# ASSESSING INTERNAL MIGRATION IN A SMALL COUNTRY

**G.W. Roberts**
*University of West Indies, Mona, Kingston, Jamaica*

*Résumé* — Une analyse de la migration interne à la Jamaique met en lumière les questions de définition et d'autres questions concernant ce phénomène car il affecte les petites sociétés. La migration interne récente fait voir un élargissement considérable de la paroisse de banlieue, St. Andrew, et la population décroissante du centre de la région métropolitaine, Kingston. Des répartitions d'équilibre émanant des matrices de transition de la migration pour la période 1966-70, insistent sur le grand pouvoir attirant de St. Andrew. Des matrices de transition pour trois niveaux d'éducation révèlent que plus le niveau d'éducation est élevé plus grandes sont les chances de migration. Les pouvoirs successifs des matrices de transition sont utilisés pour obtenir des estimations des populations paroissales jusque'en 1990.

*Abstract* — An analysis of internal migration in Jamaica illustrates definitional and other issues of this phenomenon as it affects small societies. Recent internal migration depicts considerable expansion of the suburban parish, St. Andrew, and the declining population of the centre of the metropolitan area, Kingston. Equilibrium distributions from transition matrices of migration for 1966-70 stress the strong attractive force of St. Andrew. Transition matrices for three levels of education show that the higher the level of education the greater the chances of migrating. Successive powers of transition matrices are employed to secure estimates of parish populations to 1990.

*Key words* — **Internal migration, Jamaica, urban growth**

In all societies, internal migration is now recognized as one of the significant aspects of social development. In the form of a movement from rural to urban industrial centres it has long characterized industrialized regions. An important feature of all developing societies today is the growing drift from rural to urban areas that have no large-scale industries. The small populations of the Caribbean islands offer interesting examples of such migrations. True, the short distances over which migration has to be measured, as well as historical factors, tend to blur the distinction between rural and urban in these populations. For, under plantation slavery, rural communities could not be rigidly demarcated from such small towns as the colonies supported, while both of these types of communities maintained close links with the metropole. Moreover, in modern times the tourist industry, because of its location and the patterns of employment it fosters, has tended to reduce urban-rural contrasts. Nevertheless, they offer examples that highlight the elements in the more complex situation of larger developing countries. In each of them, the pattern of internal migration is a mounting concentration in the capital, which usually is the only sizable urban area and which has as yet no well-established manufacturing sector.

An initial problem to be settled in discussing internal migration is one of definition. Although an integral part of such a movement is the permanent change of residence, all such changes cannot be treated as internal migration. The distinguishing feature of internal migration is movement from one carefully demarcated political or administrative division of a country to another. Some of these divisions are urban and

some suburban, but most are rural (Bogue, 1969; Shyrock, Siegel, et al., 1971; Lee, et al., 1957). A change of residence that does not take the individual out of such an areal unit is a local movement and not internal migration. On these terms, much of the character, direction, and scale of internal migration depends on the form of areal grouping adopted for its measurement in a given country. In fact, the smaller the areal units used and the greater their number, the higher tends to be the volume of internal migration. This means that, especially where the countries are small in size, careful attention has to be paid to the choice of geographical units in terms of which the phenomenon is assessed (Duncan, et al., 1961; Haggett, 1965).

In many small Caribbean islands, residential shifts of only a few miles suffice to constitute internal migration, according to the administrative divisions recognized. Even in the case of Jamaica, the largest of the English-speaking group in the Caribbean, internal migration, treated in terms of movements measured from the centre of one parish to the centre of another, may be as short as 10 miles, while the longest movement possible would be only 130 miles. The possibility that standard techniques applied to these minuscule countries will result in greatly exaggerated estimates of internal movements has always to be faced.

This paper illustrates some aspects of internal migration, derived from the experience of Jamaica. With an area of only 4,400 square miles and a population of about two million, this island emphasizes the major implications of smallness in the analysis of such migration.

*Background to Internal Migration in Jamaica*

The present division of the island into 14 administrative units, one of which is the capital, Kingston, was effected in 1871, with the stated aim of creating units with much less variation in area and population than was characteristic of the multiplicity of divisions recognized up to that time. While Kingston-St. Andrew is often used as a technical description of the entire metropolitan centre, the single term Kingston also commonly designates this larger urban area.

Changes of parish populations in Jamaica since 1921 are shown in Table 1. An outstanding feature is the exceptional expansion of St. Andrew, the suburban portion of the capital. Its eight-fold increase in 50 years dominates the redistribution of population in the island, being equivalent to an annual increment of 7,400 or 4.3 per cent. In contrast to this has been the position of Kingston proper. As this has come to constitute the commercial centre of the capital, its significance as a residential area has declined, so that by 1960 it reaches its maximum population of 123,400, which has subsequently fallen markedly. Its growth has been of the order of 1,000 or 1.2 per cent per year. The parish with the second highest rate of growth — 1.8 per cent per year — is St. James. Its relatively high rate derives from the fact that the centre of the tourist industry, Montego Bay, is located there. Should this industry continue to expand, it will probably mean an acceleration in the rate of growth of St. James. Clarendon, with a rate of growth of 1.6 per cent per year, also commands attention. On the other hand, there are three parishes that have been increasing at an annual rate of less than 1 per cent.

