Accounting for Intragenerational Mobility on Poverty and Inequality *

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STUDY OBJECTIVE.

The ability to move along the social scale is a fundamental determinant of one's wellbeing because it affects the dynamics of poverty and inequality. The overall objective of this chapter is to measure net intragenerational mobility between income classes in Brazil using demographic projection methods. Specific aims are twofold: (1) to suggest a method to calculate intragenerational net mobility using the residual difference between projected and observed censual populations. The main advantage of this approach is to estimate net mobility by age using only cross-sectional data by income class; (2) to estimate how income-specific net mobility has changed between 1980 and 2000 in Brazil in the presence of concurrent fertility and mortality declines. More specifically, this chapter will demonstrate the importance of social mobility vis-à-vis demographic changes in the determination of poverty. I identify the ages and income classes at which net mobility is positive, or negative, and describe the age standard of mobility and mortality in two periods, between 1980 and 1990, and between 1990 and 2000.

BACKGROUND AND SIGNIFICANCE.

The motivation for this study lies in a deceptively simple question: Why has income inequality changed relatively little in the face of one the most rapid demographic transitions ever experienced in Brazil? More specifically, why the rapid reproductive convergence of the poorest

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and richest income classes did not seem to have affected inequality more markedly? Previous studies have offered a simple answer: because there is social mobility between groups homogenizing the size of income classes (e.g. Lam 1986; Mare 1997; Preston and Campbell 1993). When upward social mobility is high, one can be born into a poor family and still break the poverty trap by moving upwards. That is, social mobility may counterbalance the trends implied by demographic differentials. Mare (1997), for instance, showed that differential fertility by educational attainment have had small effects on educational trends, partly because of intergenerational mobility and partly because differential fertility have not been large enough to have a large effect in the long term.

Any attempt to measure the dynamics of poverty and inequality must take into account how income groups reproduce and also how members of these groups move between them. When ascendant mobility for those at the bottom of the income distribution is higher than for those at the top, the class or origin is less important in determining income inequality and poverty status than in situations where mobility is low.

In the United States there are several studies in Sociology and Economics dealing with *inter*generational mobility. Comprehensive reviews of what has happened to intergenerational mobility in the last century in the United States are available (McMurrer, Condon and Sawhill 1997; Morgan, Grusky and Fields 2006). In Latin America, good comparative studies have also been produced (Behrman, Gaviria and Székely 2001). In Brazil, the mobility literature has focused attention on education (Barros and Lam 1993; Ferreira and Veloso 2003), occupation (Pastore 1982; Pastore and Silva 2000), income (Ferreira and Veloso 2004; Pero and Szerman 2005) and on the mobility of elites (Ferreira 2001; Medeiros 2005). Yet studies dealing with *intra*generational mobility are virtually inexistent in Brazil, largely due to the lack of longitudinal data.

Research on intragenerational mobility was more prevalent in American Sociology during the 1970s and 1980s (DiPrete 1993; Rosenfeld 1992; Spilerman 1977), but more recent research emphasizing career processes is also available (DiPrete and Nonnemaker 1997; Spilerman and Petersen 1999). Attention to the "life cycle approach" made intragenerational mobility important on its own right, although the topic is "rarely studied as such anymore" (Morgan et al. 2006: 7). Intragenerational mobility is an important research topic in Sociology when the goal is to understand one's status achievement over the life cycle rather than in relation to past generations. Since the ultimate goal is to unveil the dynamic evolution of wellbeing through time, it should matter little if the reference group is the parents' generation or early periods of one's own life cycle. Because intragenerational mobility presents the experience or real cohorts, it enables the location in time of acts of mobility linked to structural characteristics of society (Sørensen 1975: 457). From an operational point of view, one comparative advantage of examining mobility from an intragenerational perspective is that longitudinal data, rarely available in developing countries, is not required since the group of analysis refers to age cohorts rather than individuals. Moreover, in intragenerational cohort studies information about the parents and retrospective data is not required, so recall errors are minimized.

Standard procedures to measure inter and intragenerational mobility usually require longitudinal or retrospective questions about states occupied in the present and in the past. Once current and past positions – in socioeconomic status, income, region, race, marital status and others – are compared, one can infer the likelihood of moving upwards, downwards, or of remaining in the same category of origin. The absence of retrospective questions in household surveys have, however, hindered research on mobility in less developed countries, where the cost of implementing follow up surveys is prohibitive.

In this chapter I suggest an innovative way of measuring income net mobility[1] combining cross-sectional data and demographic projection methods. The method estimates net intragenerational cohort mobility by age and between three income classes: poor, middle and rich. One advantage of this approach is that it takes into account the role of demographic differentials between income groups (e.g. differences in fertility and mortality) to offer a picture of net mobility over the life cycle. It also provides an initial strategy to examine the “selection hypothesis”, which suggests that upward mobility is impeded by large family sizes and the probability of downward mobility exacerbated (Blau and Duncan 1967; Van Bavel 2006). This hypothesis holds when large families have to spend resources (time, money, effort) with children and may therefore find it difficult to maintain or improve their social position. Couples with low fertility may also find it easier to move upwards in the social scale because they can use their extra resources to improve their chances for status achievement.

Although the bulk of previous research has treated social mobility as “independent” from fertility, there is reason to suspect that fertility affects mobility, or that there is some degree of mutual reciprocity between the two variables. (Kasarda and Billy 1985) provide an excellent review of the theoretical and empirical causal links between social mobility and fertility. I this chapter I take net mobility as a residual outcome of the difference between recorded and projected populations by income class and age. Mobility is, therefore, an indirect product of fertility and mortality because these two demographic components are what define the projection. The next section elaborates on the methodological details.

[1] For the sake of simplicity, from now on the term mobility refers to intragenerational cohort mobility. Cohorts are defined by age, but not by sex, for three different income groups: poor, middle and rich classes.

DATA AND METHODS.

The dataset includes special tabulations of family per capita income by age, available in the 1980, 1991 and 2000 Brazilian Censuses produced by the *Instituto Brasileiro de Geografia e Estatística* (IBGE). The Brazilian censuses are publicly available at IPUMS International website (Ruggles et al. 2004).

Measuring income mobility.

A general definition states that income mobility "measures how individuals or families move within the income distribution over time" (Gottschalk and Dazinger 1998: 20). This definition is perhaps too vague to be incorrect, but is certainly incomplete because it does not elaborate on how to measure mobility. To assure consistency, one has to answer: Mobility between what, when and how? To answer the "what", I reiterate that this chapter deals with *intra*generational mobility. It refers to mobility within the same generation and between income classes, but not necessarily for the same individuals. Instead of tracking individuals or households, I track entire cohorts of individuals based on their age and income. I refer to mobility as net mobility because there is no information to determine the origin and destiny of moves, but I can infer the net total result of incoming or outgoing individuals in each age group by comparing projected and observed populations in each age and income class. The main advantage of this approach is that it only requires cross-sectional data, so the time dimension of mobility can be extended. In addition, using cohorts instead of individuals tends to dilute measurement errors and reduce attrition. The drawback of this approach, however, is that by looking at average cohort income eliminates the possibility of studying intra-cohort income mobility (Fields et al. 2006).

To answer the "when" of mobility, I reiterate that the period of investigation covers income net mobility in Brazil between three years: 1980, 1991 and 2000. The first period, 1980-1990, is marked by expressive educational expansion (Ferreira and Barros 1999; Wajmann and Menezes-Filho 2003) and by accelerated rate of inflation. The next interval, 1991-2000, is characterized by a slight decline in racial inequality, and by regional convergence of income between states and rural-urban areas (Ferreira et al. 2006). The added value of having three points in time is that *changes* in net mobility can also be observed. As mobility can only be estimated with two or more years of data, at a very minimum, it takes at least three data points to measure changes in mobility. Few studies have looked at changes in *inter*generational income mobility in the U.S. (Gottschalk 1997; Gottschalk and Dazinger 1998) and only one has looked at changes in Brazil (Ferreira and Veloso 2004). I did not find research examining changes in *intra*generational income mobility over time.

Finally, to answer "how" to measure mobility I start by defining three income classes between which mobility occurs: poor, middle and rich. Income thresholds separating these three subpopulations are calculated following (Medeiros 2005)[2]. These three classes have fixed income boundaries over time and follow the distribution of family income per capita of 1980. The family per capita income value separating the poor from the middle class in 1980 was equal to R$80.42 (about $44.5 Dollars on October 2007), which corresponds to roughly 33 percent of the population at the bottom of the distribution. This absolute poverty threshold remains the same in 1990 and 2000. The rich group accounts for about one percent of those at the top of the income distribution, and the middle class is represented by the subpopulation in between the rich and the poor.

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[2] See the methodological section of previous chapters for further details on the calculation of income classes, inequality measures and estimation of income-specific demographic rates.

The strategy to estimate mobility between these three income classes consists in comparing the difference between observed and projected populations. The residual difference in the size of projected and recorded populations in each income class is attributed to international migration and net social mobility.[3] The logic of the method consists in acknowledging two forces of decrement in each age: the first is mortality, which is estimated using indirect demographic methods described in the previous chapter[4]; the second force of decrement (or increment) is net social mobility, which can be estimated as the complement of mortality needed to match projected and recorded censual populations. This methodological strategy follows the logic of multiple decrement/increment processes to combine forces of mortality and mobility into a single framework expressed in Leslie matrices, which can then be used to project and generate counterfactual scenarios of population growth. A detailed explanation of how to estimate the influence of intragenerational mobility is in the next section.

The matrix model of interregional cohort-survival with three subpopulations.

Building on the matrix framework of interregional population growth and distribution developed by Rogers (1968, 1975), this section demonstrates how information on intragenerational mobility can be retrieved by comparing projected and observed subpopulations. The method has two assumptions. The first is that mortality and net social mobility can be expressed as part of a multiple decrement process for each subpopulation. The second assumption is that mortality and net mobility are constant during the transition periods. Therefore, the chance of dying or moving

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[3] Preliminary results show that international migration flows do not make much difference and that most of the difference between projected and observed populations is due to social mobility.

[4] A copy of the referred chapter is available under request to the author.

between states will be the same for each period of analysis (e.g. for each projection period of five years).

For a single population, the general model surviving an age distribution forward through time may be expressed by a summation of matrices multiplication according to equation (1) defined as:

$$\mathbf{w}^{\mathbf{t+1}} = \mathbf{S}\mathbf{w}^{\mathbf{t}} + \mathbf{M}\mathbf{w}^{\mathbf{t}} \tag{1}$$

where,

$$\underset{\mathbf{n\times n}}{\mathbf{S}} = \begin{bmatrix} 0 & b_1 & b_2 & \cdots & b_u & 0 & 0 \\ {}_1d_{r+1} & 0 & 0 & \cdots & \cdots & \cdots & 0 \\ 0 & {}_{r+1}d_{r+2} & 0 & \cdots & \cdots & \cdots & 0 \\ 0 & 0 & {}_{r+1}d_{r+2} & \cdots & \cdots & \cdots & 0 \\ \vdots & & & \ddots & & & 0 \\ \vdots & & & & \ddots & & \\ 0 & & & & & {}_{n-1}d_n & 0 \end{bmatrix}, \quad \mathbf{w}^{\mathbf{t}} = \begin{bmatrix} w_r^t \\ w_{r+1}^t \\ w_{r+2}^t \\ \vdots \\ \vdots \\ w_{n-1}^t \\ w_n^t \end{bmatrix} \quad \underset{\mathbf{n\times n}}{\mathbf{M}} = \begin{bmatrix} 0 & 0 & \cdots & \cdots & 0 \\ m_1 & 0 & & & 0 \\ 0 & m_2 & \ddots & & \vdots \\ \vdots & & & \ddots & \vdots \\ 0 & \cdots & \cdots & m_{n-1} & 0 \end{bmatrix}$$

w_r^t = population in the *r*th age group at time t;

b_r = number of births surviving to the t+1 in the *r*th childbearing age group;

d_r = proportion of people who "survived" between ages *r* and *r*+1st between t and t+1.

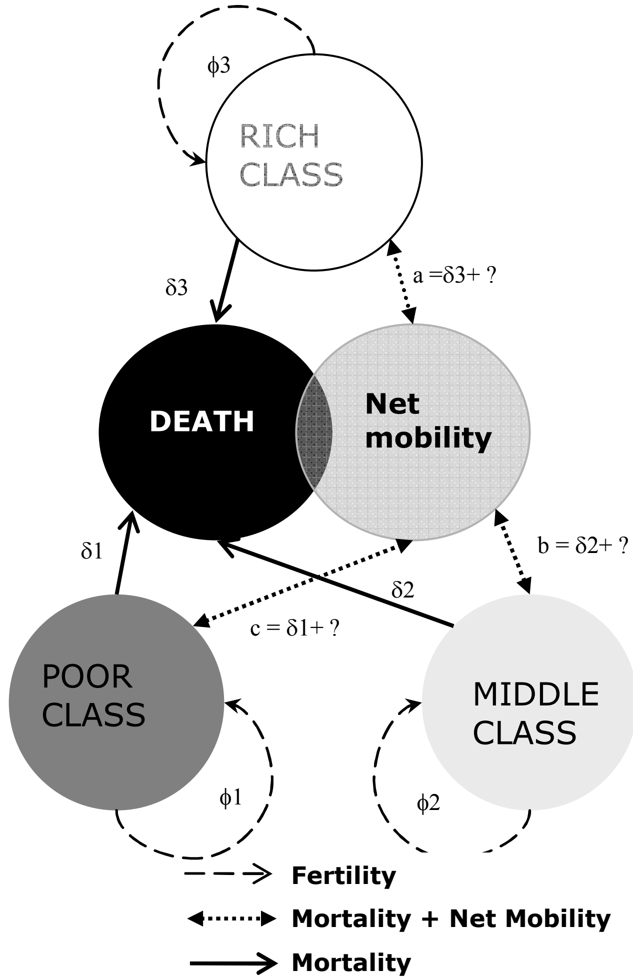
m_i = net migration/mobility rate for the *i*th age group.

The elements in the subdiagonals of $\mathbf{S_1}$ and $\mathbf{S_2}$ account for the "mortality" of those individuals who left age group *r* to *r*+1st through death. The state-age specific elements in matrices $\mathbf{S_i}$ can be fully retrieved making use of standard demographic techniques. Fertility and survivorship rates can be obtained with direct and indirect demographic methods (e.g. Brass et al. 1968) discussed in the previous chapter. The elements in matrices $\mathbf{M_{ij}}$, which describe the net proportion of people in age group *r*th who made the transition from state *j* into state *i* and into the next age group, are usually harder to obtain without mobility information. However, even when detailed information on movements between states is not available, age-specific transition matrices can still be estimated using the logic of multiple decrement processes. Disaggregating the total population into three subpopulations, $\mathbf{w}_{\text{Total}}{}^{t} = \mathbf{w}_{\text{Poor}}{}^{t} + \mathbf{w}_{\text{Middle}}{}^{t} + \mathbf{w}_{\text{Rich}}{}^{t}$, we may express the fundamental model of population projection with internal mobility and three groups by combining net mobility and mortality rates. This joint process of population growth can be represented in matrix form as:

$$\begin{bmatrix} \mathbf{w}^{\mathbf{t+5}}_{POOR} \\ \mathbf{w}^{\mathbf{t+5}}_{MIDDLE} \\ \mathbf{w}^{\mathbf{t+5}}_{RICH} \end{bmatrix} = \begin{bmatrix} \mathbf{S}_{POOR} + \mathrm{M}_{POOR} & \mathbf{0} & \mathbf{0} \\ \mathbf{0} & \mathrm{S}_{MIDDLE} + \mathrm{M}_{MIDDLE} & \mathbf{0} \\ \mathbf{0} & \mathbf{0} & \mathrm{S}_{RICH} + \mathrm{M}_{RICH} \end{bmatrix} \times \begin{bmatrix} \mathbf{w}^{\mathbf{t}}_{POOR} \\ \mathbf{w}^{\mathbf{t}}_{MIDDLE} \\ \mathbf{w}^{\mathbf{t}}_{RICH} \end{bmatrix} \qquad (2)$$

This expression implies that the future population size of each income class can be expressed as a product of the baseline population and a set of fertility and mortality rates (in **S**) plus a matrix **M** accounting for net migrants from or to other subpopulations. Net mobility rates in **M** represent the complement of survival probabilities in **S** required to match the size of projected and observed populations. The population projection scheme illustrating population dynamics over time using fertility, survival and net mobility can be diagrammatically expressed as:

Figure 1. Projection scheme of population dynamics with fertility, mortality and net mobility



age	pop in t+5										pop in t
10-14	7,043,996	=	0	ϕ1	0	0	0	0	X	6,051,245
15-19	6,012,191		c	0	0	0	0	0		3,979,415
10-14	7,800,583		0	0	0	ϕ2	0	0		8,091,295
15-19	8,440,000		0	0	b	0	0	0		9,403,650
10-14	58,906		0	0	0	0	0	ϕ3		63,500
15-19	66,965		0	0	0	0	a	0		105,780

This multiregional Leslie matrix for two age groups (10-14 and 15-19) and three subpopulations (poor, middle and rich) illustrates the structure required to project the size of poor, middle and rich classes from time *t* to *t+5* using a set of fertility (ϕ1, ϕ2, ϕ3) and survival probabilities that include the net mobility of specific classes (parameters a, b, c in the subdiagonal]. Projected and recorded populations at time *t+5* have the same size because mobility between income classes has been incorporated into the projection matrices.

