALDRU: School of Economics, University of Cape Town

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Appendix 1: Selected migration functions

1 Barnum and Sabot (1975): Rural-urban migration in Tanzania, 1955-71.[10]

Dependent variable:	Male migrants, by age-education categories in urban area j who came from origin i as a proportion of the comparable population in origin i (M_{ij}/p_i).
Migrant:	Person in town j in 1971 who was born in the countryside and who moved to town after age 13
Functional form:	Linear
Data source:	Migration from the 1971 National Urban Mobility, Employment and Income Survey; population from the population census

Variables	Regression coefficients (t-statistics in parentheses)
Constant	0.11 (0.3)
Value of urban wage stream, undiscounted, by age-education group (using mean time of arrival for the age education group)	0.0024 (4.0)
Value of rural per capita income stream, undiscounted (monetary and subsistence income included)	-0.0070 (1.1)
Job openings in four- month job search period as a proportion of number employed, by time of arrival	0.666 (4.1)
Average urban population in urban area j	0.023 (5.8)
Weighted average linear distance between receiving towns and sending regional centres	-0.0077 (2.1)
R^2	0.55
No. of observations	108

[10] As presented in Yap (1977)

2 Greenwood (1971): Interstate migration in India in 1961[11]

Dependent variable: Male migrants from state i to state j (Mij)
Migrant: Person who was born in state i and who has been living in state j for less than one year
Functional form: Log linear
Data source: 1961 census of India

Variables	Regression coefficients (t-statistics in parentheses)
Average annual income of workers in industrial establishments, 1961:	
State i	-1.24
	(4.48)
State j	0.56
	(2.02)
Male population,1961:	
State i	1.01
	(10.79)
State j	0.79
	(8.46)
Percent of male population residing in urban areas (5000 or more),1961:	
State i	0.38
	(2.52)
State j	0.16
	(1.07)
Percent of males who are literate,1961:	
State i	0.79
	(2.93)
State j	1.11
	(4.14)
Rail distance (kilometres) between representative cities and states i and j	-1.97
	(16.18)
R^2	0.70
F	59.8

[11] As presented in Yap (1977)

No. of observations	240

3 Huntington (1974): Rural-Urban migration in Kenya, 1964-68.[12]

Dependent variable:	Male migrants who moved from province i to area j, 1964-68, as proportion of the 1962 urban population j multiplied by the rural population i (M_{ij}/P_iP_j)
Migrant:	Persons 15-20 years of age enumerated in urban area j in 1968 who had moved in 1964-68 period
Functional form:	Log linear
Data source:	Migration from a 1968 sample survey of 1000 urban migrants, conducted by Henry Remple; population from 1962 population census

Variables coefficients	Regression (t-statistics in parentheses)
Constant	-44.23 (6.00)
Average male modern sector earnings	6.79 (4.61)
Rural cash income per adult male	-1.25 (2.69)
Secondry school enrollment, 1966, as a proportion of population, 1969:	
Urban town j	0.90 (1.35)
Rural province i	1.08 (2.19)
Road mileage between urban town j and district centre i	-0.43 (1.51)
Potential contacts (the ethnic composition of urban area j weighted by the ethnic population in	0.69 (2.97)
R^2	0.61

[12] As presented in Yap (1977)

F	11.2
No. of observations	39

4 Levy and Wadycki (1972): Interstate migration in Venezueala in 1961.

Dependent variable: Male migrants from state i to state j as a proportion of the population in state i (M_{ij}/P_i)
Migrant: Person who has been living in state j for one year or less
Functional form: Log linear
Data source: 1961 census of Venezuela