Gains and losses experienced by each parish between 1911 and 1970 have been estimated, and the components of growth in terms of natural increase, internal migration, and external migration have been determined (Roberts, 1957; Roberts, et al., 1974). A convenient way of showing the influence of such migration as a factor affecting parish populations is to express it as a percentage of the corresponding natural increase. This has been done for the periods 1911-21, 1921-43, 1943-60, and 1960-70 (Table 2). The

TABLE 1.   GROWTH OF PARISH POPULATIONS OF JAMAICA,
1921-1970

| Parish | Population, Both Sexes | | | | Average Annual Increase | |
|--------|------|------|------|------|--------|------|
| | 1921 | 1943 | 1960 | 1970 | Number | Per Cent |
| Kingston | 63,700 | 110,100 | 123,400 | 109,800 | 1,030 | 1.2 |
| St. Andrew | 54,600 | 128,100 | 296,000 | 421,700 | 7,430 | 4.3 |
| St. Thomas | 42,500 | 60.700 | 68.700 | 71.200 | 590 | 1.1 |
| Portland | 49,000 | 60,700 | 64,500 | 69,300 | 400 | 0.7 |
| St. Mary | 71,400 | 90,900 | 94,200 | 100,400 | 560 | 0.7 |
| St. Ann | 70,900 | 96,200 | 114,400 | 122,700 | 1,070 | 1.1 |
| Trelawny | 34,600 | 47,500 | 56,100 | 61,900 | 550 | 1.2 |
| St. James | 41,900 | 63,500 | 83,000 | 103,100 | 1,210 | 1.8 |
| Hanover | 38,200 | 51,700 | 53,900 | 59,400 | 410 | 0.9 |
| Westmoreland | 68,900 | 90,100 | 109,600 | 115,800 | 980 | 1.1 |
| St.Elizabeth | 79,300 | 100,200 | 116,700 | 127,800 | 980 | 1.0 |
| Manchester | 63,900 | 92,700 | 111,800 | 122,900 | 1,200 | 1.3 |
| Clarendon | 83,000 | 123,500 | 164,000 | 178,300 | 2,000 | 1.6 |
| St. Catherine | 96,600 | 121,000 | 153,500 | 184,200 | 1,740 | 1.3 |
| Total | 858,500 | 1,237,000 | 1,609,800 | 1,848,500 | 20,160 | 1.6 |

outstanding feature of the first period is the gain shown by the capital, Kingston, and to a lesser degree increments shown by parishes surrounding it. By contrast, parishes in the west of the island all exhibit net losses as a consequence of internal migration. But it should be noted that, although St. James registers a net loss, this is the smallest of all the outflows, amounting to 6 per cent of its natural increase.

Within the second period, 1921-43, the present pattern of internal migration establishes itself. This is characterized by a marked drift into St. Andrew from all other parishes. In fact, only two other parishes show net gains: Kingston, where the gain is one-tenth of what it was in 1911-21, and St. Thomas, where it amounts to 45 per cent of the natural increase. Net losses assessed as percentages of corresponding levels of natural increase are highest for St. Elizabeth (52 per cent) and St. Ann (40 per cent). Once more the position of St. James should be noted: it shows neither losses nor gains as a result of internal migration.

By the third period, the dominant position of St. Andrew is well established as the only parish with net in-migration, the increment being 1.5 times its natural increase. In

TABLE 2.  NET GAIN OR LOSS BY EACH PARISH AS A PER CENT OF
NATURAL INCREASE IN PARISH POPULATION,
1911-1970

| Parish | Period | | | |
| --- | --- | --- | --- | --- |
| | 1911-21 | 1921-43 | 1943-60 | 1960-70 |
| Kingston | +792.31 | +76.56 | -35.84 | -55.78 |
| St. Andrew | +227.78 | +440.82 | +152.15 | +75.19 |
| St. Thomas | +22.22 | +45.45 | -4.69 | -17.58 |
| Portland | +25.49 | -18.67 | -33.06 | -26.79 |
| St. Mary | +8.57 | -35.09 | -53.49 | -33.33 |
| St. Ann | -34.31 | -39.88 | -38.43 | -36.84 |
| Trelawny | -10.53 | -18.31 | -26.92 | -26.06 |
| St. James | -6.38 | - | -0.58 | +3.95 |
| Hanover | -16.33 | -24.06 | -45.38 | -34.97 |
| Westmoreland | -13.95 | -27.07 | -31.17 | -40.74 |
| St. Elizabeth | -46.62 | -51.74 | -48.72 | -41.90 |
| Manchester | -48.57 | -31.72 | -29.83 | -18.13 |
| Clarendon | +5.47 | -6.38 . | -4.52 | -13.08 |
| St. Catherine | +6.52 | -2.78 | -2.32 | +7.26 |

what are essentially intra-urban movements, Kingston has begun to lose substantial numbers to St. Andrew, while of the remaining parishes St. Mary, St. Elizabeth, and Hanover also record appreciable out-migration.

Within the fourth period, 1960-70, some modifications of the earlier pattern emerge, but the pull into St. Andrew continues as the most pronounced feature; the net inflow into this suburban area amounts to 75 per cent of its natural increase. St. James offers an interesting picture of gain as a result of internal migration, to the amount of 4 per cent of its natural increase, evidence of the pull being exerted by the developing tourist industry it supports. An even higher gain is recorded for St. Catherine. Industrial and other expansion here, as well as the fact that the residential sections of St. Andrew are spilling over into this parish, produced a gain from internal migration of 7 per cent of its natural increase.

Before proceeding to examine internal migration during 1960-70, with which the remainder of this paper deals, it should be noted that several studies based on the 1960 Census of Jamaica have been carried out. Tekse's analysis identifies various migration streams in the island and presents one-year transition probabilities (Tekse, 1967). G.E.