The combined "survival probability", expressed by the sum of matrices **S** and **M**, reflects the joint effect of mortality and net mobility and are expressed as a single parameter for each age and class. Mortality and net mobility are expressed in a single matrix because when projected subpopulations ($w^{t+5}*$) are larger than observed ones (w^{t+5}), matrix **M** will have negative elements (e.g. emigration from that social class). This is an undesirable result because it compromises the use of **M** as an independent projection matrix since negative entries imply negative organisms. To avoid this outcome I work with only two projection matrices. The first is represented by **S** and includes probabilities of surviving and fertility rates, as in the last chapter. It represents the demographic forces behind the reproduction of income-specific groups. The second multiregional Leslie matrix includes the reproductive forces explicit in **S** but also incorporates net social mobility, represented by the elements of **M**. This second matrix is expressed as **R= S+M**. This combined matrix **R** adjusts the survivorship ratios by incorporating all negative elements of **M** into the proportion of people surviving. This procedure provides a projection matrix with only nonnegative values from which a single dominant eigenvalue and eigenvectors can then be obtained to describe population dynamics in the steady state[5]. Some of the entries in **R** are higher than one because of immigrants coming from other social classes and regions, but that does not compromise the usefulness of the matrix as an analytical scheme.

To illustrate this theoretical discussion I present an empirical example for the projection of the poor population between 1985 and 1990 using Brazilian Census data. The parameters in matrix $\mathbf{S_{POOR}}$ below reflect the reproduction of the poor population, between ages 0 and 80:

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[5] The concept and use of eigenvalues and eigenvectors in demography is discussed somewhere else (Caswell 2001; Keyfitz and Caswell 2005).

Figure 2. Leslie matrix of the poor class for the period 1985-1990

age	w^{t+10}_{POOR}* Poor^{1990}		S_{POOR}																	w^{t+5}_{POOR} Poor^{1985}
0	8,446,845		0	0	**0.12**	**0.41**	**0.60**	**0.54**	**0.39**	**0.24**	**0.09**	**0.02**	0	0	0	0	0	0	0	7,760,538
5	7,667,290		**0.99**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7,396,204
10	7,363,506		0	**1.00**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7,043,996
15	6,998,534		0	0	**0.99**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6,012,191
20	5,947,210		0	0	0	**0.99**	0	0	0	0	0	0	0	0	0	0	0	0	0	3,936,405
25	3,880,457		0	0	0	0	**0.99**	0	0	0	0	0	0	0	0	0	0	0	0	2,362,833
30	2,322,412		0	0	0	0	0	**0.98**	0	0	0	0	0	0	0	0	0	0	0	2,133,777
35	2,088,392		0	0	0	0	0	0	**0.98**	0	0	0	0	0	0	0	0	0	0	2,101,456
40	2,044,574	=	0	0	0	0	0	0	0	**0.97**	0	0	0	0	0	0	0	0	0	1,924,381
45	1,856,319		0	0	0	0	0	0	0	0	**0.96**	0	0	0	0	0	0	0	0	1,618,401
50	1,542,824		0	0	0	0	0	0	0	0	0	**0.95**	0	0	0	0	0	0	0	1,119,114
55	1,050,044		0	0	0	0	0	0	0	0	0	0	**0.94**	0	0	0	0	0	0	873,685
60	801,532		0	0	0	0	0	0	0	0	0	0	0	**0.92**	0	0	0	0	0	630,254
65	559,718		0	0	0	0	0	0	0	0	0	0	0	0	**0.89**	0	0	0	0	483,437
70	404,832		0	0	0	0	0	0	0	0	0	0	0	0	0	**0.84**	0	0	0	420,402
75	319,524		0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0.76**	0	0	252,756
80+	168,063		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0.43**	**0.43**	141,623

The leftmost column in Figure 2 represents the projected population in 1990, and the right column is the number of people who were poor in 1985 by five year age groups. The first row of the matrix has net fertility rates properly adjusted for the effect of mortality on births. More precisely, the values in the first row reflect the contribution of persons in the *r*th age group at initial time t+5 to the number of persons in the first age group at the end of the interval, time t+10 in this case. Survivorship ratios are in the subdiagonal of $\mathbf{S_{POOR}}$ and reflect the proportion of persons in the *r*th age group at initial time t+5 who survive to be in the (i+5)th age group at time t+10 (Schoen 2006: 12). The projected poor population, however, is different from the one actually registered in 1990, because matrix **S** does not incorporate net mobility and the impact of the migrants' fertility on the projection. A matrix incorporating these two factors is represented by $\mathbf{R_{POOR}}$:

Figure 3. Leslie matrix of the poor class for the period 1985-1990 incorporating net mobility

age	w^{t+10}_{POOR} Poor^{1990}		$R_{POOR} = S_{POOR} + M_{POOR}$																	w^{t+5}_{POOR} Poor^{1985}
0	8,796,586		0	0	0.10	0.40	0.67	0.65	0.43	0.26	0.10	0.02	0	0	0	0	0	0	0	8,288,408
5	8,804,529		1.06	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7,952,320
10	8,190,257		0	1.03	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7,286,970
15	5,901,452		0	0	0.81	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4,900,683
20	4,250,221		0	0	0	0.87	0	0	0	0	0	0	0	0	0	0	0	0	0	3,451,232
25	3,820,620		0	0	0	0	1.11	0	0	0	0	0	0	0	0	0	0	0	0	2,653,442
30	3,468,164		0	0	0	0	0	1.31	0	0	0	0	0	0	0	0	0	0	0	2,837,480
35	2,981,957		0	0	0	0	0	0	1.05	0	0	0	0	0	0	0	0	0	0	2,256,451
40	2,446,579	=	0	0	0	0	0	0	0	1.08	0	0	0	0	0	0	0	0	0	2,144,579
45	1,872,958		0	0	0	0	0	0	0	0	0.87	0	0	0	0	0	0	0	0	1,465,247
50	1,511,877		0	0	0	0	0	0	0	0	0	1.03	0	0	0	0	0	0	0	1,211,295
55	1,189,421		0	0	0	0	0	0	0	0	0	0	0.98	0	0	0	0	0	0	914,340
60	1,005,328		0	0	0	0	0	0	0	0	0	0	0	1.10	0	0	0	0	0	755,354
65	815,921		0	0	0	0	0	0	0	0	0	0	0	0	1.08	0	0	0	0	588,009
70	560,997		0	0	0	0	0	0	0	0	0	0	0	0	0	0.95	0	0	0	478,968
75	381,727		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.80	0	0	265,039
80+	327,696		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.67	0.67	223,101

Matrix $\mathbf{R}_{POOR}$ above generates a population (w^{t+10}_{POOR}) with the same size as the one in 1990. Age specific fertility rates in $\mathbf{R}_{POOR}$ are on average 6.26 percent higher than in $\mathbf{S}_{POOR}$. Some entries in the subdiagonal of matrix **R** are higher than one to reflect the entrance of people to the poor class at those ages. In the next section I provide a detailed description of how to calculate the survivorship ratios in the subdiagonal of any matrix **R**[6].

Procedure to estimate the joint effect of mortality and net mobility.

For the sake of comparison, the entries in the subdiagonal of matrix **R** are calculated using two procedures. The first method is based on the variable r-method of intercensal survival described by Preston, Heuveline and Guillot (2001: 184-190). The second procedure is also based on intercensal survivorship ratios but its results are more accurate than the r-method. I use the distribution of the poor populations in 1980 and in 1990 to illustrate these methods below.

[6] **S** and **R** matrices for other income classes are reproduced in Appendix A.

The logic of the r-method consists in assuming that the mean growth during the intercensal period is constant by age. With this assumption, the number of person-years in the life table can be estimated as:

$$ {}_nL_x = {}_nN_x^* \times e^{Sx} \qquad (3) $$

where,

$$ {}_nN_x^* = \left[{}_nN_x(t1) \cdot {}_nN_x(t2)\right]^{1/2} = \text{geometric mean of \# of people between t1 and t2} \qquad (4) $$

$$ S_x = 5 \cdot \sum_{a=0,5}^{x-5} {}_5r_a + 2.5\,{}_5r_x = \text{cumulation of age-specific growth rates to midpoint of interval} \qquad (5) $$

$$ {}_nr_x[t1,t2] = \frac{\ln\left({}_nN_x(t2)/{}_nN_x(t1)\right)}{(t2-t1)} = \text{age-specific growth rate} \qquad (6) $$

The remaining functions of the life-table are the number of individuals surviving to age x (l_x), the number of person-years lived in the poor state above age x (T_x), the life expectancy of individuals exposed to mortality and net mobility in age x (e^o_x), and the combined probability of surviving and moving to or out of the poor class between age x and x+ n (${}_np_x$). These functions are calculated as:

$$l_x = \frac{1}{2 \cdot n} \cdot \left({}_nL_x + {}_nL_{x-n} \right) \tag{7}$$

l_0 = mean number of births entering the poor population between t1 and t2 as a result of social mobility. This radix is calculated iteratively to approximate projected and observed censual populations in the first two age groups. (8)

$$T_x = \sum_{a=x}^{\infty} {}_nL_a \tag{9}$$

$$e_x^o = \frac{T_x}{l_x} \tag{10}$$

$$ {}_np_x = \frac{{}_nL_x}{{}_nL_{x-n}} \tag{11}$$

$$ {}_\infty p_x = \frac{{}_\infty L_x}{\left({}_nL_{x-n} + {}_\infty L_x \right)} \tag{12}$$

All these functions are calculated for the poor population in Table 1. Column (10), in particular, represents the values in the subdiagonal of Leslie matrix **R.** It accounts for the reproduction and mobility, of the poor class. Again, some values are higher than one to reflect the entrance of individuals into the poor class at those ages. The entrance of individuals contributes to increase life expectancies to values that are much higher than they would be in the absence of social mobility. When social mobility is taken into account, life expectancy at birth shifts to 90.17 years. This value is almost 50 percent higher than the life expectancy of 60.93 years estimated in the absence of mobility reported in the last chapter.

Table 1. Life table for the poor population of Brazil corresponding to mortality and net mobility rates in 1980 and 1990 using the r-method: l0= 1,752,557

R-method

	$_nN_x$ (1980) (1)	$_nN_x$ (1990) (2)	$_nN_x$* (3)	$_nr_x$ (4)	S_x (5)	$_nL_x$ (6)	l_x (7)	T_x (8)	e_x (9)	$_np_x$ (10)
0	7,486,155	8,663,037	8,053,126	0.015	0.037	8,352,516	1,752,557	158,035,904	90.17	
5	7,075,275	8,938,082	7,952,320	0.023	0.131	9,069,321	1,742,184	149,683,388	85.92	1.086
10	6,051,245	8,190,257	7,039,975	0.030	0.266	9,181,011	1,825,033	140,614,067	77.05	1.012
15	3,979,415	5,901,452	4,846,063	0.039	0.440	7,522,402	1,670,341	131,433,056	78.69	0.819
20	2,396,900	4,250,221	3,191,764	0.057	0.681	6,309,189	1,383,159	123,910,654	89.59	0.839
25	2,170,915	3,820,620	2,879,973	0.057	0.966	7,566,488	1,387,568	117,601,465	84.75	1.199
30	2,147,125	3,468,164	2,728,843	0.048	1.227	9,309,317	1,687,580	110,034,977	65.20	1.230
35	1,977,920	2,981,957	2,428,595	0.041	1.450	10,349,709	1,965,903	100,725,660	51.24	1.112
40	1,677,740	2,446,579	2,026,012	0.038	1.647	10,513,488	2,086,320	90,375,951	43.32	1.016
45	1,173,935	1,872,958	1,482,812	0.047	1.858	9,503,216	2,001,670	79,862,463	39.90	0.904
50	931,155	1,511,877	1,186,504	0.048	2.096	9,647,136	1,915,035	70,359,247	36.74	1.015
55	686,990	1,189,421	903,947	0.055	2.354	9,516,828	1,916,396	60,712,111	31.68	0.986
60	544,360	1,005,328	739,771	0.061	2.645	10,414,727	1,993,155	51,195,284	25.69	1.094
65	502,030	815,921	640,013	0.049	2.919	11,859,732	2,227,446	40,780,557	18.31	1.139
70	332,555	560,997	431,929	0.052	3.172	10,299,161	2,215,889	28,920,825	13.05	0.868
75	200,345	381,727	276,545	0.064	3.463	8,829,239	1,912,840	18,621,664	9.74	0.857
80	131,990	327,696	207,973	0.091	3.852	9,792,424	1,862,166	9,792,424	5.26	0.526

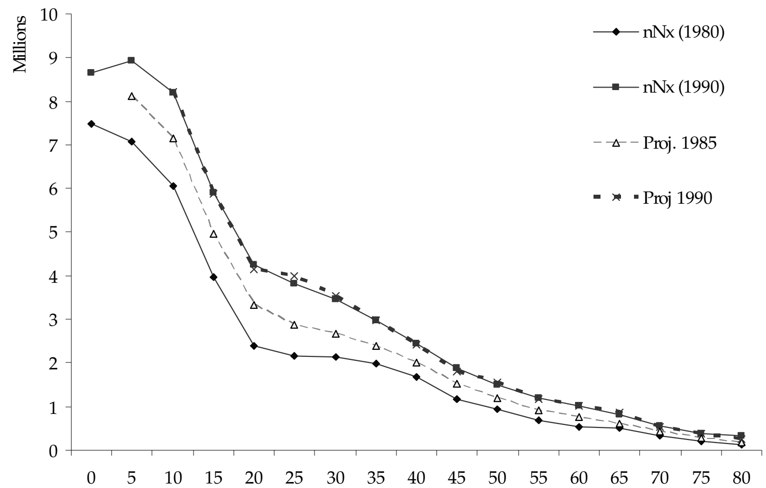
The values in column (10), when multiplied by the baseline population in 1980, provide the projected poor population in 1985. When this new projected population for 1985 is multiplied again for the respective survivorship ratio in column (10) it provides the projected population for 1990. For instance:

$$_n\Pr oj(t2)_x = {}_nN_{x-2n}(t1) \cdot {}_np_{x-n} \cdot {}_np_x \qquad (13)$$

