

Internal migration

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Outline

- Introduction
- Concepts and definitions
- Migration data across countries
 - Last-move, duration of residence
 - Residence at some fixed prior date
- Domestic migration in the United States
- Internal migration in China
- Analysis of spatial association



Introduction

- Besides fertility and mortality, the third way that populations change their size is through migration
- The size of the population decreases in the **area of origin** and increases in the **area of destination**
- Unlike the former events, the event of migration may occur on multiple occasions or never occur during our lifetime



Definition of migration

(Lee 1966)

- Migration is defined broadly as a permanent or semi-permanent change of residence
- No restriction is placed upon the distance of the move or upon the voluntary or involuntary nature of the act
- No distinction is made between external and internal migration
- Every act of migration involves an origin, a destination, and an intervening set of obstacles
 - Distance is always present as an intervening obstacle

Definition of migration

- Permanent change of residence
 - Residential mobility
 - Moving a great enough distance that all activities are transferred from one place to another
- **International migrants**
 - Move between countries (either legally or without documentation)
- **Internal migrants**
 - Move within national boundaries (usually without constraint, but not always)



Measuring migration

- “Permanence” usually means that you have been gone at least one year from the old place
- “Distance moved” in the U.S.
 - The Census Bureau defines a migrant as a person who has moved to a different county within the U.S.
- From the standpoint of a local school district, for example, a migrant would be someone moving into or out of the school district’s boundaries



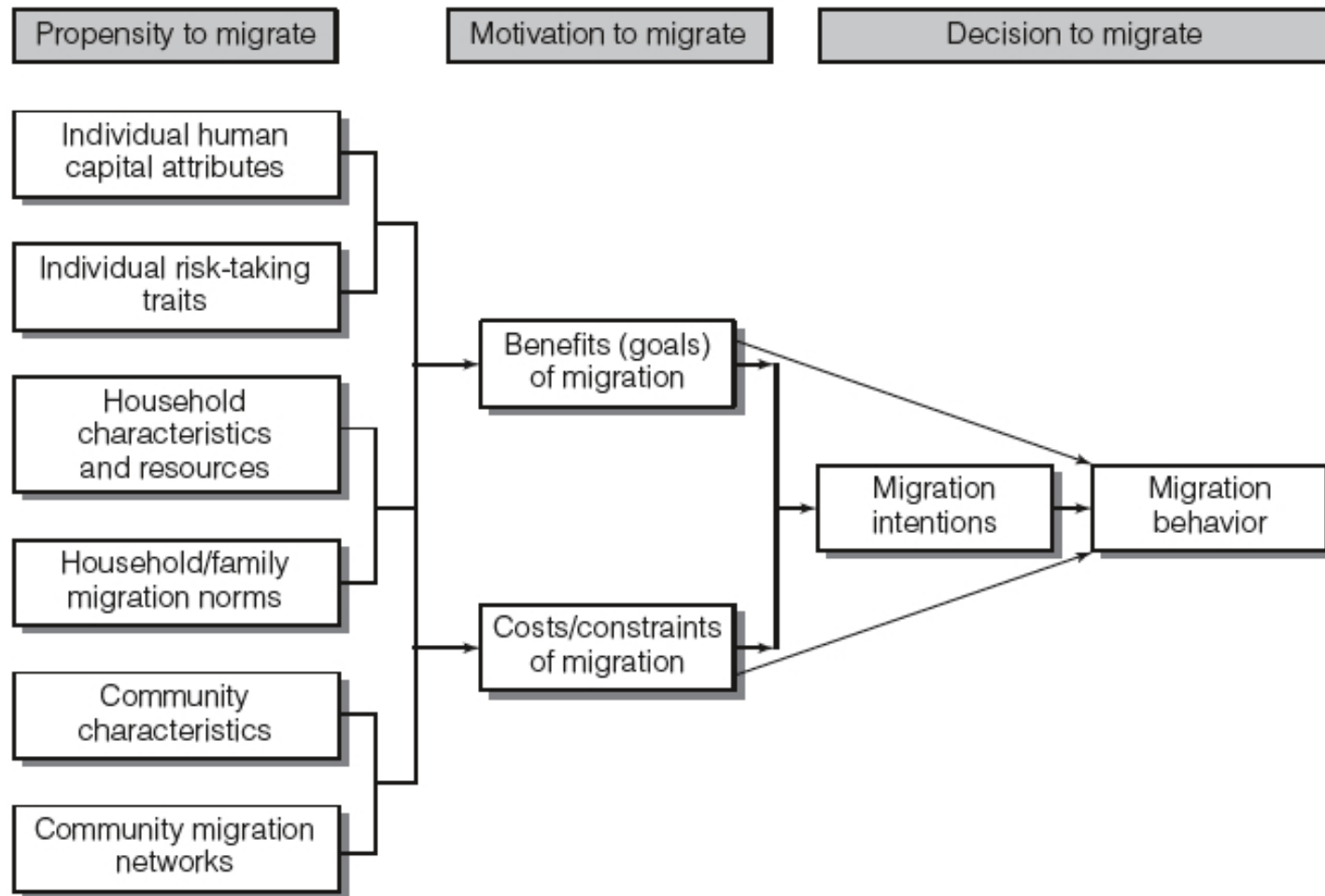
What is the migration transition?