TABLE 3. MINIMUM ESTIMATES OF INTERNAL MIGRATION, JAMAICA, 1960-70
MALES

| Parish of Birth | PARISH OF RESIDENCE | | | | | | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | Kings-ton | St. And-rew | St. Thomas | Port-land | St. Mary | St. Ann | Tre-lawny | St. James | Han-over | West-more-land | St. Eliza-beth | Man-ches-ter | Clar-endon | St. Cath-erine | TOTAL |
| Kingston | - | 11,462 | 700 | 687 | 1,369 | 974 | 570 | 646 | 227 | 562 | 946 | 1,367 | 1,197 | 2,652 | 23,359 |
| St. Andrew | 457 | - | 209 | 114 | 282 | 100 | 51 | 102 | 19 | 36 | 86 | 216 | 197 | 839 | 2,708 |
| St. Thomas | 723 | 1,683 | - | 412 | 163 | 46 | 23 | 52 | 21 | 29 | 84 | 101 | 184 | 327 | 3,848 |
| Portland | 495 | 2,014 | 465 | - | 412 | 90 | 30 | 70 | 22 | 37 | 52 | 125 | 164 | 356 | 4,332 |
| St. Mary | 702 | 3,966 | 273 | 528 | - | 490 | 84 | 139 | 45 | 44 | 84 | 122 | 236 | 1,118 | 7,837 |
| St. Ann | 819 | 3,681 | 113 | 129 | 611 | - | 591 | 233 | 57 | 56 | 93 | 252 | 456 | 870 | 7,961 |
| Trelawny | 448 | 1,726 | 62 | 53 | 115 | 235 | - | 427 | 73 | 60 | 97 | 288 | 187 | 277 | 4,048 |
| St. James | 374 | 1,758 | 57 | 69 | 93 | 144 | 417 | - | 431 | 399 | 247 | 158 | 192 | 314 | 4,653 |
| Hanover | 283 | 1,057 | 44 | 69 | 64 | 85 | 167 | 1,177 | - | 476 | 90 | 93 | 190 | 188 | 3,983 |
| Westmoreland | 650 | 2,515 | 127 | 83 | 104 | 120 | 235 | 1,513 | 507 | - | 504 | 192 | 398 | 474 | 7,422 |
| St. Elizabeth | 706 | 3,317 | 178 | 112 | 152 | 123 | 158 | 675 | 96 | 356 | - | 902 | 542 | 612 | 7,929 |
| Manchester | 714 | 3,232 | 128 | 96 | 115 | 188 | 266 | 190 | 47 | 76 | 434 | - | 1,125 | 674 | 7,285 |
| Clarendon | 797 | 3,200 | 243 | 124 | 209 | 298 | 106 | 137 | 65 | 101 | 228 | 804 | - | 1,452 | 7,764 |
| St. Catherine | 711 | 4,010 | 237 | 194 | 701 | 304 | 79 | 127 | 38 | 74 | 176 | 245 | 895 | - | 7,791 |
| TOTAL | 7,879 | 43,621 | 2,836 | 2,670 | 4,390 | 3,197 | 2,777 | 5,488 | 1,648 | 2,306 | 3,121 | 4,865 | 5,963 | 10,153 | 100,914 |

TABLE 4.  MINIMUM ESTIMATES OF INTERNAL MIGRATION, JAMAICA, 1960-70
FEMALES

| Parish of Birth | | PARISH OF RESIDENCE | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Kingston | St. Andrew | St. Thomas | Portland | St. Mary | St. Ann | Trelawny | St. James | Hanover | Westmoreland | St. Elizabeth | Manchester | Clarendon | St. Catherine | TOTAL |
| Kingston | - | 12,280 | 713 | 729 | 1,352 | 972 | 508 | 615 | 289 | 565 | 834 | 1,307 | 1,171 | 2,682 | 24,017 |
| St. Andrew | 581 | - | 216 | 135 | 294 | 112 | 33 | 115 | 22 | 52 | 83 | 206 | 240 | 890 | 2,979 |
| St. Thomas | 996 | 2,527 | - | 457 | 184 | 60 | 25 | 53 | 18 | 23 | 63 | 75 | 210 | 324 | 5,015 |
| Portland | 649 | 3,042 | 600 | - | 493 | 105 | 25 | 79 | 20 | 48 | 48 | 124 | 147 | 348 | 5,728 |
| St. Mary | 993 | 5,368 | 211 | 550 | - | 624 | 62 | 130 | 23 | 40 | 76 | 118 | 221 | 1,253 | 9,669 |
| St. Ann | 1,181 | 5,602 | 107 | 138 | 629 | - | 562 | 233 | 65 | 60 | 90 | 286 | 570 | 1,148 | 10,671 |
| Trelawny | 685 | 2,690 | 62 | 46 | 104 | 273 | - | 561 | 79 | 76 | 82 | 387 | 197 | 340 | 5,582 |
| St. James | 575 | 2,460 | 64 | 72 | 107 | 145 | 464 | - | 451 | 436 | 220 | 183 | 209 | 347 | 5,733 |
| Hanover | 445 | 1,793 | 32 | 38 | 74 | 81 | 121 | 1,378 | - | 663 | 90 | 86 | 167 | 179 | 5,147 |
| Westmoreland | 1,034 | 4,153 | 94 | 82 | 118 | 114 | 172 | 1,641 | 541 | - | 481 | 246 | 436 | 563 | 9,679 |
| St. Elizabeth | 1,197 | 5,502 | 165 | 140 | 161 | 150 | 144 | 767 | 95 | 445 | - | 1,408 | 711 | 840 | 11,725 |
| Manchester | 999 | 4,968 | 102 | 83 | 122 | 211 | 234 | 191 | 40 | 74 | 413 | - | 1,423 | 758 | 9,618 |
| Clarendon | 1,147 | 5,275 | 197 | 162 | 242 | 325 | 106 | 160 | 63 | 117 | 219 | 978 | - | 1,729 | 10,720 |
| St. Catherine | 998 | 5,858 | 270 | 241 | 721 | 347 | 101 | 135 | 48 | 79 | 127 | 279 | 955 | - | 10,159 |
| TOTAL | 11,480 | 61,518 | 2,833 | 2,873 | 4,601 | 3,519 | 2,557 | 6,058 | 1,754 | 2,678 | 2,826 | 5,683 | 6,657 | 11,401 | 126,438 |

Ebanks has used indexes of differential migration to study recent patterns of internal movements (Ebanks, 1969). Harris and Steer have examined movements of rural families in the island (Harris and Steer, 1968). Nassau Adams has explored the variables responsible for internal migration by means of a multiple regression model (Adams, 1969).

*The Decade 1960-70*

Internal migration during this decade can be studied from material from the 1970 Census, which assesses these movements on the basis of persons born in Jamaica and which defines a migrant as one whose normal parish of residence is not the same as his parish of birth. Persons migrating during 1960-70 are those moving to their parish of normal residence after 1960. From such Census data, estimates of male and female inter-parish shifts during this decade can be derived; these form the subject of Table 3 and 4 (1970 Population Census, Volume 5). Total internal male migrants (100,900) constitute 12 per cent of the total male (native born) population, while the number of female migrants (126,400) is equivalent to 14 per cent of the total for that sex. A qualification of these estimates must be noted. In effect, they represent survivors of persons who moved during the decade. It is possible to apply inflating factors, based on life table functions, to these estimates. But in view of recent steep falls in mortality, these correction factors do not produce any marked revision of the data, so such adjustments are not made. By contrast, estimates based on the same technique for the period 1911-21 were, because of the higher mortality prevailing at that time, appreciably understated (Roberts, 1957).