Equation (13) shows how the number of people at age *x* in 1980 increased, or decreased, ten years later as a consequence of the combined effect of mortality and net mobility into that age group. Projected populations using the survivorship probabilities from column (10) are reported and plotted in table 3.2:

Table 2. Observed and projected poor populations resulting from the survivorship ratios estimated according to the r-method

	${}_nN_x$ (1980) (1)	${}_nN_x$ (1990) (2)	Proj. 1985 (11)	Proj 1990 (12)
0	7,486,155	8,663,037		
5	7,075,275	8,938,082	8,128,610	
10	6,051,245	8,190,257	7,162,408	8,228,715
15	3,979,415	5,901,452	4,958,049	5,868,473
20	2,396,900	4,250,221	3,337,615	4,158,414
25	2,170,915	3,820,620	2,874,556	4,002,737
30	2,147,125	3,468,164	2,670,953	3,536,667
35	1,977,920	2,981,957	2,387,084	2,969,454
40	1,677,740	2,446,579	2,009,219	2,424,858
45	1,173,935	1,872,958	1,516,521	1,816,148
50	931,155	1,511,877	1,191,714	1,539,488
55	686,990	1,189,421	918,577	1,175,616
60	544,360	1,005,328	751,807	1,005,244
65	502,030	815,921	619,888	856,117
70	332,555	560,997	435,970	538,320
75	200,345	381,727	285,092	373,747
80	131,990	327,696	174,762	241,820



The values in columns (12) and (2) are very similar to each other, but they are not identical. The similarity between projected and observed poor populations suggests that the values in column (10), in Table 1, are accurate enough to represent the joint effect of mortality and mobility on population growth. There is, however, an alternative method to generate survivorship probabilities that are even more precise and perhaps even simpler than the r-method. This alternative method consists in calculating a new set of life table functions, which in the case of five-year age groups can be defined as:

$$ {}_np_5{}^* = \frac{{}_nN_5{}^*}{{}_nN_{5-n}(t1)} \tag{14} $$

$$ {}_np_x{}^* = \frac{{}_nN_x(t2)}{{}_nN_{x-2n}(t1) \cdot {}_np_{x-n}{}^*} \forall x > 5 \tag{15} $$

$$ {}_\infty p_x{}^* = \frac{{}_\infty L_x^{NEW}}{\left({}_nL_{x-n}^{NEW} + {}_\infty L_x^{NEW}\right)} \tag{16} $$

Where:

$${}_nL_0^{NEW} = {}_nL_0 \text{ in Table 1 defined by the r-method} \quad (17)$$

$${}_nL_x^{NEW} = {}_np_x{}^{*} \cdot {}_nL_{x-n}^{NEW} \quad (18)$$

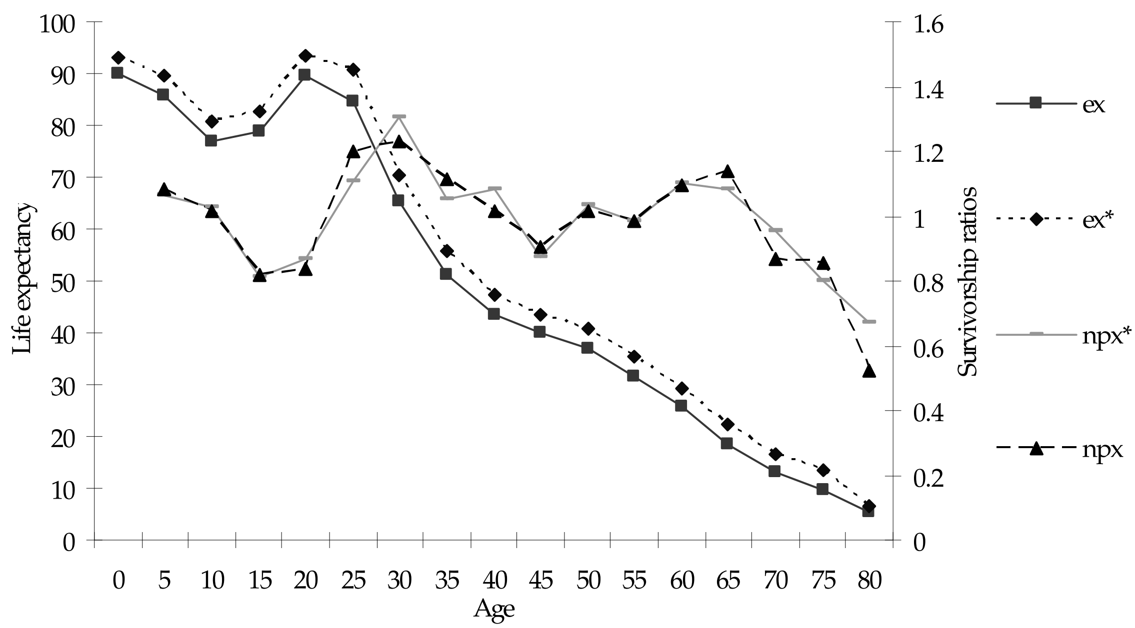
The function ${}_\infty L_x^{NEW}$ is defined through mathematical iterations to make projected and observed populations in t(2) to have the same size in the last age-group. The inputs and calculations of these functions for the Brazilian poor population using 1980 and 1990 censuses are in Table 3.

Table 3. Alternative life-table estimates providing identical observed and projected poor populations in 1990: l0= 1,752,557 and L0= 8,352,516

	${}_nN_x$ (1980) (1)	${}_nN_x$ (1990) (2)	${}_nN_x{}^*$ (3)	${}_np_x{}^*$ (13)	${}_nL_x{}^{NEW}$ (14)	$l_x{}^*$ (15)	$T_x{}^*$ (16)	$e_x{}^*$ (17)	Proj. 1985* (18)	Proj 1990* (19)
0	7,486,155	8,663,037	8,053,126		8,352,516	1,752,557	162,812,365	92.90		
5	7,075,275	8,938,082	7,952,320	**1.062**	8,872,629	1,722,515	154,459,849	89.67	7,952,320	
10	6,051,245	8,190,257	7,039,975	**1.030**	9,138,102	1,801,073	145,587,219	80.83	7,286,970	8,190,257
15	3,979,415	5,901,452	4,846,063	**0.810**	7,400,617	1,653,872	136,449,117	82.50	4,900,683	5,901,452
20	2,396,900	4,250,221	3,191,764	**0.867**	6,418,342	1,381,896	129,048,501	93.39	3,451,232	4,250,221
25	2,170,915	3,820,620	2,879,973	**1.107**	7,105,302	1,352,364	122,630,159	90.68	2,653,442	3,820,620
30	2,147,125	3,468,164	2,728,843	**1.307**	9,286,939	1,639,224	115,524,857	70.48	2,837,480	3,468,164
35	1,977,920	2,981,957	2,428,595	**1.051**	9,759,805	1,904,674	106,237,918	55.78	2,256,451	2,981,957
40	1,677,740	2,446,579	2,026,012	**1.084**	10,582,162	2,034,197	96,478,113	47.43	2,144,579	2,446,579
45	1,173,935	1,872,958	1,482,812	**0.873**	9,241,884	1,982,405	85,895,951	43.33	1,465,247	1,872,958
50	931,155	1,511,877	1,186,504	**1.032**	9,536,000	1,877,788	76,654,067	40.82	1,211,295	1,511,877
55	686,990	1,189,421	903,947	**0.982**	9,363,801	1,889,980	67,118,066	35.51	914,340	1,189,421
60	544,360	1,005,328	739,771	**1.100**	10,295,611	1,965,941	57,754,265	29.38	755,354	1,005,328
65	502,030	815,921	640,013	**1.080**	11,121,158	2,141,677	47,458,654	22.16	588,009	815,921
70	332,555	560,997	431,929	**0.954**	10,610,271	2,173,143	36,337,496	16.72	478,968	560,997
75	200,345	381,727	276,545	**0.797**	8,456,158	1,906,643	25,727,225	13.49	265,039	381,727
80	131,990	327,696	207,973	**0.671**	17,271,067	2,572,722	17,271,067	6.71	223,101	327,696

Table 3 shows that projected and recorded poor populations in 1990 are now identical. The survivorship ratios reported in column (13), when multiplied by the baseline population in column (1), produce a population that is equal in size to what was indeed observed in the census. The life expectancies using this alternative methodology are also slightly higher than what was reported in Table 1, using the r-method. For the sake of comparison, the graph below plots the life expectancies (columns 9 and 17) and the combined probability of surviving and moving in or out of the poor class between age x and x+n (columns 10 and 13) according to the two methodologies:

Graph 1. Life expectancies and survivorship ratios of the poor population between 1980 and 1990 according to the r-method and according to a more accurate methodology



Graph 1 confirms that both methodologies provide very similar life expectancies and survivorship ratios, but since ${}_np_x$* is more precise than ${}_np_x$ in terms of projection outcomes, in the following analyses I use ${}_np_x$* instead of the later. Life tables and projected populations for the middle and rich classes between 1980 and 2000 are in Appendix B.

RESULTS.

I introduce the main results in two sections. I first compare the fertility and survivorship ratios of the three classes with and without considering net mobility. This comparison gives a sense of how net mobility impacts the growth of income classes and how this impact has changed since 1980. In the second set of results I show how net mobility changes the net reproduction and intrinsic growth rates of income specific populations in each year. This analysis parallels the results presented in the last chapter but it incorporates the role of net mobility and how it affects population growth and distribution.

Fertility comparisons with and without mobility.

As described in the previous chapter, fertility rates were calculated using the average fertility resulting from the own children and Brass's P/F indirect methods. In this chapter, the assumption is that level and standard of fertility are the same for both cases, with and without mobility. The difference between these two scenarios lies in assumption regarding the number of births from the stationary population (l_0) in the preceding 5-year period that are entering in the projected population. According to Preston et al (2001: 122), the number of persons aged 0 to 4 at the end of the projection interval can be obtained by surviving the births through time t+5 following equation:

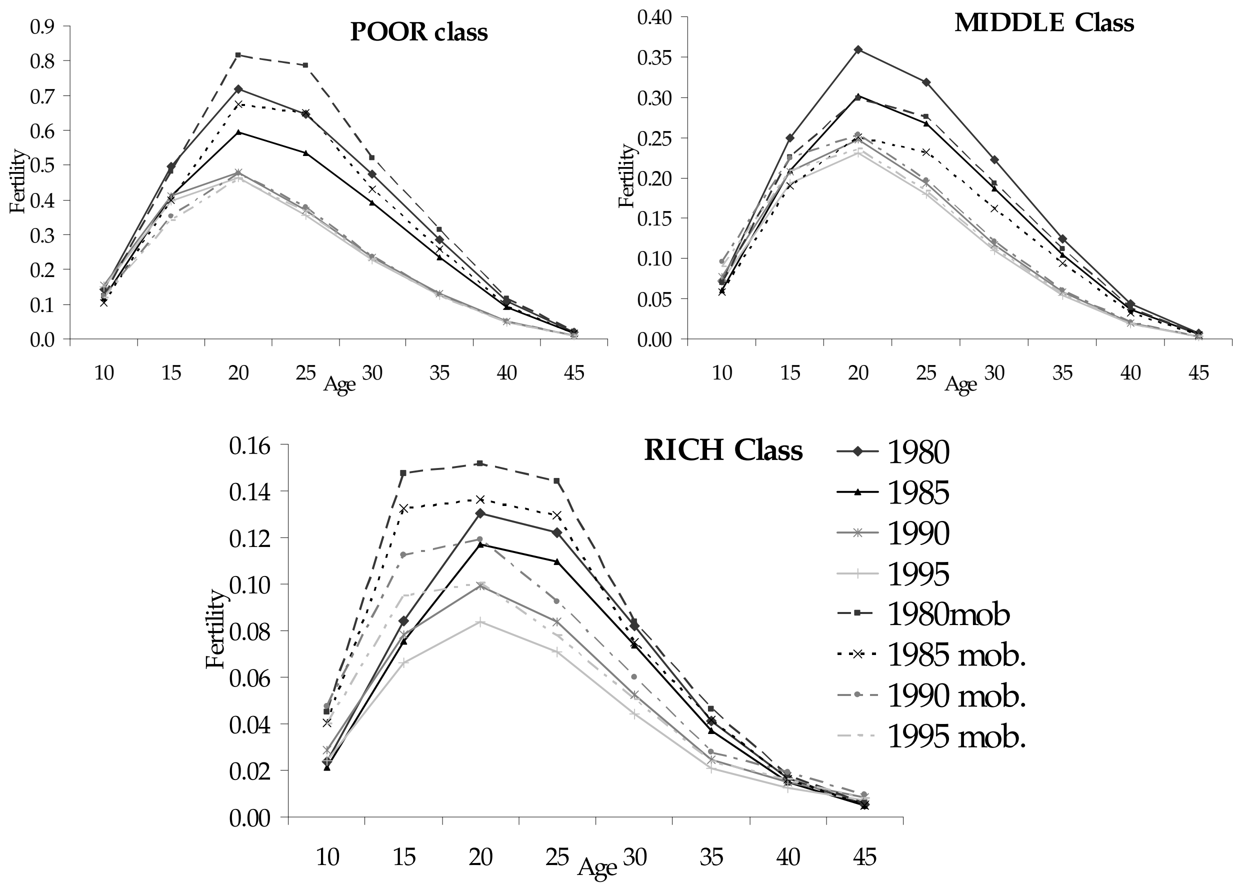
$$ {}_5N_0(t+5) = \frac{B[t,t+5]\cdot {}_5L_0}{5\cdot l_0} \qquad (19) $$

where $B[t, t+5]$ represents the total number of births in the population between times t and t+5.

Equation (19) shows that one way to "adjust" the number of individuals projected in the first age groups is to vary the number of births surviving into the future via l_0. When net mobility is not considered in survivorship ratios, the radix of the stationary population so far has always been equal to l_0= 100,000. In the scenarios with net mobility, however, the value of l_0 varies by year and income class to accommodate the number of births required to provide identical projected and observed populations[7]. Changing the value of the radix works as a "correction factor" for the number of births after including the migrants into the projection model. This correction can be understood as the impact that migrants have on the fertility of the population. The graphs below compares the entries in first row of matrices **S** and **R**, which respectively reflect fertility before and after the inclusion of net mobility in the Leslie matrices:

[7] The values of l_0 in the scenario with net mobility are calculated iteratively and are reported in Table 3 and in Appendix B.

Figure 4. Net fertility by income class and year, with and without net mobility



The traced lines in Figure 4 represent fertility levels between 1980 and 1995 incorporating the impact of net mobility and after discounting the influence of mortality (e.g. the first row of the Leslie matrices of each class). The three graphs in the figure have different scales to emphasize and facilitate the visualization of the differences in fertility with and without considering net mobility. The overall result is that the rise and fall of fertility follows the pattern of net mobility in the 1980s and 1990s. Net fertility is higher than previously estimated values when net mobility is positive and lower when it is negative.

In the 1980s, a period of intense downward mobility to the poor class, fertility rates after considering mobility were higher than in the previous chapter, where fertility is estimated without considering the impact of net mobility. At the end of the 1980s, after considering mobility the projected number of births contributing to population growth in the poor class was about nine percent higher than in the scenario without mobility. In the 1990s, this dynamic was the opposite since there were more individuals leaving than entering into the poor class. As a result, the net fertility of the poor class was slightly lower than in the case without mobility. The projected number of births in the 1990s, after considering the exits of the poor class, was 81 percent of the total number of births in the scenario without mobility.

In the rich class the impact of net mobility on fertility was even more eminent. The graph of the rich class in Figure 4 shows that the fertility of the rich population is clearly higher once mobility is considered. Because the rich class received migrants from other classes during all years, its net fertility is clearly higher after incorporating migrants' births. In 1990, there were 52 percent more births in the projected rich population with mobility than in the projection without. In 2000 this figure was similar, shifting to 48 percent.