Variables coefficients	Regression (t-statistics in parentheses)	
	Men 15-24	Men 25-54
Constant	-62.51	-19.52
	(8.61)	(3.34)
Average wage of economically active males, age 10 or over, 1961:		
State i	-0.08	-0.85
	(0.19)	(2.32)
State j	1.89	0.94
	(4.69)	(2.59)
Percent of economically active males, age 15-24 (25-54), who are unemployed, 1961:		
State i	-0.21	0.73
	(0.74)	(3.28)
State j	-2.45	-0.78
	(8.75)	(3.47)
Total population, 1961:		
State i	0.14	0.29
	(1.18)	(2.69)
State j	0.98	0.73
	(8.12)	(6.72)
Percent of population residing in urban areas (2500 or more), 1961:		
State i	-0.72	-0.75
	(2.16)	(2.49)
State j	1.10	0.81
	(3.29)	(2.69)

Percent of population, age 7-14, enrolled in school, 1961:		
State i	3.07	1.14
	(2.93)	(1.29)
State j	4.10	0.16
	(3.91)	(0.18)
Road mileage (kilometres) between capital cities of state i and j	-1.06	-1.17
	(13.01)	(15.92)
R^2	0.61	0.60
No. of observations	380	380

5 Garrison (1982): Determinants of migration between 32 Mexican States, 1969: Two regressions[2]

Dependent variable: Number of migrants living in state j for less than one year in 1970 who had previously lived in state i, as a proportion of the population in state i (M_{ij}/P_i)

Migrant: Number of migrants living in state j for less than one year in 1970 who had previously lived in state i

Functional form: Log linear

Data source: 1970 Mexican census

Variables coefficients	Regression	
	I	II
Constant	-30.43	-28.39
Distance between capital of state i and capital of state j	-1.05[a]	-1.03[a]
Average monthly earnings of employed males, age 15-65, 1970		
State i	0.24[a]	0.27[a]
State j	0.32[a]	0.33[a]
Percent of economically active males, age 15-65, who are unemployed, 1970		
State i	-0.14[a]	-
State j	-0.03	-
Total population, 1970		
State i	-0.34[a]	-0.34[a]

State j	0.64[a]	0.64[a]
Percentage of population residing in urban areas (15000 or more), 1970		
State i	0.14	0.08
State j	0.72[a]	0.71[a]
Percentage of population age 7-15, enrolled in school, 1970		
State i	1.11[a]	0.65
State j	2.94[a]	2.84[a]
R^2	0.50	0.49
No. of observations	990	990

a Significant at 0.001 level.

6 Banerjee and Kanbur (1981): Estimates of Inter-state Rural-Urban Migration for India, 1960-1

Dependent variable: Rate of male migration from i to j during the year prior to the census of 1961 $(M_{ij}/P_i)X\ 10000$
Migrant: Number of males who migrated from i to j during the year prior to the census
Functional form: Log Linear
Data source: Census of India, 1961

Variables coefficients	Regression (t- ratios in parentheses)	
Method of estimation	OLS	Logit-GLS
Constant	-16.85079	-25.02613
Rural Income	0.12172 (2.28057)[a]	0.11280 (6.63064
Rural income (Quadratic form)	-0.00024 (-1.89156)[b]	-0.00024 (-5.96064
Gini coefficient of land holdings in i	9.79223 (2.04499)[a]	7.93399 (7.93399
Index of poverty in i	-0.07096 (-2.13846)[a]	-0.04694 (-3.19421
Expected income differential	-0.00023	0.00019

	9-0.65269)	(1.73758
Variability of urban return	-0.24634 (-2.15824)[a]	-0.13894 (-3.20102
Distance between i and j	-0.00574 (-2.20817)[a]	-0.01289 (-11.45270
Stock of previous migrants from i in j	0.00809 (22.49355)[a]	0.00098 (22.53604
Past growth of income in i	-0.02197 (-3.30726)[a]	0.00039 (0.17128
Past growth of income in j	0.00831 (1.86387)[b]	0.00557 (3.79101
Percentage of males in i who are matriculants and above	1.09958 (2.42054)[a]	0.80815 (4.45590
Percentage of males in i who are illiterate	0.04621 (1.12249)	0.02120 (1.36185
R^2	0.77634	-
Log-likelihood	-	-4506.23520
F	52.93480[a]	-
No. of observations	196	196

a Significant at the 5 percent level
b Significant at the 10 percent level