These tables provide the basis for estimating gains and losses experienced by all parishes as a consequence of internal migration. Two important aspects of this migration that emerge are movements between contiguous parishes and movements into the capital. These processes can be more easily identified from Table 5, which shows shifts between contiguous parishes as well as the sources of in-migration into Kingston and St. Andrew. It is seen that the latter gains 40,900 males and 58,500 females as a result of in-migration, while St. Catherine also registers gains of 2,400 males and 1,200 females. In the case of the third parish experiencing net gains, St. James, the amounts are small — 800 males and 300 females. The area supplying most of the in-migrants into St. Andrew is Kingston proper, which furnishes 27 per cent of its total male in-migrants and 20 per cent of its total female in-migrants.

Migration between contiguous parishes has another important feature. The tendency is for each parish to record a net loss to the contiguous parish located between it and St. Andrew, which suggests that much of the movement into suburban areas may take place in stages, with most parishes losing heavily to the adjoining parish east of it. Schematically, the migration into Kingston-St. Andrew can be treated as being composed of two streams, one passing through the northern coastal region of the island and the other moving through its southern parishes. As is seen from Figure 1, the situation in the sixties is similar to that prevailing during the earlier periods, as for instance during 1921-43 (Roberts, 1957).

*Internal Migration as a Probability Process*

By treating internal migration as a probability process, it is possible to consider several of its other aspects. Movers within the period 1965-70 are used in conjunction with the populations of 1970 to derive probabilities of moving from one parish to another, or of not moving, during the five-year interval. These transition matrices are

TABLE 5.  ESTIMATES OF NET GAIN (+) OR LOSS (–) TO PARISHES
AS A RESULT OF INTERNAL MIGRATION, JAMAICA, 1960-70

| Parish | MALE | | | | | FEMALE | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Contiguous Parishes | Kingston | St. Andrew | Other | All Parishes | Contiguous Parishes | Kingston | St. Andrew | Other | All Parishes |
| Kingston | – | – | -11,005 | -4,475 | -15,480 | – | – | -11,699 | -838 | -12,537 |
| St. Andrew | +10,229 | +11,005 | – | +19,679 | +40,913 | +15,260 | +11,699 | – | +31,580 | +58,539 |
| St. Thomas | +53 | -23 | -1,474 | +432 | -1,012 | +143 | -283 | -2,311 | +269 | -2,182 |
| Portland | +63 | +192 | -1,900 | -17 | -1,662 | -86 | +80 | -2,907 | +58 | -2,855 |
| St. Mary | -412 | +667 | -3,684 | -12 | -3,441 | -584 | +359 | -5,074 | +231 | -5,068 |
| St. Ann | -1,265 | +155 | -3,581 | -73 | -4,764 | -1,415 | -209 | -5,490 | -38 | -7,152 |
| Trelawny | +398 | +112 | -1,675 | -116 | -1,271 | +101 | -177 | -2,657 | -292 | -3,025 |
| St. James | +2,298 | -272 | -1,656 | -79 | +835 | +2,776 | +40 | -2,345 | -146 | +325 |
| Hanover | -715 | -56 | -1,038 | -526 | -2,335 | -1,049 | -156 | -1,771 | -417 | -3,393 |
| Westmoreland | -1,293 | -88 | -2,479 | -1,256 | -5,116 | -1,119 | -469 | -4,101 | -1,308 | -6,997 |
| St. Elizabeth | -809 | +240 | -3,231 | -1,008 | -4,808 | -1,568 | -363 | -5,419 | -1,549 | -8,899 |
| Manchester | +233 | +653 | -3,016 | -290 | -2,420 | +778 | +308 | -4,762 | -259 | -3,935 |
| Clarendon | -78 | +400 | -3,003 | +880 | -1,801 | -84 | +24 | -5,035 | +1,032 | -4,063 |
| St. Catherine | +1,540 | +1,941 | -3,171 | +2,052 | +2,362 | +2,107 | +1,684 | -4,968 | +2,419 | +1,242 |
| TOTAL | +10,242 | +15,480 | -40,913 | +15,191 | – | +15,260 | +12,537 | -58,539 | +30,742 | – |
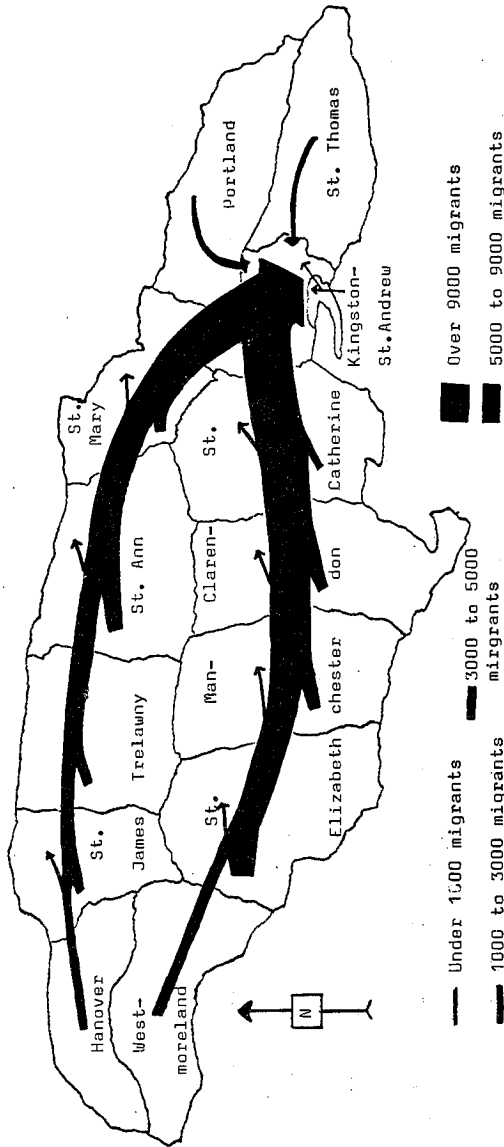
FIGURE 1. PARISHES OF JAMAICA AND REPRESENTATION OF CURRENTS OF IN-MIGRATION INTO KINGSTON – ST. ANDREW, 1960-70.

shown in Tables 6 and 7. Diagonal values, depicting the chances of residents remaining within their parish of residence, range from 98 per cent for St. Andrew to 66 per cent for Kingston. Other measures based on these diagonals will be discussed after a consideration of equilibrium values of the matrices.