Mortality comparisons with and without mobility.

Mortality is examined by comparing two indicators: survivorship ratios and life expectancies. Comparing survivorships with and without net mobility will indicate at which age groups mobility is more, or less, prevalent for each income class. The other indicator, life expectancy, will show how much longer one would, on average, expect to live if patterns of mortality and net mobility were to remain constant over the life cycle. I borrow the class specific mortality estimates from the previous chapter and compare them to what would be observed had net mobility been considered.

Figure 5. Survivorship ratios by income class, Brazil, 1980s and 1990s

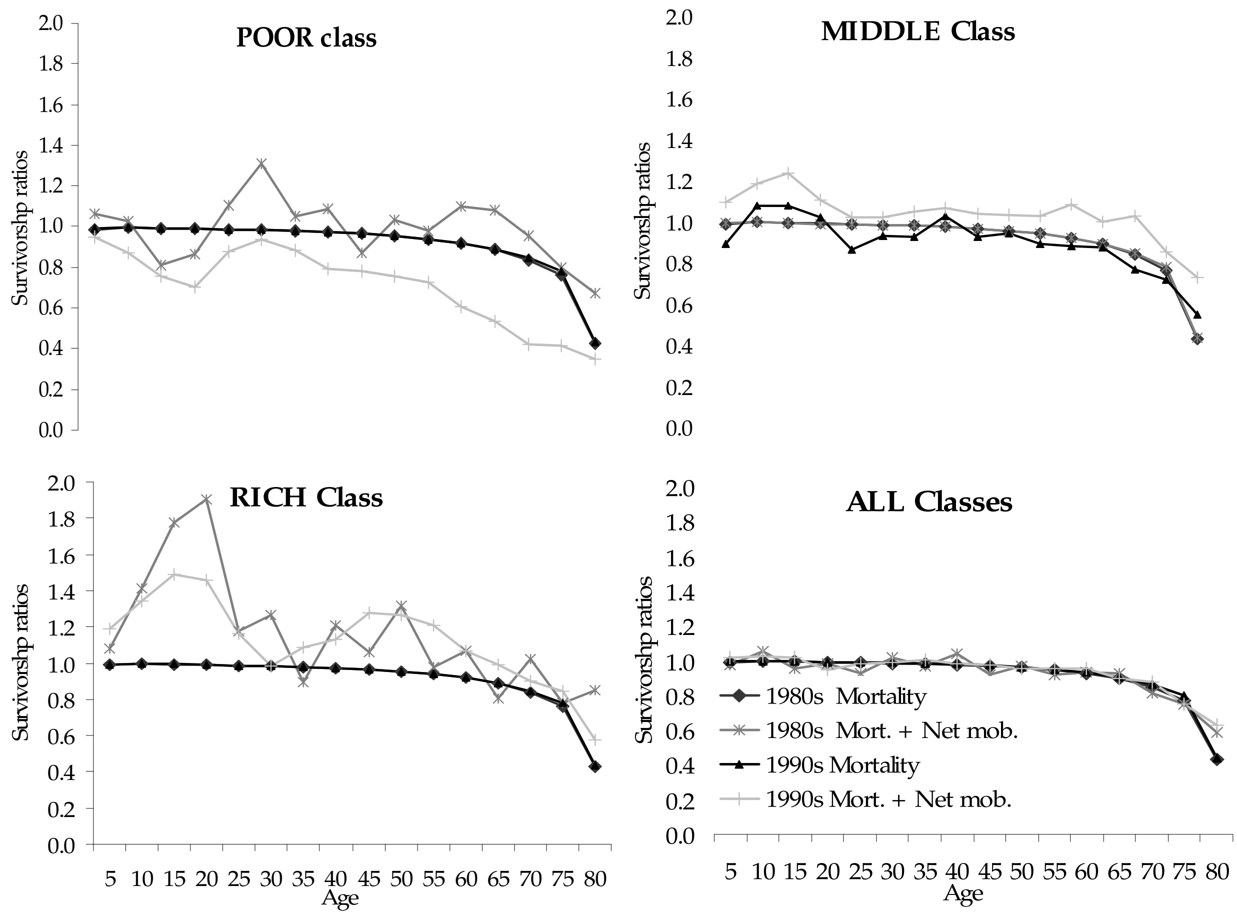


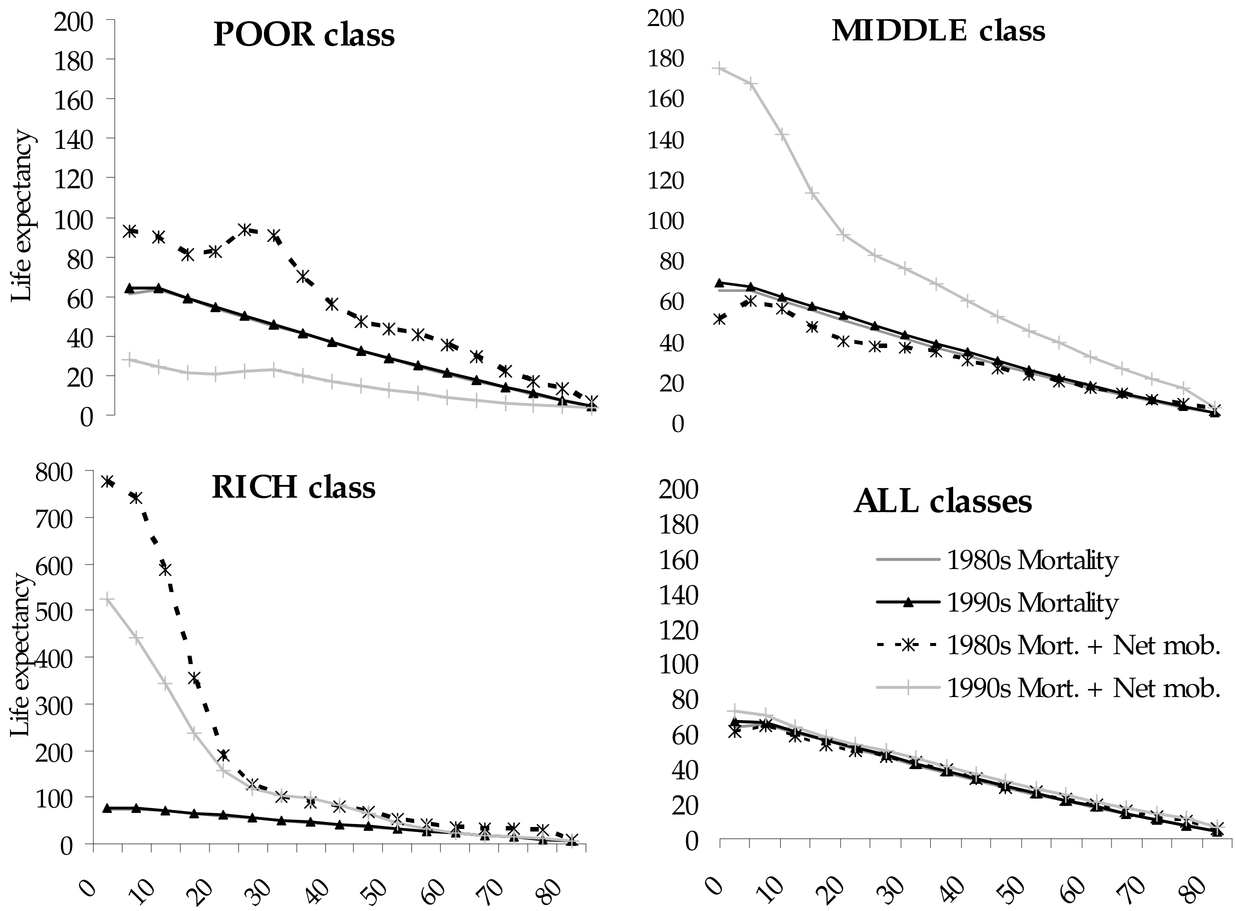
Figure 5 plots the survivorship ratios of each income class. The entries in the graphs correspond to the subdiagonal of matrices **R** (mortality plus net mobility) and **S** (only mortality). The graphs show the age pattern of net mobility in each income class. Values below one imply in exit from that class through death or mobility, and values above one correspond to ages where the flow of migrants from other classes was positive. The first thing to notice is that the curves have similar patterns by age, but different levels.

The net mobility standard of the poor class shows that the peak of entrance into that same group happened in the 1980s at ages 25 and 60. Yet, during the 1990s there was a reversal in this flow and the exit from the poor class could be perceived at all ages, but it was particularly high after ages 50 and above. The counterpart of this exit of the poor class is reflected by the entrance into the middle class, where survivorship was higher than one at all ages during the 1990s. The rich class had entrants during both decades, but the proportion of people moving into the rich class was particularly marked during the first phase of the life cycle, between ages 5 and 20. It is also worth noticing that mobility has its most obvious impact on the growth of the rich class, where the discrepancy between the survivorship curves is most evident. Finally, the small differences in the curves with and without net mobility, in the lower right graph (e.g. ALL Classes), are attributable to international migration.

Another way of measuring the effect of net mobility on survival is to compare "life expectancies". Life expectancies after mobility indicate the average duration in a certain income class if mobility and mortality patters were to remain indefinitely constant in a synthetic cohort. The cautionary tale is that positive net mobility generates biologically impossible "life expectancies". Values higher than 100 years are obviously hypothetical and unrealistic, but they are useful to signalize the relative impact of mobility in comparison to scenarios where mortality is the only source of decrement. Figure 6 plots life expectancies of income classes in the 1980s and 1990s with and without considering the impact of net mobility.

Figure 6 shows that positive net mobility in the 1980s contributed to increase the average duration of years spent in the poor and in the rich classes, especially before age 30. The middle and rich classes received all the migrants who left the middle class during the 1980s. In the 1990s, however, because of upward mobility from the poor to the middle class, life expectancies increased significantly in the middle class, especially before age 30.

Figure 6. Life expectancies by income class, Brazil, 1980s and 1990s



Net reproduction and intrinsic growth rates under the influence of mobility.

This section describes how poor, middle and rich classes have grown and reproduced after considering the joint effect of fertility, mortality and net mobility. Table 4 shows how the population dynamics of each income class changes after including net mobility in the calculations of period measures of reproduction and stable growth.

In terms of reproduction, Table 4 indicates that net mobility had two effects over time. In the 1980s, as noticed before, it contributed to reinforce the growth of the poor and rich classes. Net mobility increased the net reproduction rate (NRR) of the poor by about 8 percent and the

NRR of the rich by 560 percent in relation to the scenario where only fertility and mortality are considered. Net mobility to the rich class reversed the NRR from .49 to 3.28, which indicates that the reason why the rich class is not following a path of extinction is because of upward mobility from other classes. For the middle class, net mobility helped to decrease the NRR from 1.34 to 1.15 and to bring this class closer to replacement.

In the 1990s, net mobility reversed all the period indicators discussed in the last chapter. On the one hand, the massive exit from the poor class reduced the net reproduction of this class by 72 percent between 1980 and 1990, from 2.97 to .82. On the other hand, the entrance of individuals into the middle and rich classes increased their growth and reversed their NRR to values above replacement. The NRR of the middle class shifted from .90 to 1.67, and the NRR of the rich class shifted from .39 to 1.64 daughters for every rich woman after considering net mobility. This shift is also reflected in the crude rate of natural increase (CRNI), which increased from .0015 to .0349 in the rich class.

Table 4. Comparison between observed and stable-equivalent population parameters under two scenarios: with and without considering the influence of net mobility

WITHOUT CONSIDERING NET MOBILITY

Year, Social Class	*NRR*	Intrinsic rates			Crude rates		
		r	*b*	*d*	*CRNI*	*CBR*	*CDR*
1980							
Poor	2.7583	0.0366	0.0462	0.0096	0.0283	0.0385	0.0102
Middle	1.3476	0.0107	0.0223	0.0116	0.0179	0.0266	0.0087
Rich	0.4973	-0.0239	0.0042	0.0281	0.0050	0.0102	0.0053
1990							
Poor	1.7729	0.0217	0.0310	0.0093	0.0202	0.0288	0.0086
Middle	0.9035	-0.0038	0.0126	0.0163	0.0101	0.0180	0.0079
Rich	0.3863	-0.0329	0.0024	0.0353	0.0015	0.0078	0.0063

CONSIDERING NET MOBILITY

Year, Social Class	*NRR*	Intrinsic rates			Crude rates		
		r	*b*	*d*	*CRNI*	*CBR*	*CDR*
1980							
Poor	2.9730	0.0377	0.0399	0.0022	0.0370	0.0385	0.0015
Middle	1.1511	0.0051	0.0233	0.0182	0.0125	0.0266	0.0141
Rich	3.2843	0.0406	0.0098	-0.031	0.0501	0.0102	-0.040
1990							
Poor	0.8167	-0.0079	0.0303	0.0382	-0.012	0.0288	0.0413
Middle	1.6700	0.0192	0.0137	-0.005	0.0325	0.0180	-0.014
Rich	1.6386	0.0171	0.0046	-0.012	0.0349	0.0078	-0.027

The impact of net mobility on future growth can be inferred by examining intrinsic rates. The trends in Table 4 show that if fertility, mortality and net mobility remained constant for a very long time, the poor class would decrease, while the middle and rich classes would increase. Between 1980 and 1990 the rhythm of growth of the middle class increased; the rhythm of the rich decreased, but remained positive; and the rhythm of growth of the poor became negative in the 1990s.

The influence of mobility on the reproduction of poverty was pervasive in the 1980s and 1990s, but it had opposite effects during these two periods. In the first period it helped to increase poverty, but in the second it acted on the opposite direction, contributing to alleviate poverty and its reproduction. Net mobility was particularly important in the reproduction of the rich class, but since this class accounts for only about one percent of the population its overall influence is not so important to one concerned with absolute numbers.

SUMMARY AND CONCLUSION.

This chapter showed how to measure the influence of net mobility on fertility, mortality and growth of specific income classes using Brazilian census data. Two questions guided this chapter. The first asked how one can measure intragenerational flows of net mobility in the absence of longitudinal or retrospective information. The solution I offered is based on a variation of the r-method using intercensal survivorship. Survivorship ratios estimated according to this variation incorporate the joint effect of mortality and net mobility, but they also present a "correction" for the number of expected births in the presence of mobility.

One important methodological contribution of this chapter is to show how life tables estimated with different methodologies (with and without net mobility) provide different projected population sizes and age structures. In particular, it advances our knowledge of projection methods by describing how the future growth and distribution of subpopulations may differ under scenarios with and without net mobility. The behavior of net mobility is hard to predict because it depends on market forces and other trends that are not intuitive and easy to estimate, but the results of this chapter signalize that the curves of net mobility have a similar age pattern in each class, despite their differences in levels over time. If these patterns turn out to be an empirical regularity rather than a data coincidence, they could be estimated and incorporated into future population projections by income level. More data and further empirical validations considering other time periods would, however, be required before making final assertions on this matter.

The second goal of this chapter was to demonstrate how net mobility affects the reproduction of poverty in comparison to a scenario where only fertility and mortality are considered. The results show that the impact of net mobility depends on the period of analysis. In the 1980s, Brazil was plagued by economic crisis and very high inflation. During this period the average time spent in poverty would be 59.5 years if mortality was the only factor contributing to this figure. After considering the entrance of movers to the poor class, however, the number of years spent in poverty would increase to 92.9 if mortality and mobility conditions were to remains the same over the life cycle. In the 1990s, a period marked by considerable economic improvements and social upward mobility from the poor class, the "life expectancy" in poverty shifted from 62.6 to 27.8 years, before and after considering net mobility.

The mobility dynamics of the poor, middle and rich classes between 1980 and 2000 also altered the speed of reproduction of these groups. The average number of daughters being "born" in the poor class in 1980 shifted from 2.76 to 2.97 due to positive mobility. In 1990, however, the net reproduction of the poor declined from 1.77 to .82 after considering the exit of individuals of that class.

The period indicators reported in this chapter (NRR, e_0) are useful to predict and understand what would happen to poverty and to the size and distribution of other economic classes if demographic circumstances were to remain stable over time. When mortality, fertility and mobility conditions change, however, little can be said about what will happen. One way to address this problem is to produce "what if" scenarios.

The results presented in this and in the previous chapters set an empirical base to experiment and conduct counterfactual analysis dealing with different scenarios. In the next chapter I investigate the possible paths that poverty and inequality would follow had the demographic terms been different.

Appendix A. Leslie matrices with and without net mobility, baseline and projected populations by income class and year

- Projection models for the Brazilian **poor**, **1980-1985**

Matrix including fertility and mortality

w^{t+5}_{POOR}* Poor[1985]										S_{POOR}									w^{t}_{POOR} Poor[1980]
7,760,538		0	0	0.14	0.50	0.72	0.65	0.47	0.28	0.11	0.02	0	0	0	0	0	0	0	7,486,155
7,396,204		0.99	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7,075,275
7,043,996		0	1.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6,051,245
6,012,191		0	0	0.99	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3,979,415
3,936,405		0	0	0	0.99	0	0	0	0	0	0	0	0	0	0	0	0	0	2,396,900
2,362,833		0	0	0	0	0.99	0	0	0	0	0	0	0	0	0	0	0	0	2,170,915
2,133,777		0	0	0	0	0	0.98	0	0	0	0	0	0	0	0	0	0	0	2,147,125
2,101,456		0	0	0	0	0	0	0.98	0	0	0	0	0	0	0	0	0	0	1,977,920
1,924,381	=	0	0	0	0	0	0	0	0.97	0	0	0	0	0	0	0	0	0	1,677,740
1,618,401		0	0	0	0	0	0	0	0	0.96	0	0	0	0	0	0	0	0	1,173,935
1,119,114		0	0	0	0	0	0	0	0	0	0.95	0	0	0	0	0	0	0	931,155
873,685		0	0	0	0	0	0	0	0	0	0	0.94	0	0	0	0	0	0	686,990
630,254		0	0	0	0	0	0	0	0	0	0	0	0.92	0	0	0	0	0	544,360
483,437		0	0	0	0	0	0	0	0	0	0	0	0	0.89	0	0	0	0	502,030
420,402		0	0	0	0	0	0	0	0	0	0	0	0	0	0.84	0	0	0	332,555
252,756		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.76	0	0	200,345
141,623		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.43	0.43	131,990

Matrix including fertility and (mortality+ net mobility)

w^{t+5}_{POOR} Poor[1985]										$R_1 = S_1 + M_1$									w^{t}_{1} Poor[1980]
8,288,408		0	0	0.12	0.48	0.81	0.79	0.52	0.31	0.12	0.02	0	0	0	0	0	0	0	7,486,155
7,952,320		1.06	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7,075,275
7,286,970		0	1.03	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6,051,245
4,900,683		0	0	0.81	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3,979,415
3,451,232		0	0	0	0.87	0	0	0	0	0	0	0	0	0	0	0	0	0	2,396,900
2,653,442		0	0	0	0	1.11	0	0	0	0	0	0	0	0	0	0	0	0	2,170,915
2,837,480		0	0	0	0	0	1.31	0	0	0	0	0	0	0	0	0	0	0	2,147,125
2,256,451		0	0	0	0	0	0	1.05	0	0	0	0	0	0	0	0	0	0	1,977,920
2,144,579	=	0	0	0	0	0	0	0	1.08	0	0	0	0	0	0	0	0	0	1,677,740
1,465,247		0	0	0	0	0	0	0	0	0.87	0	0	0	0	0	0	0	0	1,173,935
1,211,295		0	0	0	0	0	0	0	0	0	1.03	0	0	0	0	0	0	0	931,155
914,340		0	0	0	0	0	0	0	0	0	0	0.98	0	0	0	0	0	0	686,990
755,354		0	0	0	0	0	0	0	0	0	0	0	1.10	0	0	0	0	0	544,360
588,009		0	0	0	0	0	0	0	0	0	0	0	0	1.08	0	0	0	0	502,030
478,968		0	0	0	0	0	0	0	0	0	0	0	0	0	0.95	0	0	0	332,555
265,039		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.80	0	0	200,345
223,101		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.67	0.67	131,990

Appendix A. Cont'd.

- Projection models for the Brazilian **poor**, **1990-1995**

Matrix including fertility and mortality

w^{t+5}_{POOR}* Poor[1995]		S_POOR																	w^{t}_{POOR} Poor[1990]
8,490,708		0	0	**0.16**	**0.41**	**0.48**	**0.37**	**0.23**	**0.13**	**0.05**	**0.01**	0	0	0	0	0	0	0	8,663,037
8,606,705		**0.99**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8,938,082
8,907,027		0	**1.00**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8,190,257
8,138,694		0	0	**0.99**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5,901,452
5,834,772		0	0	0	**0.99**	0	0	0	0	0	0	0	0	0	0	0	0	0	4,250,221
4,187,988		0	0	0	0	**0.99**	0	0	0	0	0	0	0	0	0	0	0	0	3,820,620
3,755,289		0	0	0	0	0	**0.98**	0	0	0	0	0	0	0	0	0	0	0	3,468,164
3,397,077		0	0	0	0	0	0	**0.98**	0	0	0	0	0	0	0	0	0	0	2,981,957
2,904,756	=	0	0	0	0	0	0	0	**0.97**	0	0	0	0	0	0	0	0	0	2,446,579
2,362,948		0	0	0	0	0	0	0	0	**0.97**	0	0	0	0	0	0	0	0	1,872,958
1,787,476		0	0	0	0	0	0	0	0	0	**0.95**	0	0	0	0	0	0	0	1,511,877
1,419,355		0	0	0	0	0	0	0	0	0	0	**0.94**	0	0	0	0	0	0	1,189,421
1,091,616		0	0	0	0	0	0	0	0	0	0	0	**0.92**	0	0	0	0	0	1,005,328
893,265		0	0	0	0	0	0	0	0	0	0	0	0	**0.89**	0	0	0	0	815,921
688,562		0	0	0	0	0	0	0	0	0	0	0	0	0	**0.84**	0	0	0	560,997
436,350		0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0.78**	0	0	381,727
307,311		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0.43**	**0.43**	327,696

Matrix including fertility and (mortality+ net mobility)

w^{t+5}_{POOR} Poor[1995]		$R_1 = S_1 + M_1$																	w^{t}_{1} Poor[1990]
7,919,805		0	0	**0.12**	**0.35**	**0.48**	**0.38**	**0.24**	**0.13**	**0.05**	**0.01**	0	0	0	0	0	0	0	8,663,037
8,219,369		**0.95**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8,938,082
7,782,508		0	**0.87**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8,190,257
6,196,793		0	0	**0.76**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5,901,452
4,131,674		0	0	0	**0.70**	0	0	0	0	0	0	0	0	0	0	0	0	0	4,250,221
3,716,587		0	0	0	0	**0.87**	0	0	0	0	0	0	0	0	0	0	0	0	3,820,620
3,574,909		0	0	0	0	0	**0.94**	0	0	0	0	0	0	0	0	0	0	0	3,468,164
3,055,618		0	0	0	0	0	0	**0.88**	0	0	0	0	0	0	0	0	0	0	2,981,957
2,367,690	=	0	0	0	0	0	0	0	**0.79**	0	0	0	0	0	0	0	0	0	2,446,579
1,916,070		0	0	0	0	0	0	0	0	**0.78**	0	0	0	0	0	0	0	0	1,872,958
1,415,786		0	0	0	0	0	0	0	0	0	**0.76**	0	0	0	0	0	0	0	1,511,877
1,101,334		0	0	0	0	0	0	0	0	0	0	**0.73**	0	0	0	0	0	0	1,189,421
719,852		0	0	0	0	0	0	0	0	0	0	0	**0.61**	0	0	0	0	0	1,005,328
536,197		0	0	0	0	0	0	0	0	0	0	0	0	**0.53**	0	0	0	0	815,921
341,980		0	0	0	0	0	0	0	0	0	0	0	0	0	**0.42**	0	0	0	560,997
233,640		0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0.42**	0	0	381,727
245,087		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0.35**	**0.35**	327,696

Appendix A. Cont'd.

- Projection models for the Brazilian **poor**, **1995-2000**

Matrix including fertility and mortality

age	w^{t+10}_{POOR}* Poor[2000]		S_{POOR}																	w^{t+5}_{POOR} Poor[1995]
0	10,212,182		0	0	**0.15**	**0.40**	**0.46**	**0.36**	**0.23**	**0.13**	**0.05**	**0.01**	0	0	0	0	0	0	0	8,490,708
5	8,435,497		**0.99**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8,606,705
10	8,576,801		0	**1.00**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8,907,027
15	8,850,951		0	0	**0.99**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8,138,694
20	8,046,735		0	0	0	**0.99**	0	0	0	0	0	0	0	0	0	0	0	0	0	5,834,772
25	5,749,337		0	0	0	0	**0.99**	0	0	0	0	0	0	0	0	0	0	0	0	4,187,988
30	4,116,375		0	0	0	0	0	**0.98**	0	0	0	0	0	0	0	0	0	0	0	3,755,289
35	3,678,317		0	0	0	0	0	0	**0.98**	0	0	0	0	0	0	0	0	0	0	3,397,077
40	3,309,129	=	0	0	0	0	0	0	0	**0.97**	0	0	0	0	0	0	0	0	0	2,904,756
45	2,805,463		0	0	0	0	0	0	0	0	**0.97**	0	0	0	0	0	0	0	0	2,362,948
50	2,255,104		0	0	0	0	0	0	0	0	0	**0.95**	0	0	0	0	0	0	0	1,787,476
55	1,678,089		0	0	0	0	0	0	0	0	0	0	**0.94**	0	0	0	0	0	0	1,419,355
60	1,302,643		0	0	0	0	0	0	0	0	0	0	0	**0.92**	0	0	0	0	0	1,091,616
65	969,934		0	0	0	0	0	0	0	0	0	0	0	0	**0.89**	0	0	0	0	893,265
70	753,833		0	0	0	0	0	0	0	0	0	0	0	0	0	**0.84**	0	0	0	688,562
75	535,571		0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0.78**	0	0	436,350
80+	322,143		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0.43**	**0.43**	307,311

Matrix including fertility and (mortality+ net mobility)

age	w^{t+10}_{POOR} Poor[2000]		$R_{POOR} = S_{POOR} + M_{POOR}$																	w^{t+5}_{POOR} Poor[1995]
0	7,642,956		0	0	**0.12**	**0.34**	**0.46**	**0.37**	**0.23**	**0.12**	**0.05**	**0.01**	0	0	0	0	0	0	0	7,919,805
5	7,514,200		**0.95**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8,219,369
10	7,156,714		0	**0.87**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7,782,508
15	5,888,288		0	0	**0.76**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6,196,793
20	4,338,445		0	0	0	**0.70**	0	0	0	0	0	0	0	0	0	0	0	0	0	4,131,674
25	3,612,924		0	0	0	0	**0.87**	0	0	0	0	0	0	0	0	0	0	0	0	3,716,587
30	3,477,567		0	0	0	0	0	**0.94**	0	0	0	0	0	0	0	0	0	0	0	3,574,909
35	3,149,666		0	0	0	0	0	0	**0.88**	0	0	0	0	0	0	0	0	0	0	3,055,618
40	2,426,178	=	0	0	0	0	0	0	0	**0.79**	0	0	0	0	0	0	0	0	0	2,367,690
45	1,854,287		0	0	0	0	0	0	0	0	**0.78**	0	0	0	0	0	0	0	0	1,916,070
50	1,448,374		0	0	0	0	0	0	0	0	0	**0.76**	0	0	0	0	0	0	0	1,415,786
55	1,031,336		0	0	0	0	0	0	0	0	0	0	**0.73**	0	0	0	0	0	0	1,101,334
60	666,541		0	0	0	0	0	0	0	0	0	0	0	**0.61**	0	0	0	0	0	719,852
65	383,937		0	0	0	0	0	0	0	0	0	0	0	0	**0.53**	0	0	0	0	536,197
70	224,738		0	0	0	0	0	0	0	0	0	0	0	0	0	**0.42**	0	0	0	341,980
75	142,425		0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0.42**	0	0	233,640
80+	165,387		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0.35**	**0.35**	245,087

Appendix A. Cont'd.

- Projection models for the Brazilian **middle**, **1980-1985**

Matrix including fertility and mortality

S_{MIDDLE}

w^{t+5}_{MIDDLE}* Middle[1985]																			**w^{t}_{MIDDLE} Middle[1980]**
10,221,261		0	0	**0.07**	**0.25**	**0.36**	**0.32**	**0.22**	**0.12**	**0.04**	**0.01**	0	0	0	0	0	0	0	8,813,965
8,737,159		**0.99**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7,595,495
7,570,137		0	**1.00**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8,091,295
8,051,852		0	0	**1.00**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9,403,650
9,326,008		0	0	0	**0.99**	0	0	0	0	0	0	0	0	0	0	0	0	0	8,797,045
8,699,542		0	0	0	0	**0.99**	0	0	0	0	0	0	0	0	0	0	0	0	6,988,560
6,892,916		0	0	0	0	0	**0.99**	0	0	0	0	0	0	0	0	0	0	0	5,314,115
5,221,001		0	0	0	0	0	0	**0.98**	0	0	0	0	0	0	0	0	0	0	4,240,290
4,142,783	=	0	0	0	0	0	0	0	**0.98**	0	0	0	0	0	0	0	0	0	3,938,250
3,815,833		0	0	0	0	0	0	0	0	**0.97**	0	0	0	0	0	0	0	0	3,392,195
3,247,685		0	0	0	0	0	0	0	0	0	**0.96**	0	0	0	0	0	0	0	3,053,805
2,874,458		0	0	0	0	0	0	0	0	0	0	**0.94**	0	0	0	0	0	0	2,346,940
2,153,868		0	0	0	0	0	0	0	0	0	0	0	**0.92**	0	0	0	0	0	1,808,335
1,597,177		0	0	0	0	0	0	0	0	0	0	0	0	**0.88**	0	0	0	0	1,464,795
1,205,027		0	0	0	0	0	0	0	0	0	0	0	0	0	**0.82**	0	0	0	947,850
691,371		0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0.73**	0	0	601,880
429,896		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0.42**	**0.42**	429,925

Matrix including fertility and (mortality+ net mobility)

$R_{MIDDLE} = S_{MIDDLE} + M_{MIDDLE}$

w^{t+5}_{MIDDLE} Middle[1985]																			**w^{t}_{MIDDLE} Middle[1980]**
8,921,968		0	0	**0.07**	**0.23**	**0.30**	**0.28**	**0.19**	**0.11**	**0.04**	**0.01**	0	0	0	0	0	0	0	8,813,965
7,868,118		**0.89**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7,595,495
8,187,515		0	**1.08**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8,091,295
8,704,785		0	0	**1.08**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9,403,650
9,576,799		0	0	0	**1.02**	0	0	0	0	0	0	0	0	0	0	0	0	0	8,797,045
7,564,913		0	0	0	0	**0.86**	0	0	0	0	0	0	0	0	0	0	0	0	6,988,560
6,487,274		0	0	0	0	0	**0.93**	0	0	0	0	0	0	0	0	0	0	0	5,314,115
4,900,189		0	0	0	0	0	0	**0.92**	0	0	0	0	0	0	0	0	0	0	4,240,290
4,344,099	=	0	0	0	0	0	0	0	**1.02**	0	0	0	0	0	0	0	0	0	3,938,250
3,637,747		0	0	0	0	0	0	0	0	**0.92**	0	0	0	0	0	0	0	0	3,392,195
3,187,444		0	0	0	0	0	0	0	0	0	**0.94**	0	0	0	0	0	0	0	3,053,805
2,713,292		0	0	0	0	0	0	0	0	0	0	**0.89**	0	0	0	0	0	0	2,346,940
2,069,175		0	0	0	0	0	0	0	0	0	0	0	**0.88**	0	0	0	0	0	1,808,335
1,580,193		0	0	0	0	0	0	0	0	0	0	0	0	**0.87**	0	0	0	0	1,464,795
1,125,341		0	0	0	0	0	0	0	0	0	0	0	0	0	**0.77**	0	0	0	947,850
677,468		0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0.71**	0	0	601,880
563,874		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0.55**	**0.55**	429,925

Appendix A. Cont'd.