Since the matrices represent Markov processes, the assumption of continued internal migration at these levels leads to equilibrium or stable distributions over the 14 parishes. (If $P$ is the transition matrix, the equilibrium state is approximated by $P^{256}$) It is instructive to compare the equilibrium distribution with the actual distribution of 1970 (Table 8). What prevailing patterns of internal migration imply, so far as expansion of

TABLE 6. PROBABILITY OF MOVEMENT OVER FIVE-YEAR PERIOD
MALE

| Parish of Birth | PARISH OF RESIDENCE | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Kingston | St. Andrew | St. Thomas | Portland | St. Mary | St. Ann | Trelawny | St. James | Hanover | Westmoreland | St. Elizabeth | Manchester | Clarendon | St. Catherine |
| Kingston | .6607 | .1496 | .0110 | .0106 | .0212 | .0149 | .0089 | .0105 | .0035 | .0085 | .0154 | .0218 | .0187 | .0446 |
| St. Andrew | .0024 | .9818 | .0013 | .0007 | .0018 | .0007 | .0003 | .0007 | .0001 | .0003 | .0006 | .0015 | .0014 | .0063 |
| St. Thomas | .0141 | .0317 | .9243 | .0079 | .0032 | .0009 | .0005 | .0011 | .0005 | .0007 | .0019 | .0023 | .0037 | .0070 |
| Portland | .0092 | .0370 | .0086 | .9170 | .0083 | .0018 | .0007 | .0017 | .0005 | .0008 | .0012 | .0026 | .0032 | .0077 |
| St. Mary | .0084 | .0474 | .0037 | .0072 | .9003 | .0069 | .0011 | .0018 | .0005 | .0007 | .0014 | .0018 | .0029 | .0159 |
| St. Ann | .0072 | .0336 | .0011 | .0012 | .0066 | .9234 | .0063 | .0025 | .0005 | .0006 | .0010 | .0030 | .0044 | .0087 |
| Trelawny | .0082 | .0338 | .0014 | .0009 | .0029 | .0051 | .9145 | .0097 | .0016 | .0012 | .0026 | .0070 | .0041 | .0069 |
| St. James | .0037 | .0223 | .0008 | .0010 | .0015 | .0023 | .0060 | .9357 | .0065 | .0064 | .0039 | .0027 | .0029 | .0045 |
| Hanover | .0050 | .0211 | .0009 | .0016 | .0015 | .0022 | .0035 | .0252 | .9177 | .0094 | .0023 | .0021 | .0032 | .0044 |
| Westmoreland | .0061 | .0249 | .0016 | .0008 | .0012 | .0013 | .0027 | .0178 | .0053 | .9187 | .0068 | .0025 | .0042 | .0060 |
| St. Elizabeth | .0057 | .0297 | .0016 | .0009 | .0015 | .0013 | .0017 | .0072 | .0009 | .0035 | .9250 | .0100 | .0052 | .0060 |
| Manchester | .0068 | .0311 | .0014 | .0013 | .0012 | .0022 | .0030 | .0023 | .0007 | .0008 | .0051 | .9250 | .0120 | .0072 |
| Clarendon | .0056 | .0243 | .0018 | .0009 | .0018 | .0026 | .0008 | .0012 | .0005 | .0009 | .0018 | .0066 | .9399 | .0112 |
| St. Catherine | .0052 | .0301 | .0017 | .0016 | .0056 | .0027 | .0007 | .0013 | .0003 | .0006 | .0019 | .0022 | .0074 | .9385 |

TABLE 7.   PROBABILITY OF MOVEMENT OVER FIVE-YEAR PERIOD
FEMALE

| Parish of Birth | Kings-ton | St. Andrew | St. Thomas | Port-land | St. Mary | St. Ann | Tre-lawny | St. James | Han-over | West-more-land | St. Eliza-beth | Man-chester | Clar-endon | St. Cath-erine |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Kingston | .6669 | .1530 | .0109 | .0109 | .0201 | .0146 | .0075 | .0096 | .0046 | .0084 | .0128 | .0197 | .0174 | .0434 |
| St. Andrew | .0032 | .9808 | .0013 | .0008 | .0016 | .0008 | .0002 | .0008 | .0001 | .0003 | .0006 | .0014 | .0017 | .0065 |
| St. Thomas | .0178 | .0496 | .9016 | .0090 | .0037 | .0010 | .0005 | .0012 | .0003 | .0006 | .0016 | .0017 | .0044 | .0068 |
| Portland | .0111 | .0545 | .0117 | .8931 | .0094 | .0019 | .0006 | .0016 | .0005 | .0011 | .0013 | .0027 | .0030 | .0075 |
| St. Mary | .0109 | .0650 | .0026 | .0073 | .8794 | .0083 | .0009 | .0017 | .0003 | .0005 | .0011 | .0017 | .0025 | .0177 |
| St. Ann | .0090 | .0533 | .0011 | .0014 | .0062 | .8970 | .0060 | .0022 | .0007 | .0007 | .0012 | .0034 | .0055 | .0123 |
| Trelawny | .0123 | .0559 | .0016 | .0010 | .0022 | .0063 | .8818 | .0127 | .0017 | .0019 | .0016 | .0084 | .0042 | .0085 |
| St. James | .0059 | .0301 | .0011 | .0011 | .0017 | .0020 | .0065 | .9251 | .0068 | .0063 | .0032 | .0029 | .0024 | .0051 |
| Hanover | .0076 | .0342 | .0008 | .0009 | .0018 | .0017 | .0027 | .0297 | .8965 | .0128 | .0022 | .0022 | .0031 | .0039 |
| Westmoreland | .0095 | .0429 | .0010 | .0008 | .0014 | .0014 | .0020 | .0180 | .0058 | .8971 | .0058 | .0030 | .0045 | .0067 |
| St. Elizabeth | .0092 | .0430 | .0015 | .0013 | .0016 | .0016 | .0013 | .0075 | .0011 | .0043 | .8931 | .0143 | .0068 | .0084 |
| Manchester | .0087 | .0502 | .0011 | .0012 | .0014 | .0027 | .0026 | .0023 | .0005 | .0007 | .0047 | .8994 | .0158 | .0087 |
| Clarendon | .0078 | .0405 | .0016 | .0013 | .0018 | .0027 | .0008 | .0012 | .0005 | .0010 | .0016 | .0078 | .9175 | .0138 |
| St. Catherine | .0067 | .0438 | .0021 | .0018 | .0055 | .0029 | .0009 | .0012 | .0004 | .0006 | .0012 | .0024 | .0077 | .9228 |

PARISH OF RESIDENCE

TABLE 8.   COMPARISON OF PROPORTIONAL DISTRIBUTION
ACCORDING TO 1970 CENSUS AND EQUILIBRIUM VALUES

| Parish | MALE | | FEMALE | |
|--------|------|--|--------|--|
| | 1970 | Equilibrium Value | 1970 | Equilibrium Value |
| Kingston | 5.57 | 1.10 | 6.29 | 1.37 |
| St. Andrew | 21.75 | 65.51 | 23.82 | 72.80 |
| St. Thomas | 3.95 | 2.14 | 3.76 | 1.66 |
| Portland | 3.81 | 1.54 | 3.69 | 1.24 |
| St. Mary | 5.54 | 2.58 | 5.32 | 1.98 |
| St. Ann | 6.77 | 1.94 | 6.51 | 1.47 |
| Irelawny | 3.48 | 1.04 | 3.22 | 0.60 |
| St. James | 5.61 | 2.37 | 5.55 | 1.90 |
| Hanover | 3.28 | 0.55 | 3.15 | 0.41 |
| Westmoreland | 6.36 | 0.93 | 6.17 | 0.69 |
| St. Elizabeth | 7.09 | 1.77 | 6.75 | 1.01 |
| Manchester | 6.80 | 3.09 | 6.50 | 2.19 |
| Clarendon | 9.97 | 4.73 | 9.33 | 3.57 |
| St. Catherine | 10.02 | 10.72 | 9.92 | 9.12 |

the metropolitan area is concerned, appears dramatically from this comparison. In the case of males, the equilibrium distribution shows that 66 per cent of the island's population of that sex are located in the parish of St. Andrew, which represents a three-fold rise in the proportion of the population it now supports. Even higher is the concentration implied for females, 73 per cent of whom are, according to equilibrium conditions, located in the suburban parish. It should be also noted that the equilibrium value for Kingston is very small, about 1 per cent, which is only one-fifth of the proportion obtained in 1970. Similar values for other parishes are also very small compared with corresponding proportions of 1970. St. Catherine provides the single exception to this pattern of reduced proportions, with the position seemingly governed by the expansion of adjoining metropolitan areas; as early as 1970, in fact, the implications of this juxtaposition were emerging. Moreover, even the parish of St. James, which showed definite signs of attracting populations in 1970, is, under equilibrium conditions, destined to support about 2 per cent of the total; that is, less than one-third of the proportion now located there.

Another way in which use can be made of equilibrium distribution is to combine it with diagonals of the transition matrix to produce an index of spatial mobility for each parish. This index, proposed by S. Prais, is the standardized mean duration of stay in a

TABLE 9.  INDICES OF SPATIAL MOBILITY
ACCORDING TO SEX, JAMAICA, 1970

| Parish | Male | Female |
| --- | --- | --- |
| Kingston | 2.91 | 2.96 |
| St. Andrew | 19.06 | 13.51 |
| St. Thomas | 12.93 | 9.99 |
| Portland | 11.86 | 9.24 |
| St. Mary | 9.77 | 8.12 |
| St. Ann | 12.80 | 9.56 |
| Trelawny | 11.57 | 8.41 |
| St. James | 15.17 | 13.09 |
| Hanover | 12.08 | 9.62 |
| Westmoreland | 12.18 | 9.65 |
| St. Elizabeth | 13.10 | 9.26 |
| Manchester | 12.92 | 9.72 |
| Clarendon | 15.85 | 11.68 |
| St. Catherine | 14.52 | 11.76 |

given parish. It is the ratio $(1 - p'_j)/(1 - p_{jj})$, where $p'_j$ is the equilibrium value for the $j$th parish and $p_{jj}$ is the corresponding diagonal of the transition matrix (Bartholomew, 1973). The higher the level of the index, the lower is the degree of mobility of the population for which it is derived. The values for the two sexes of the 14 parishes are shown in Table 9. It appears that females are much more mobile than males; the single exception being the case of Kingston, but here the difference between the sexes is small. There is also considerable variation by parish. By far, the most mobile elements of the island's population are those from Kingston, with an index of three for both sexes. On the other hand, the least mobility is shown by the population of St. Andrew, where the indices are 19 for males and 14 for females. Thus, not only does this suburban area exert a strong attractive force, pulling in migrants from all over the island, but persons born in it have a very low propensity to shift their residence to another parish. With regard to other parishes, the lowest index is that for St. Mary (ten for males and eight for females), while the highest are those for males in Clarendon (16) and for females in St. James (13).