- Projection models for the Brazilian **middle**, **1985-1990**

Matrix including fertility and mortality

age	w^{t+10}_{MIDDLE}* Middle[1990]										S_{MIDDLE}									w^{t+5}_{MIDDLE} Middle[1985]
0	9,288,085		0	0	**0.06**	**0.21**	**0.30**	**0.27**	**0.19**	**0.10**	**0.04**	**0.01**	0	0	0	0	0	0	0	10,221,261
5	10,132,192		**0.99**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8,737,159
10	8,707,989		0	**1.00**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7,570,137
15	7,533,234		0	0	**1.00**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8,051,852
20	7,985,371		0	0	0	**0.99**	0	0	0	0	0	0	0	0	0	0	0	0	0	9,326,008
25	9,222,642		0	0	0	0	**0.99**	0	0	0	0	0	0	0	0	0	0	0	0	8,699,542
30	8,580,482		0	0	0	0	0	**0.99**	0	0	0	0	0	0	0	0	0	0	0	6,892,916
35	6,772,137		0	0	0	0	0	0	**0.98**	0	0	0	0	0	0	0	0	0	0	5,221,001
40	5,100,942	=	0	0	0	0	0	0	0	**0.98**	0	0	0	0	0	0	0	0	0	4,142,783
45	4,014,008		0	0	0	0	0	0	0	0	**0.97**	0	0	0	0	0	0	0	0	3,815,833
50	3,653,275		0	0	0	0	0	0	0	0	0	**0.96**	0	0	0	0	0	0	0	3,247,685
55	3,056,952		0	0	0	0	0	0	0	0	0	0	**0.94**	0	0	0	0	0	0	2,874,458
60	2,637,989		0	0	0	0	0	0	0	0	0	0	0	**0.92**	0	0	0	0	0	2,153,868
65	1,902,362		0	0	0	0	0	0	0	0	0	0	0	0	**0.88**	0	0	0	0	1,597,177
70	1,313,932		0	0	0	0	0	0	0	0	0	0	0	0	0	**0.82**	0	0	0	1,205,027
75	878,958		0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0.73**	0	0	691,371
80+	467,171		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0.42**	**0.42**	429,896

Matrix including fertility and (mortality+ net mobility)

age	w^{t+10}_{MIDDLE} Middle[1990]										$R_{MIDDLE} = S_{MIDDLE} + M_{MIDDLE}$									w^{t+5}_{MIDDLE} Middle[1985]
0	7,957,685		0	0	**0.06**	**0.19**	**0.25**	**0.23**	**0.16**	**0.09**	**0.03**	**0.01**	0	0	0	0	0	0	0	8,921,968
5	7,964,530		**0.89**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7,868,118
10	8,481,387		0	**1.08**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8,187,515
15	8,808,301		0	0	**1.08**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8,704,785
20	8,865,066		0	0	0	**1.02**	0	0	0	0	0	0	0	0	0	0	0	0	0	9,576,799
25	8,235,452		0	0	0	0	**0.86**	0	0	0	0	0	0	0	0	0	0	0	0	7,564,913
30	7,022,285		0	0	0	0	0	**0.93**	0	0	0	0	0	0	0	0	0	0	0	6,487,274
35	5,981,968		0	0	0	0	0	0	**0.92**	0	0	0	0	0	0	0	0	0	0	4,900,189
40	5,020,153	=	0	0	0	0	0	0	0	**1.02**	0	0	0	0	0	0	0	0	0	4,344,099
45	4,012,628		0	0	0	0	0	0	0	0	**0.92**	0	0	0	0	0	0	0	0	3,637,747
50	3,418,176		0	0	0	0	0	0	0	0	0	**0.94**	0	0	0	0	0	0	0	3,187,444
55	2,832,030		0	0	0	0	0	0	0	0	0	0	**0.89**	0	0	0	0	0	0	2,713,292
60	2,392,168		0	0	0	0	0	0	0	0	0	0	0	**0.88**	0	0	0	0	0	2,069,175
65	1,808,125		0	0	0	0	0	0	0	0	0	0	0	0	**0.87**	0	0	0	0	1,580,193
70	1,213,997		0	0	0	0	0	0	0	0	0	0	0	0	0	**0.77**	0	0	0	1,125,341
75	804,328		0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0.71**	0	0	677,468
80+	678,384		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0.55**	**0.55**	563,874

Appendix A. Cont'd.

- Projection models for the Brazilian **middle**, **1990-1995**

Matrix including fertility and mortality

w^{t+5}_{MIDDLE}* Middle^{1995}		S_{MIDDLE}																	w^{t}_{MIDDLE} Middle^{1990}
7,556,157		0	0	0.08	0.21	0.25	0.19	0.12	0.06	0.02	0.00	0	0	0	0	0	0	0	7,771,690
7,739,786		0.996	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8,150,525
8,132,761		0	0.998	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8,481,387
8,447,724		0	0	0.996	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8,808,301
8,744,711		0	0	0	0.99	0	0	0	0	0	0	0	0	0	0	0	0	0	8,865,066
8,780,340		0	0	0	0	0.99	0	0	0	0	0	0	0	0	0	0	0	0	8,235,452
8,141,137		0	0	0	0	0	0.99	0	0	0	0	0	0	0	0	0	0	0	7,022,285
6,923,239		0	0	0	0	0	0	0.99	0	0	0	0	0	0	0	0	0	0	5,981,968
5,872,249	=	0	0	0	0	0	0	0	0.98	0	0	0	0	0	0	0	0	0	5,020,153
4,894,477		0	0	0	0	0	0	0	0	0.97	0	0	0	0	0	0	0	0	4,012,628
3,873,065		0	0	0	0	0	0	0	0	0	0.97	0	0	0	0	0	0	0	3,418,176
3,251,658		0	0	0	0	0	0	0	0	0	0	0.95	0	0	0	0	0	0	2,832,030
2,637,664		0	0	0	0	0	0	0	0	0	0	0	0.93	0	0	0	0	0	2,392,168
2,157,487		0	0	0	0	0	0	0	0	0	0	0	0	0.90	0	0	0	0	1,808,125
1,545,333		0	0	0	0	0	0	0	0	0	0	0	0	0	0.85	0	0	0	1,213,997
949,973		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.78	0	0	804,328
647,676		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.44	0.44	678,384

Matrix including fertility and (mortality+ net mobility)

w^{t+5}_{MIDDLE} Middle^{1995}		$R_{MIDDLE} = S_{MIDDLE} + M_{MIDDLE}$																	w^{t}_{MIDDLE} Middle^{1990}
7,991,861		0	0	0.10	0.22	0.25	0.20	0.12	0.06	0.02	0.00	0	0	0	0	0	0	0	7,771,690
8,513,556		1.10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8,150,525
9,625,562		0	1.18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8,481,387
10,443,057		0	0	1.23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8,808,301
9,724,897		0	0	0	1.10	0	0	0	0	0	0	0	0	0	0	0	0	0	8,865,066
9,060,911		0	0	0	0	1.02	0	0	0	0	0	0	0	0	0	0	0	0	8,235,452
8,412,995		0	0	0	0	0	1.02	0	0	0	0	0	0	0	0	0	0	0	7,022,285
7,360,175		0	0	0	0	0	0	1.05	0	0	0	0	0	0	0	0	0	0	5,981,968
6,372,693	=	0	0	0	0	0	0	0	1.07	0	0	0	0	0	0	0	0	0	5,020,153
5,213,248		0	0	0	0	0	0	0	0	1.04	0	0	0	0	0	0	0	0	4,012,628
4,133,973		0	0	0	0	0	0	0	0	0	1.03	0	0	0	0	0	0	0	3,418,176
3,498,655		0	0	0	0	0	0	0	0	0	0	1.02	0	0	0	0	0	0	2,832,030
3,063,055		0	0	0	0	0	0	0	0	0	0	0	1.08	0	0	0	0	0	2,392,168
2,383,446		0	0	0	0	0	0	0	0	0	0	0	0	1.00	0	0	0	0	1,808,125
1,850,075		0	0	0	0	0	0	0	0	0	0	0	0	0	1.02	0	0	0	1,213,997
1,030,389		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.85	0	0	804,328
1,079,725		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.73	0.73	678,384

Appendix A. Cont'd.

- Projection models for the Brazilian **middle**, **1995-2000**

Matrix including fertility and mortality

S_{MIDDLE}

age	w^{t+10}_{MIDDLE}* Middle[2000]																			w^{t+5}_{MIDDLE} Middle[1995]
0	7,197,699		0	0	**0.07**	**0.19**	**0.23**	**0.18**	**0.11**	**0.05**	**0.02**	**0.00**	0	0	0	0	0	0	0	7,556,157
5	7,525,137		**0.996**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7,739,786
10	7,722,917		0	**0.998**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8,132,761
15	8,100,482		0	0	**0.996**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8,447,724
20	8,386,737		0	0	0	**0.99**	0	0	0	0	0	0	0	0	0	0	0	0	0	8,744,711
25	8,661,135		0	0	0	0	**0.99**	0	0	0	0	0	0	0	0	0	0	0	0	8,780,340
30	8,679,785		0	0	0	0	0	**0.99**	0	0	0	0	0	0	0	0	0	0	0	8,141,137
35	8,026,311		0	0	0	0	0	0	**0.99**	0	0	0	0	0	0	0	0	0	0	6,923,239
40	6,796,256	=	0	0	0	0	0	0	0	**0.98**	0	0	0	0	0	0	0	0	0	5,872,249
45	5,725,242		0	0	0	0	0	0	0	0	**0.97**	0	0	0	0	0	0	0	0	4,894,477
50	4,724,242		0	0	0	0	0	0	0	0	0	**0.97**	0	0	0	0	0	0	0	3,873,065
55	3,684,386		0	0	0	0	0	0	0	0	0	0	**0.95**	0	0	0	0	0	0	3,251,658
60	3,028,492		0	0	0	0	0	0	0	0	0	0	0	**0.93**	0	0	0	0	0	2,637,664
65	2,378,899		0	0	0	0	0	0	0	0	0	0	0	0	**0.90**	0	0	0	0	2,157,487
70	1,843,919		0	0	0	0	0	0	0	0	0	0	0	0	0	**0.85**	0	0	0	1,545,333
75	1,209,249		0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0.78**	0	0	949,973
80+	697,882		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0.44**	**0.44**	647,676

Matrix including fertility and (mortality+ net mobility)

$R_{MIDDLE} = S_{MIDDLE} + M_{MIDDLE}$

age	w^{t+10}_{MIDDLE} Middle[2000]																			w^{t+5}_{MIDDLE} Middle[1995]
0	8,497,309		0	0	**0.09**	**0.21**	**0.24**	**0.18**	**0.11**	**0.06**	**0.02**	**0.00**	0	0	0	0	0	0	0	7,991,861
5	8,754,745		**1.10**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8,513,556
10	10,054,293		0	**1.18**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9,625,562
15	11,851,869		0	0	**1.23**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10,443,057
20	11,529,767		0	0	0	**1.10**	0	0	0	0	0	0	0	0	0	0	0	0	0	9,724,897
25	9,939,737		0	0	0	0	**1.02**	0	0	0	0	0	0	0	0	0	0	0	0	9,060,911
30	9,256,250		0	0	0	0	0	**1.02**	0	0	0	0	0	0	0	0	0	0	0	8,412,995
35	8,817,801		0	0	0	0	0	0	**1.05**	0	0	0	0	0	0	0	0	0	0	7,360,175
40	7,840,921	=	0	0	0	0	0	0	0	**1.07**	0	0	0	0	0	0	0	0	0	6,372,693
45	6,617,813		0	0	0	0	0	0	0	0	**1.04**	0	0	0	0	0	0	0	0	5,213,248
50	5,370,901		0	0	0	0	0	0	0	0	0	**1.03**	0	0	0	0	0	0	0	4,133,973
55	4,231,306		0	0	0	0	0	0	0	0	0	0	**1.02**	0	0	0	0	0	0	3,498,655
60	3,784,060		0	0	0	0	0	0	0	0	0	0	0	**1.08**	0	0	0	0	0	3,063,055
65	3,051,887		0	0	0	0	0	0	0	0	0	0	0	0	**1.00**	0	0	0	0	2,383,446
70	2,438,744		0	0	0	0	0	0	0	0	0	0	0	0	0	**1.02**	0	0	0	1,850,075
75	1,570,265		0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0.85**	0	0	1,030,389
80+	1,536,606		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0.73**	**0.73**	1,079,725

Appendix A. Cont'd.

- Projection models for the Brazilian **rich**, **1980-1985**

Matrix including fertility and mortality

w^{t+5}_{RICH}* Rich[1985]										S_{RICH}									w^{t}_{Rich} Rich[1980]
61,924		0	0	**0.02**	**0.08**	**0.13**	**0.12**	**0.08**	**0.04**	**0.02**	**0.01**	0	0	0	0	0	0	0	66,325
66,038		**0.996**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	56,725
56,644		0	**0.999**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	63,500
63,372		0	0	**0.998**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	105,780
105,430		0	0	0	**0.997**	0	0	0	0	0	0	0	0	0	0	0	0	0	131,925
131,364		0	0	0	0	**0.996**	0	0	0	0	0	0	0	0	0	0	0	0	146,405
145,673		0	0	0	0	0	**0.99**	0	0	0	0	0	0	0	0	0	0	0	130,930
130,134		0	0	0	0	0	0	**0.99**	0	0	0	0	0	0	0	0	0	0	96,195
95,470	=	0	0	0	0	0	0	0	**0.99**	0	0	0	0	0	0	0	0	0	82,425
81,637		0	0	0	0	0	0	0	0	**0.99**	0	0	0	0	0	0	0	0	83,005
81,990		0	0	0	0	0	0	0	0	0	**0.99**	0	0	0	0	0	0	0	95,080
93,585		0	0	0	0	0	0	0	0	0	0	**0.98**	0	0	0	0	0	0	84,010
82,272		0	0	0	0	0	0	0	0	0	0	0	**0.98**	0	0	0	0	0	62,470
60,730		0	0	0	0	0	0	0	0	0	0	0	0	**0.97**	0	0	0	0	49,065
47,021		0	0	0	0	0	0	0	0	0	0	0	0	0	**0.96**	0	0	0	29,060
27,154		0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0.93**	0	0	17,850
14,719		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0.48**	**0.48**	12,685

Matrix including fertility and (mortality+ net mobility)

w^{t+5}_{RICH} Rich[1985]										$R_{RICH} = S_{RICH} + M_{RICH}$									w^{t}_{Rich} Rich[1980]
76,890		0	0	**0.04**	**0.15**	**0.15**	**0.14**	**0.08**	**0.05**	**0.02**	**0.01**	0	0	0	0	0	0	0	66,325
71,611		**1.08**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	56,725
80,278		0	**1.42**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	63,500
112,744		0	0	**1.78**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	105,780
201,497		0	0	0	**1.90**	0	0	0	0	0	0	0	0	0	0	0	0	0	131,925
154,990		0	0	0	0	**1.17**	0	0	0	0	0	0	0	0	0	0	0	0	146,405
185,101		0	0	0	0	0	**1.26**	0	0	0	0	0	0	0	0	0	0	0	130,930
116,765		0	0	0	0	0	0	**0.89**	0	0	0	0	0	0	0	0	0	0	96,195
116,271	=	0	0	0	0	0	0	0	**1.21**	0	0	0	0	0	0	0	0	0	82,425
87,536		0	0	0	0	0	0	0	0	**1.06**	0	0	0	0	0	0	0	0	83,005
108,997		0	0	0	0	0	0	0	0	0	**1.31**	0	0	0	0	0	0	0	95,080
92,717		0	0	0	0	0	0	0	0	0	0	**0.98**	0	0	0	0	0	0	84,010
89,874		0	0	0	0	0	0	0	0	0	0	0	**1.07**	0	0	0	0	0	62,470
50,396		0	0	0	0	0	0	0	0	0	0	0	0	**0.81**	0	0	0	0	49,065
50,110		0	0	0	0	0	0	0	0	0	0	0	0	0	**1.02**	0	0	0	29,060
22,619		0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0.78**	0	0	17,850
25,947		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0.85**	**0.85**	12,685

Appendix A. Cont'd.