An important issue in the study of internal migration is the identifying of characteristics that may predispose persons to migrate. It is known from many studies that educational and professional qualifications constitute significant elements in inducing persons to leave their place of birth and seek employment elsewhere. What

TABLE 10. INDICES OF SPATIAL MOBILITY
ACCORDING TO EDUCATIONAL ATTAINMENT, JAMAICA, 1970

| Parish | MALE | | | FEMALE | | |
|---|---|---|---|---|---|---|
| | Primary | Secondary | University | Primary | Secondary | University |
| Kingston | 1.83 | 1.41 | 1.14 | 1.77 | 1.39 | 1.15 |
| St. Andrew | 5.72 | 3.11 | 2.26 | 4.44 | 3.71 | 2.02 |
| St. Thomas | 4.28 | 1.72 | 1.30 | 3.77 | 1.77 | 1.38 |
| Portland | 3.73 | 2.02 | 1.32 | 3.23 | 1.97 | 1.40 |
| St. Mary | 2.98 | 1.63 | 1.29 | 2.68 | 1.65 | 1.52 |
| St. Ann | 3.76 | 1.89 | 1.41 | 3.25 | 1.98 | 1.46 |
| Trelawny | 3.72 | 2.11 | 1.30 | 3.06 | 1.91 | 1.56 |
| St. James | 4.56 | 3.28 | 2.07 | 3.98 | 3.27 | 2.11 |
| Hanover | 3.81 | 2.20 | 1.26 | 3.23 | 2.14 | 1.55 |
| Westmoreland | 3.90 | 2.55 | 1.30 | 3.48 | 2.66 | 1.29 |
| St. Elizabeth | 3.73 | 1.44 | 1.38 | 3.09 | 1.44 | 1.37 |
| Manchester | 3.71 | 2.54 | 2.83 | 3.16 | 2.45 | 2.00 |
| Clarendon | 5.11 | 3.76 | 1.43 | 3.93 | 3.21 | 1.32 |
| St. Catherine | 4.31 | 2.68 | 1.46 | 3.78 | 2.48 | 1.54 |

seems to be required here, therefore, is an examination designed to show whether levels of educational attainment are linked to differential probabilities of migration. In order to do this, probabilities of migrating from one parish to another for three educational levels are considered. Transition matrices are constructed in terms of overall migration, that is, migration from parish of birth to parish of present residence, without reference to the period within which the movement takes place. These are also less rigorously defined than the transition matrices previously presented for the entire population, as they are based on all persons so qualified, not on those born within the island. But the measures obtained are sufficiently reliable to emphasize the differentials in spatial mobility for three levels of education: elementary, secondary, and university.

Again, it is useful to adopt as indices of spatial mobility measures proposed by Prais, and these are shown by sex for the three levels of educational attainment in Table 10. The general pattern is for the higher levels of education to be associated with greater mobility, although males in Manchester exhibit a slight departure from this. As was the case with overall probabilities of movement, highest indices of spatial mobility (that is lowest chances of migrating) tend to be those for St. Andrew, while lowest indices (that is highest chances of migrating) tend to be those for Kingston; but Clarendon does not fit

into this pattern. The relatively high indices for St. James attest to the attractive force that the tourist industry exercises in this parish. The relevance of educational attainment to internal migration in Jamaica is also stressed by Ebanks, who examines, as well, other factors associated with these movements (Ebanks, 1968).

*Population Projections for Parishes of the Island*

A further use to which transition matrices can be put is in the preparation of population projections for geographical divisions of a country. For instance, it is possible to incorporate two forms of migration into such a model. One, internal migration, deals with movements between sections of a country, while the second covers movements from sections of a country to the outside world as well as migration from the outside world into sections of a country. Incorporated into these are assumptions concerning mortality and fertility, with the former being interpreted as an absorbing state (Bartos, 1967). Other techniques of projecting populations on a regional basis are available, such as analyzing rates of growth in conjunction with natural increase over the immediate past. In the case of Jamaica, the analysis of these rates of growth has been used to trace the expansion of Kingston-St. Andrew (Roberts, 1963).

The present approach is to combine the transition probabilities given above with a component projection made for the island as a whole in order to see how internal migration interacts with overall growth of the population to effect changes in areal distribution. The initial distribution is that of the 1970 Census, and this is progressively modified by the application of successive powers of the matrix. Thus, with a starting date of 1970, we obtain estimates of distributions at 1975, 1980, 1985, and 1990. These are taken as determining the distributions at these five dates, which, applied to the totals of the component projection, yield estimates of parish populations.

The component projection of the island used is one of three described elsewhere (Roberts, et al., 1974). It illustrates the implications of population control of two types: falling fertility and continued emigration. Fertility is taken as falling to replacement level by 1985 and thereafter to remain unchanged up to 1990. The assumed rates of net loss through external migration result in much lower absolute losses than the considerable outflows experienced during 1960-70. These, combined with current mortality rates, furnish composite sources of decrement.

*Results of the Projection*

The results of combining male and female transition matrices over five-year periods with the above-mentioned component projection are shown in Table 11. This gives male and female parish populations at five-year intervals from 1970 to 1990. The marked curbs on population growth incorporated are sufficient to cause declines in some parish populations by 1980. Appreciable increases still characterize the suburban district, St. Andrew, the population of which amounts to 0.72 million by 1990; that is, just over one-third of the island total. Again, St. Catherine shows a sizable increase. In the case of Kingston, a pronounced fall is in evidence; by 1990 it should be supporting 56,000, equivalent to a reduction of one-half in the 20 years following 1970. There is still an appreciable rise in population in St. James, where males move up by 7 per cent and females by 23 per cent. In some parishes, declines are confined to a single sex. Thus, declines in male populations are recorded in St. Mary (9 per cent), Manchester (2 per cent), and Clarendon (1 per cent), while declines limited to females appear in Hanover (3 per cent) and Westmoreland (7 per cent). St. Elizabeth records declines for both sexes, 10 per cent for males and 8 per cent for females. Therefore, it can be concluded that in

127

TABLE 11. ESTIMATED PARISH POPULATION OF JAMAICA, 1975 TO 1990 ACCORDING TO PROJECTION

| Parish | MALE | | | | | FEMALE | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1970 Census | Projected Population | | | | 1970 Census | Projected Population | | | |
| | | 1975 | 1980 | 1985 | 1990 | | 1975 | 1980 | 1985 | 1990 |
| Kingston | 50,300 | 40,200 | 32,300 | 26,200 | 21,500 | 59,500 | 51,200 | 44,000 | 38,200 | 34,200 |
| St. Andrew | 196,400 | 232,100 | 260,100 | 278,300 | 291,700 | 225,300 | 287,700 | 342,100 | 388,300 | 431,900 |
| St. Thomas | 35,700 | 36,900 | 37,000 | 35,800 | 34,400 | 35,500 | 37,800 | 38,600 | 38,400 | 37,900 |
| Portland | 34,400 | 35,300 | 35,000 | 33,200 | 32,000 | 34,900 | 36,800 | 37,200 | 36,700 | 36,000 |
| St. Mary | 50,000 | 50,900 | 50,200 | 48,100 | 45,400 | 50,400 | 52,800 | 53,100 | 52,000 | 50,800 |
| St. Ann | 61,100 | 62,100 | 61,000 | 58,100 | 54,900 | 61,600 | 63,900 | 63,800 | 62,000 | 60,000 |
| Trelawny | 31,400 | 32,400 | 32,200 | 31,100 | 29,900 | 30,500 | 31,700 | 31,600 | 30,800 | 29,800 |
| St. James | 50,700 | 54,100 | 55,700 | 55,400 | 54,400 | 52,500 | 58,200 | 61,700 | 63,400 | 64,600 |
| Hanover | 29,600 | 29,900 | 29,200 | 27,700 | 26,000 | 29,800 | 30,900 | 30,700 | 29,900 | 28,900 |
| Westmoreland | 57,500 | 57,400 | 55,600 | 52,100 | 48,500 | 58,300 | 59,800 | 59,000 | 56,700 | 54,200 |
| St. Elizabeth | 64,000 | 65,100 | 64,100 | 61,100 | 57,600 | 63,900 | 65,400 | 64,300 | 61,800 | 59,000 |
| Manchester | 61,400 | 63,900 | 64,300 | 62,500 | 60,200 | 61,500 | 65,800 | 67,500 | 67,400 | 66,900 |
| Clarendon | 90,000 | 93,700 | 94,300 | 92,000 | 88,700 | 88,300 | 94,700 | 97,500 | 97,900 | 98,600 |
| St. Catherine | 90,400 | 99,100 | 102,200 | 102,900 | 102,000 | 93,800 | 105,900 | 114,100 | 119,200 | 123,200 |
| TOTAL | 903,000 | 952,100 | 973,200 | 964,500 | 947,200 | 945,600 | 1,042,600 | 1,105,200 | 1,142,700 | 1,176,000 |

terms of this projection there is very little expansion apart from the suburban area of St. Andrew, the adjoining parish of St. Catherine, and St. James.

*Conclusion*

In small populations such as that of Jamaica, movements into the capital constitute the major population concentration and result from in-migration into suburban areas. But it should be emphasized that smaller towns within these populations also exhibit very high growth rates, for which internal migration is responsible. In view of their small sizes and, in most cases, changing boundaries, the isolation of their components of growth cannot be readily effected. The important point is that in recent years some of these towns in Jamaica have shown rates of growth exceeding that of St. Andrew, and these have resulted from very high levels of in-migration. Thus, modifications of the pattern of internal migration may be expected in the future.

Again, one must question whether the dramatic expansion of the capital indicated in the projection can be sustained in the absence of equally dramatic development in agriculture and industry. Urbanization on such a scale seems inconceivable without comparable rises in output per head in many sectors of the economy. At present, there seems to be little ground for assuming that the requisite agricultural expansion or industrial growth will materialize.

In the absence of substantial increases in overall productivity, the society may well find it necessary to consider instituting some form of curbing the growth of the main urban centre. This is a policy issue that must be raised with respect to all small societies of the Caribbean. As was pointed out by Leonard Broom many years ago, urbanization in this region has not emerged in response to industrialization (Broom, 1953). On the contrary, we may argue that this process appeared as an inevitable consequence of mounting population pressure in rural districts. While this applies to all developing societies in some degree, it is especially acute in the Caribbean because of the very small sizes and slender resources of its political units.

*References*

Adams, N.A. 1969. Internal Migration in Jamaica: An Economic Analysis. Social and Economic Studies 18:137-151.

Bartholomew, D.J. 1973. Stochastic Models for Social Processes, 2nd edition. London: John Wiley.

Bartos, O.J. 1967. Simple Models of Group Behavior. New York: Columbia University Press.

Bogue, D.J. 1969. Principles of Demography. New York: John Wiley.

Broom, L. 1953. Urban Research in the British Caribbean: A Prospectus. Social and Economic Studies 1:113-119.

Duncan, O.D., R.P. Cuzzort, and B. Duncan. 1961. Statistical Geography. Illinois: The Free Press.

Ebanks, B.E. 1968. Differential Internal Migration in Jamaica, 1943-1960. Social and Economic Studies 17:197-214.

Haggett, P. 1965. Locational Analysis in Human Geography. London: Edward Arnold.

Harris, R.N., and E.S. Steer. Demographic-Resources Push in Rural Migration: A Jamaican Case Study. Social and Economic Studies 17:398-406.

Lee, E.S., A.R. Miller, C.P. Brainerd, and R.A. Easterlin. 1957. Population Redistribution and Economic Growth, United States, 1870-1950. I Methodological Considerations and Reference Tables. Philadelphia: The American Philosophical Society.

Roberts, G.W. 1957. The Population of Jamaica. Cambridge: Cambridge University Press.

———— 1963. Provisional Assessment of Growth of the Kingston-St. Andrew Area 1960-70. Social and  ́.onomic Studies 12:432-441.

G. W. Roberts

Roberts, G.W., S.A. Sinclair, B. Boland, D. Powell, and L. Hewitt. 1974. Recent Population Movements in Jamaica. Paris: CICRED.

Shyrock, H.S., J.S. Siegel, et al. 1971. The Methods and Materials of Demography. Volume 2. Washington: U.S. Bureau of the Census.

Tekse, K. 1967. Internal Migration in Jamaica. Kingston: Department of Statistics.

1970 Population Census of the Commonwealth Caribbean. Volume 5. Internal Migration. Kingston: University of the West Indies.