- Projection models for the Brazilian **rich**, **1985-1990**

Matrix including fertility and mortality

age	w^{t+10}_{RICH}* Rich^{1990}									S_{RICH}										w^{t+5}_{RICH} Rich^{1985}
0	50,050		0	0	**0.02**	**0.08**	**0.12**	**0.11**	**0.07**	**0.04**	**0.01**	**0.00**	0	0	0	0	0	0	0	61,924
5	61,657		**0.996**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	66,038
10	65,944		0	**0.999**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	56,644
15	56,530		0	0	**0.998**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	63,372
20	63,162		0	0	0	**0.997**	0	0	0	0	0	0	0	0	0	0	0	0	0	105,430
25	104,981		0	0	0	0	**0.996**	0	0	0	0	0	0	0	0	0	0	0	0	131,364
30	130,707		0	0	0	0	0	**0.99**	0	0	0	0	0	0	0	0	0	0	0	145,673
35	144,787		0	0	0	0	0	0	**0.99**	0	0	0	0	0	0	0	0	0	0	130,134
40	129,153	=	0	0	0	0	0	0	0	**0.99**	0	0	0	0	0	0	0	0	0	95,470
45	94,557		0	0	0	0	0	0	0	0	**0.99**	0	0	0	0	0	0	0	0	81,637
50	80,639		0	0	0	0	0	0	0	0	0	**0.99**	0	0	0	0	0	0	0	81,990
55	80,700		0	0	0	0	0	0	0	0	0	0	**0.98**	0	0	0	0	0	0	93,585
60	91,648		0	0	0	0	0	0	0	0	0	0	0	**0.98**	0	0	0	0	0	82,272
65	79,980		0	0	0	0	0	0	0	0	0	0	0	0	**0.97**	0	0	0	0	60,730
70	58,201		0	0	0	0	0	0	0	0	0	0	0	0	0	**0.96**	0	0	0	47,021
75	43,937		0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0.93**	0	0	27,154
80+	20,184		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0.48**	**0.48**	14,719

Matrix including fertility and (mortality+ net mobility)

age	w^{t+10}_{RICH} Rich^{1990}									$R_{RICH} = S_{RICH} + M_{RICH}$										w^{t+5}_{RICH} Rich^{1985}
0	86,727		0	0	**0.04**	**0.13**	**0.14**	**0.13**	**0.08**	**0.04**	**0.02**	**0.01**	0	0	0	0	0	0	0	76,890
5	83,018		**1.080**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	71,611
10	101,344		0	**1.415**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	80,278
15	142,532		0	0	**1.775**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	112,744
20	214,762		0	0	0	**1.905**	0	0	0	0	0	0	0	0	0	0	0	0	0	201,497
25	236,726		0	0	0	0	**1.175**	0	0	0	0	0	0	0	0	0	0	0	0	154,990
30	195,955		0	0	0	0	0	**1.26**	0	0	0	0	0	0	0	0	0	0	0	185,101
35	165,075		0	0	0	0	0	0	**0.89**	0	0	0	0	0	0	0	0	0	0	116,765
40	141,134	=	0	0	0	0	0	0	0	**1.21**	0	0	0	0	0	0	0	0	0	116,271
45	123,481		0	0	0	0	0	0	0	0	**1.06**	0	0	0	0	0	0	0	0	87,536
50	114,947		0	0	0	0	0	0	0	0	0	**1.31**	0	0	0	0	0	0	0	108,997
55	106,288		0	0	0	0	0	0	0	0	0	0	**0.98**	0	0	0	0	0	0	92,717
60	99,189		0	0	0	0	0	0	0	0	0	0	0	**1.07**	0	0	0	0	0	89,874
65	72,504		0	0	0	0	0	0	0	0	0	0	0	0	**0.81**	0	0	0	0	50,396
70	51,469		0	0	0	0	0	0	0	0	0	0	0	0	0	**1.02**	0	0	0	50,110
75	39,003		0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0.78**	0	0	22,619
80+	41,270		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0.85**	**0.85**	25,947

Appendix A. Cont'd.

- Projection models for the Brazilian **rich**, **1990-1995**

Matrix including fertility and mortality

S_{RICH}

w^{t+5}_{RICH}* Rich[1995]																			**w^{t}_{Rich} Rich[1990]**
72,619		0	0	**0.03**	**0.08**	**0.10**	**0.08**	**0.05**	**0.02**	**0.01**	**0.01**	0	0	0	0	0	0	0	79,341
79,204		**0.998**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	90,402
90,322		0	**0.999**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	101,344
101,186		0	0	**0.998**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	142,532
142,144		0	0	0	**0.997**	0	0	0	0	0	0	0	0	0	0	0	0	0	214,762
214,023		0	0	0	0	**0.997**	0	0	0	0	0	0	0	0	0	0	0	0	236,726
235,802		0	0	0	0	0	**1.00**	0	0	0	0	0	0	0	0	0	0	0	195,955
195,064		0	0	0	0	0	0	**1.00**	0	0	0	0	0	0	0	0	0	0	165,075
164,153	=	0	0	0	0	0	0	0	**0.99**	0	0	0	0	0	0	0	0	0	141,134
140,122		0	0	0	0	0	0	0	0	**0.99**	0	0	0	0	0	0	0	0	123,481
122,326		0	0	0	0	0	0	0	0	0	**0.99**	0	0	0	0	0	0	0	114,947
113,532		0	0	0	0	0	0	0	0	0	0	**0.99**	0	0	0	0	0	0	106,288
104,544		0	0	0	0	0	0	0	0	0	0	0	**0.98**	0	0	0	0	0	99,189
96,960		0	0	0	0	0	0	0	0	0	0	0	0	**0.98**	0	0	0	0	72,504
70,126		0	0	0	0	0	0	0	0	0	0	0	0	0	**0.97**	0	0	0	51,469
48,849		0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0.95**	0	0	39,003
39,053		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0.49**	**0.49**	41,270

Matrix including fertility and (mortality+ net mobility)

$R_{RICH} = S_{RICH} + M_{RICH}$

w^{t+5}_{RICH} Rich[1995]																			**w^{t}_{Rich} Rich[1990]**
88,537		0	0	**0.05**	**0.11**	**0.12**	**0.09**	**0.06**	**0.03**	**0.02**	**0.01**	0	0	0	0	0	0	0	79,341
94,309		**1.189**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	90,402
121,381		0	**1.343**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	101,344
150,639		0	0	**1.486**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	142,532
207,968		0	0	0	**1.459**	0	0	0	0	0	0	0	0	0	0	0	0	0	214,762
250,330		0	0	0	0	**1.166**	0	0	0	0	0	0	0	0	0	0	0	0	236,726
233,161		0	0	0	0	0	**0.98**	0	0	0	0	0	0	0	0	0	0	0	195,955
212,701		0	0	0	0	0	0	**1.09**	0	0	0	0	0	0	0	0	0	0	165,075
186,316	=	0	0	0	0	0	0	0	**1.13**	0	0	0	0	0	0	0	0	0	141,134
180,213		0	0	0	0	0	0	0	0	**1.28**	0	0	0	0	0	0	0	0	123,481
156,120		0	0	0	0	0	0	0	0	0	**1.26**	0	0	0	0	0	0	0	114,947
138,835		0	0	0	0	0	0	0	0	0	0	**1.21**	0	0	0	0	0	0	106,288
113,491		0	0	0	0	0	0	0	0	0	0	0	**1.07**	0	0	0	0	0	99,189
97,937		0	0	0	0	0	0	0	0	0	0	0	0	**0.99**	0	0	0	0	72,504
65,518		0	0	0	0	0	0	0	0	0	0	0	0	0	**0.90**	0	0	0	51,469
43,383		0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0.84**	0	0	39,003
46,340		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0.58**	**0.58**	41,270

Appendix A. Cont'd.

- Projection models for the Brazilian **rich**, **1995-2000**

Matrix including fertility and mortality

age	w^{t+10}_{RICH}* Rich[2000]		S_{RICH}																	w^{t+5}_{RICH} Rich[1995]
0	53,423		0	0	**0.02**	**0.07**	**0.08**	**0.07**	**0.04**	**0.02**	**0.01**	**0.01**	0	0	0	0	0	0	0	72,619
5	72,493		**0.998**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	79,204
10	79,134		0	**0.999**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	90,322
15	90,182		0	0	**0.998**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	101,186
20	100,911		0	0	0	**0.997**	0	0	0	0	0	0	0	0	0	0	0	0	0	142,144
25	141,655		0	0	0	0	**0.997**	0	0	0	0	0	0	0	0	0	0	0	0	214,023
30	213,188		0	0	0	0	0	**1.00**	0	0	0	0	0	0	0	0	0	0	0	235,802
35	234,729		0	0	0	0	0	0	**1.00**	0	0	0	0	0	0	0	0	0	0	195,064
40	193,975	=	0	0	0	0	0	0	0	**0.99**	0	0	0	0	0	0	0	0	0	164,153
45	162,976		0	0	0	0	0	0	0	0	**0.99**	0	0	0	0	0	0	0	0	140,122
50	138,811		0	0	0	0	0	0	0	0	0	**0.99**	0	0	0	0	0	0	0	122,326
55	120,821		0	0	0	0	0	0	0	0	0	0	**0.99**	0	0	0	0	0	0	113,532
60	111,669		0	0	0	0	0	0	0	0	0	0	0	**0.98**	0	0	0	0	0	104,544
65	102,195		0	0	0	0	0	0	0	0	0	0	0	0	**0.98**	0	0	0	0	96,960
70	93,780		0	0	0	0	0	0	0	0	0	0	0	0	0	**0.97**	0	0	0	70,126
75	66,557		0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0.95**	0	0	48,849
80+	42,765		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0.49**	**0.49**	39,053

Matrix including fertility and (mortality+ net mobility)

age	w^{t+10}_{RICH} Rich[2000]		$R_{RICH} = S_{RICH} + M_{RICH}$																	w^{t+5}_{RICH} Rich[1995]
0	80,898		0	0	**0.04**	**0.09**	**0.10**	**0.08**	**0.05**	**0.02**	**0.02**	**0.01**	0	0	0	0	0	0	0	88,537
5	105,240		**1.189**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	94,309
10	126,627		0	**1.343**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	121,381
15	180,422		0	0	**1.486**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	150,639
20	219,796		0	0	0	**1.459**	0	0	0	0	0	0	0	0	0	0	0	0	0	207,968
25	242,410		0	0	0	0	**1.166**	0	0	0	0	0	0	0	0	0	0	0	0	250,330
30	246,560		0	0	0	0	0	**0.98**	0	0	0	0	0	0	0	0	0	0	0	233,161
35	253,086		0	0	0	0	0	0	**1.09**	0	0	0	0	0	0	0	0	0	0	212,701
40	240,071	=	0	0	0	0	0	0	0	**1.13**	0	0	0	0	0	0	0	0	0	186,316
45	237,906		0	0	0	0	0	0	0	0	**1.28**	0	0	0	0	0	0	0	0	180,213
50	227,848		0	0	0	0	0	0	0	0	0	**1.26**	0	0	0	0	0	0	0	156,120
55	188,565		0	0	0	0	0	0	0	0	0	0	**1.21**	0	0	0	0	0	0	138,835
60	148,243		0	0	0	0	0	0	0	0	0	0	0	**1.07**	0	0	0	0	0	113,491
65	112,058		0	0	0	0	0	0	0	0	0	0	0	0	**0.99**	0	0	0	0	97,937
70	88,500		0	0	0	0	0	0	0	0	0	0	0	0	0	**0.90**	0	0	0	65,518
75	55,225		0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0.84**	0	0	43,383
80+	51,795		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0.58**	**0.58**	46,340

Appendix B. Life-tables reflecting the combined effect of mortality and net mobility

Brazilian **poor** class, 1990-2000: l_0= 1,647,279 and L_0= 8,016,094

	$_nN_x$ (1990) (1)	$_nN_x$ (2000) (2)	$_nN_x$* (3)	$_np_x$* (13)	$_nL_x^{NEW}$ (14)	l_x* (15)	T_x* (16)	e_x* (17)	Proj. 1995* (18)	Proj 2000* (19)
0	8,663,037	7,811,367	8,226,187		8,016,094	1,647,279	45,858,623	27.84		
5	8,938,082	7,558,446	8,219,368	**0.949**	7,605,558	1,562,165	37,842,528	24.22	8,219,368	
10	8,190,257	7,156,714	7,656,065	**0.871**	6,622,262	1,422,782	30,236,970	21.25	7,782,508	7,156,714
15	5,901,452	5,888,288	5,894,866	**0.757**	5,010,439	1,163,270	23,614,708	20.30	6,196,793	5,888,288
20	4,250,221	4,338,445	4,294,107	**0.700**	3,507,865	851,830	18,604,269	21.84	4,131,674	4,338,445
25	3,820,620	3,612,924	3,715,321	**0.874**	3,067,438	657,530	15,096,404	22.96	3,716,588	3,612,924
30	3,468,164	3,477,567	3,472,862	**0.936**	2,870,165	593,760	12,028,966	20.26	3,574,909	3,477,567
35	2,981,957	3,149,666	3,064,665	**0.881**	2,528,753	539,892	9,158,801	16.96	3,055,619	3,149,666
40	2,446,579	2,426,178	2,436,357	**0.794**	2,007,844	453,660	6,630,049	14.61	2,367,690	2,426,178
45	1,872,958	1,854,287	1,863,599	**0.783**	1,572,468	358,031	4,622,205	12.91	1,916,069	1,854,287
50	1,511,877	1,448,374	1,479,785	**0.756**	1,188,643	276,111	3,049,737	11.05	1,415,786	1,448,374
55	1,189,421	1,031,336	1,107,562	**0.728**	865,873	205,452	1,861,094	9.06	1,101,334	1,031,336
60	1,005,328	666,541	818,592	**0.605**	524,037	138,991	995,221	7.16	719,853	666,541
65	815,921	383,937	559,698	**0.533**	279,498	80,353	471,184	5.86	536,197	383,937
70	560,997	224,738	355,074	**0.419**	117,147	39,664	191,687	4.83	341,980	224,738
75	381,727	142,425	233,168	**0.416**	48,788	16,594	74,540	4.49	233,640	142,425
80	327,696	165,387	232,802	**0.345**	25,752	7,454	25,752	3.45	245,087	165,387

Appendix B**.** Cont'd.

Brazilian **middle** class, 1980-1990: l_0= 1,930,080 and L_0= 8,020,094

	$_nN_x$ (1980) (1)	$_nN_x$ (1990) (2)	$_nN_x$* (3)	$_np_x$* (13)	$_nL_x^{NEW}$ (14)	l_x* (15)	T_x* (16)	e_x* (17)	Proj. 1985* (18)	Proj 1990* (19)
0	8,813,965	7,771,690	8,276,437		8,020,094	1,930,080	98,237,854	50.90		
5	7,595,495	8,150,525	7,868,118	**0.893**	7,159,439	1,517,953	90,217,760	59.43	7,868,118	
10	8,091,295	8,481,387	8,284,045	**1.078**	7,717,471	1,487,691	83,058,322	55.83	8,187,515	8,481,387
15	9,403,650	8,808,301	9,101,109	**1.076**	8,302,617	1,602,009	75,340,851	47.03	8,704,785	8,808,301
20	8,797,045	8,865,066	8,830,990	**1.018**	8,455,493	1,675,811	67,038,234	40.00	9,576,799	8,865,066
25	6,988,560	8,235,452	7,586,432	**0.860**	7,271,199	1,572,669	58,582,741	37.25	7,564,913	8,235,452
30	5,314,115	7,022,285	6,108,783	**0.928**	6,749,640	1,402,084	51,311,542	36.60	6,487,274	7,022,285
35	4,240,290	5,981,968	5,036,396	**0.922**	6,223,898	1,297,354	44,561,902	34.35	4,900,189	5,981,968
40	3,938,250	5,020,153	4,446,416	**1.024**	6,376,268	1,260,017	38,338,005	30.43	4,344,099	5,020,153
45	3,392,195	4,012,628	3,689,393	**0.924**	5,889,736	1,226,600	31,961,737	26.06	3,637,747	4,012,628
50	3,053,805	3,418,176	3,230,858	**0.940**	5,534,236	1,142,397	26,072,001	22.82	3,187,444	3,418,176
55	2,346,940	2,832,030	2,578,101	**0.888**	4,917,144	1,045,138	20,537,765	19.65	2,713,292	2,832,030
60	1,808,335	2,392,168	2,079,866	**0.882**	4,335,189	925,233	15,620,622	16.88	2,069,175	2,392,168
65	1,464,795	1,808,125	1,627,431	**0.874**	3,788,256	812,345	11,285,433	13.89	1,580,193	1,808,125
70	947,850	1,213,997	1,072,701	**0.768**	2,910,360	669,862	7,497,177	11.19	1,125,341	1,213,997
75	601,880	804,328	695,779	**0.715**	2,080,155	499,052	4,586,816	9.19	677,468	804,328
80	429,925	678,384	540,050	**0.546**	2,506,662	458,682	2,506,662	5.46	563,874	678,384

Brazilian **middle** class, 1990-2000: l_0= 1,709,937 and L_0= 8,295,366

	$_nN_x$ (1990) (1)	$_nN_x$ (2000) (2)	$_nN_x$* (3)	$_np_x$* (13)	$_nL_x^{NEW}$ (14)	l_x* (15)	T_x* (16)	e_x* (17)	Proj. 1995* (18)	Proj 2000* (19)
0	7,771,690	8,477,652	8,117,000		8,295,366	1,709,937	298,406,941	174.51		
5	8,150,525	8,892,758	8,513,557	**1.095**	9,087,222	1,738,259	290,111,575	166.90	8,513,557	
10	8,481,387	10,054,293	9,234,411	**1.181**	10,731,776	1,981,900	281,024,353	141.80	9,625,562	10,054,293
15	8,808,301	11,851,870	10,217,379	**1.231**	13,213,942	2,394,572	270,292,577	112.88	10,443,057	11,851,870
20	8,865,066	11,529,766	10,110,002	**1.104**	14,588,991	2,780,293	257,078,635	92.46	9,724,897	11,529,766
25	8,235,452	9,939,737	9,047,554	**1.022**	14,911,288	2,950,028	242,489,645	82.20	9,060,911	9,939,737
30	7,022,285	9,256,250	8,062,259	**1.022**	15,232,751	3,014,404	227,578,357	75.50	8,412,996	9,256,250
35	5,981,968	8,817,802	7,262,769	**1.048**	15,965,702	3,119,845	212,345,606	68.06	7,360,175	8,817,802
40	5,020,153	7,840,921	6,273,964	**1.065**	17,008,537	3,297,424	196,379,904	59.56	6,372,694	7,840,921
45	4,012,628	6,617,813	5,153,137	**1.038**	17,662,753	3,467,129	179,371,367	51.73	5,213,248	6,617,813
50	3,418,176	5,370,901	4,284,703	**1.030**	18,196,890	3,585,964	161,708,614	45.09	4,133,974	5,370,901
55	2,832,030	4,231,306	3,461,674	**1.024**	18,625,327	3,682,222	143,511,724	38.97	3,498,655	4,231,306
60	2,392,168	3,784,060	3,008,672	**1.082**	20,144,701	3,877,003	124,886,398	32.21	3,063,055	3,784,060
65	1,808,125	3,051,887	2,349,083	**0.996**	20,071,252	4,021,595	104,741,697	26.04	2,383,446	3,051,887
70	1,213,997	2,438,744	1,720,648	**1.023**	20,536,921	4,060,817	84,670,445	20.85	1,850,075	2,438,744
75	804,328	1,570,265	1,123,836	**0.849**	17,430,867	3,796,779	64,133,523	16.89	1,030,389	1,570,265
80	678,384	1,536,606	1,020,984	**0.728**	46,702,656	6,413,352	46,702,656	7.28	1,079,725	1,536,606

Appendix B**.** Cont'd.

Brazilian **rich** class, 1980-1990: l_0= 15,120 and L_0= 75,865

	${}_nN_x$ (1980) (1)	${}_nN_x$ (1990) (2)	${}_nN_x$* (3)	${}_np_x$* (13)	${}_nL_x^{NEW}$ (14)	l_x* (15)	T_x* (16)	e_x* (17)	Proj. 1985* (18)	Proj 1990* (19)
0	66,325	79,341	72,542		75,865	15,120	11,757,588	777.61		
5	56,725	90,402	71,611	**1.080**	81,911	15,778	11,681,723	740.40	71,611	
10	63,500	101,344	80,220	**1.415**	115,921	19,783	11,599,812	586.35	80,278	101,344
15	105,780	142,532	122,789	**1.775**	205,816	32,174	11,483,892	356.93	112,744	142,532
20	131,925	214,762	168,323	**1.905**	392,053	59,787	11,278,076	188.64	201,497	214,762
25	146,405	236,726	186,166	**1.175**	460,597	85,265	10,886,023	127.67	154,990	236,726
30	130,930	195,955	160,176	**1.264**	582,337	104,293	10,425,426	99.96	185,101	195,955
35	96,195	165,075	126,014	**0.892**	519,335	110,167	9,843,089	89.35	116,765	165,075
40	82,425	141,134	107,856	**1.209**	627,721	114,706	9,323,755	81.28	116,271	141,134
45	83,005	123,481	101,240	**1.062**	666,643	129,436	8,696,034	67.18	87,536	123,481
50	95,080	114,947	104,542	**1.313**	875,395	154,204	8,029,390	52.07	108,997	114,947
55	84,010	106,288	94,495	**0.975**	853,636	172,903	7,153,995	41.38	92,717	106,288
60	62,470	99,189	78,717	**1.070**	913,224	176,686	6,300,360	35.66	89,874	99,189
65	49,065	72,504	59,644	**0.807**	736,720	164,994	5,387,135	32.65	50,396	72,504
70	29,060	51,469	38,674	**1.021**	752,412	148,913	4,650,415	31.23	50,110	51,469
75	17,850	39,003	26,386	**0.778**	585,634	133,805	3,898,003	29.13	22,619	39,003
80	12,685	41,270	22,880	**0.850**	3,312,369	389,800	3,312,369	8.50	25,947	41,270

Brazilian **rich** class, 1990-2000: l_0= 16,685 and L_0= 89,879

	${}_nN_x$ (1990) (1)	${}_nN_x$ (2000) (2)	${}_nN_x$* (3)	${}_np_x$* (13)	${}_nL_x^{NEW}$ (14)	l_x* (15)	T_x* (16)	e_x* (17)	Proj. 1995* (18)	Proj 2000* (19)
0	79,341	93,694	86,219		89,879	16,685	8,772,364	525.78		
5	90,402	98,384	94,309	**1.189**	106,835	19,671	8,682,485	441.38	94,309	
10	101,344	126,627	113,282	**1.343**	143,446	25,028	8,575,650	342.64	121,382	126,627
15	142,532	180,423	160,362	**1.486**	213,219	35,666	8,432,204	236.42	150,638	180,423
20	214,762	219,795	217,264	**1.459**	311,107	52,433	8,218,985	156.75	207,968	219,795
25	236,726	242,410	239,551	**1.166**	362,631	67,374	7,907,878	117.37	250,330	242,410
30	195,955	246,560	219,806	**0.985**	357,169	71,980	7,545,247	104.82	233,161	246,560
35	165,075	253,086	204,397	**1.085**	387,692	74,486	7,188,078	96.50	212,701	253,086
40	141,134	240,071	184,071	**1.129**	437,579	82,527	6,800,386	82.40	186,317	240,071
45	123,481	237,907	171,397	**1.277**	558,743	99,632	6,362,806	63.86	180,213	237,907
50	114,947	227,848	161,834	**1.264**	706,433	126,518	5,804,063	45.88	156,120	227,848
55	106,288	188,564	141,570	**1.208**	853,241	155,967	5,097,630	32.68	138,834	188,564
60	99,189	148,243	121,260	**1.068**	911,064	176,431	4,244,389	24.06	113,491	148,243
65	72,504	112,058	90,137	**0.987**	899,563	181,063	3,333,325	18.41	97,937	112,058
70	51,469	88,500	67,491	**0.904**	812,886	171,245	2,433,763	14.21	65,518	88,500
75	39,003	55,225	46,410	**0.843**	685,183	149,807	1,620,877	10.82	43,384	55,225
80	41,270	51,795	46,234	**0.577**	935,694	162,088	935,694	5.77	46,339	51,795

Appendix B. Cont'd.

Brazilian **poor+ middle+ rich** classes, 1980-1990: l_0= 3,675,311 and L_0= 16,477,038

	$_nN_x$ (1980) (1)	$_nN_x$ (1990) (2)	$_nN_x$* (3)	$_np_x$* (13)	$_nL_x^{NEW}$ (14)	l_x* (15)	T_x* (16)	e_x* (17)	Proj. 1985* (18)	Proj 1990* (19)
0	16,366,445	16,514,068	16,440,091		16,477,038	3,675,311	225,603,621	61.38		
5	14,727,495	17,179,010	15,906,093	**0.972**	16,013,575	3,249,061	209,126,584	64.37	15,906,093	
10	14,206,040	16,772,987	15,436,247	**1.055**	16,886,327	3,289,990	193,113,009	58.70	15,530,155	16,772,987
15	13,488,845	14,852,285	14,154,157	**0.956**	16,149,262	3,303,559	176,226,682	53.34	13,585,966	14,852,285
20	11,325,870	13,330,050	12,287,164	**0.981**	15,845,061	3,199,432	160,077,421	50.03	13,234,758	13,330,050
25	9,305,880	12,292,799	10,695,574	**0.929**	14,717,318	3,056,238	144,232,359	47.19	10,519,772	12,292,799
30	7,592,170	10,686,405	9,007,386	**1.016**	14,950,440	2,966,776	129,515,041	43.66	9,453,285	10,686,405
35	6,314,405	9,129,001	7,592,378	**0.966**	14,437,582	2,938,802	114,564,601	38.98	7,331,729	9,129,001
40	5,698,415	7,607,865	6,584,282	**1.038**	14,981,347	2,941,893	100,127,019	34.03	6,552,225	7,607,865
45	4,649,135	6,009,067	5,285,543	**0.917**	13,739,442	2,872,079	85,145,672	29.65	5,226,035	6,009,067
50	4,080,040	5,044,999	4,536,937	**0.965**	13,263,493	2,700,293	71,406,230	26.44	4,488,084	5,044,999
55	3,117,940	4,127,739	3,587,484	**0.920**	12,198,578	2,546,207	58,142,737	22.84	3,752,457	4,127,739
60	2,415,165	3,496,685	2,906,040	**0.932**	11,367,108	2,356,569	45,944,159	19.50	2,905,417	3,496,685
65	2,015,890	2,696,550	2,331,512	**0.928**	10,549,938	2,191,705	34,577,051	15.78	2,241,541	2,696,550
70	1,309,465	1,826,464	1,546,509	**0.815**	8,596,352	1,914,629	24,027,113	12.55	1,642,597	1,826,464
75	820,075	1,225,058	1,002,317	**0.746**	6,411,204	1,500,756	15,430,761	10.28	976,606	1,225,058
80	574,600	1,047,350	775,762	**0.585**	9,019,556	1,543,076	9,019,556	5.85	815,213	1,047,350

Brazilian **poor+ middle+ rich** classes, 1990-2000: l_0= 3,434,816 and L_0= 16,415,453

	$_nN_x$ (1990) (1)	$_nN_x$ (2000) (2)	$_nN_x$* (3)	$_np_x$* (13)	$_nL_x^{NEW}$ (14)	l_x* (15)	T_x* (16)	e_x* (17)	Proj. 1995* (18)	Proj 2000* (19)
0	16,514,068	16,382,713	16,448,259		16,415,453	3,434,816	249,811,787	72.73		
5	17,179,010	16,549,588	16,861,362	**1.021**	16,760,674	3,317,613	233,396,333	70.35	16,861,362	
10	16,772,987	17,337,634	17,052,974	**1.028**	17,234,102	3,399,478	216,635,659	63.73	17,664,254	17,337,634
15	14,852,285	17,920,581	16,314,459	**1.015**	17,484,187	3,471,829	199,401,557	57.43	17,016,380	17,920,581
20	13,330,050	16,088,006	14,644,245	**0.945**	16,530,290	3,401,448	181,917,371	53.48	14,041,978	16,088,006
25	12,292,799	13,795,071	13,022,290	**0.982**	16,239,629	3,276,992	165,387,081	50.47	13,095,661	13,795,071
30	10,686,405	12,980,377	11,777,672	**0.991**	16,096,669	3,233,630	149,147,452	46.12	12,184,583	12,980,377
35	9,129,001	12,220,554	10,562,265	**1.003**	16,144,189	3,224,086	133,050,783	41.27	10,717,953	12,220,554
40	7,607,865	10,507,170	8,940,757	**0.980**	15,826,691	3,197,088	116,906,594	36.57	8,949,467	10,507,170
45	6,009,067	8,710,007	7,234,571	**0.973**	15,403,219	3,122,991	101,079,903	32.37	7,404,302	8,710,007
50	5,044,999	7,047,123	5,962,611	**0.952**	14,660,176	3,006,339	85,676,684	28.50	5,719,193	7,047,123
55	4,127,739	5,451,206	4,743,539	**0.953**	13,973,237	2,863,341	71,016,508	24.80	4,808,603	5,451,206
60	3,496,685	4,598,844	4,010,076	**0.956**	13,363,701	2,733,694	57,043,271	20.87	3,947,680	4,598,844
65	2,696,550	3,547,882	3,093,063	**0.899**	12,010,302	2,537,400	43,679,570	17.21	3,142,561	3,547,882
70	1,826,464	2,751,982	2,241,962	**0.876**	10,517,580	2,252,788	31,669,269	14.06	2,361,404	2,751,982
75	1,225,058	1,767,915	1,471,665	**0.749**	7,874,207	1,839,179	21,151,689	11.50	1,367,420	1,767,915
80	1,047,350	1,753,788	1,355,297	**0.628**	13,277,482	2,115,169	13,277,482	6.28	1,426,451	1,753,788

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