- The permanent movement of people from one place to another
- Usually in response to resource scarcity in the area of origin, typically caused by population growth, relative to perceived resources in the destination area
- It is closely related to the urban transition, because most migrants are moving to urban areas, no matter where they are from

Stocks versus flows

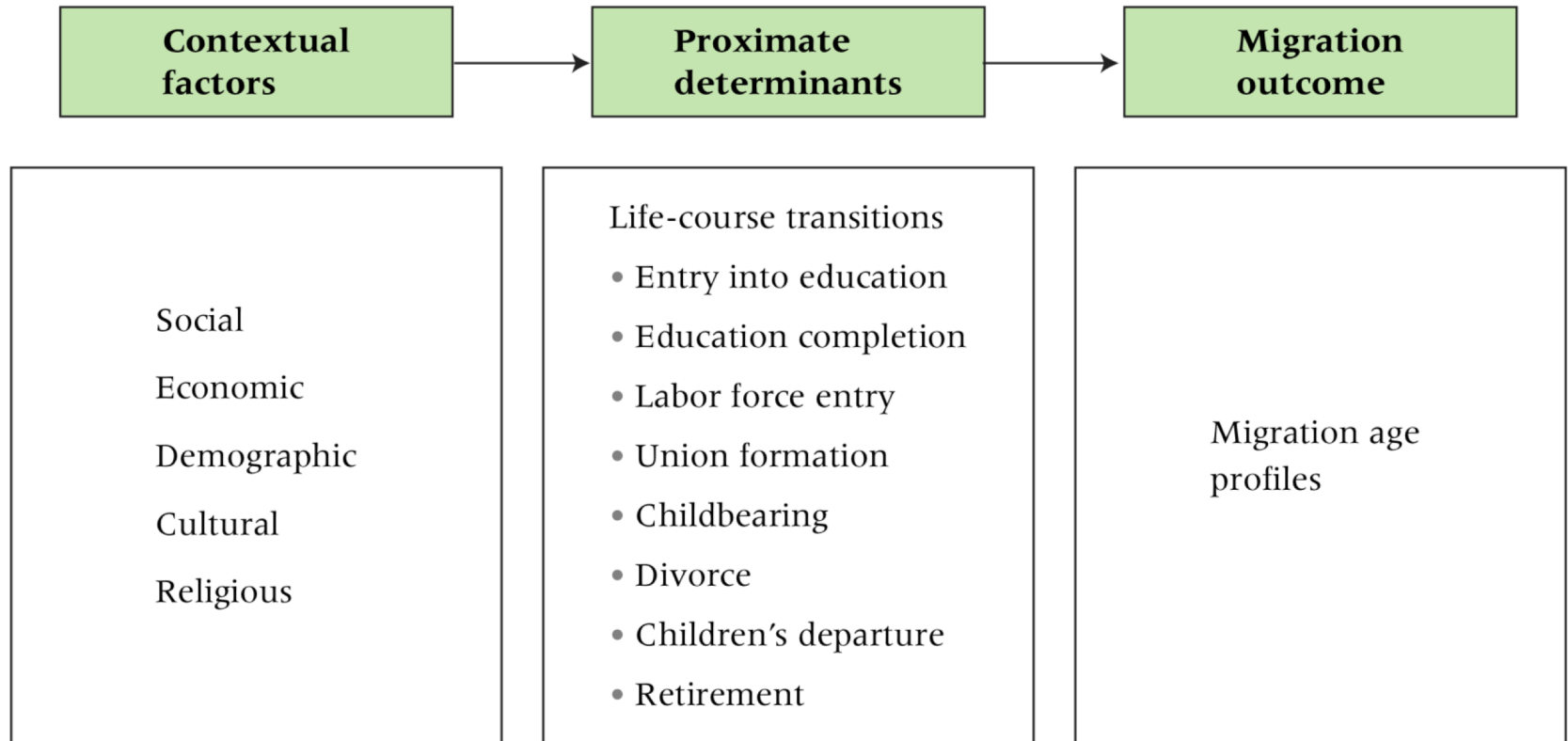
- The migration transition involves a process and a transformation
- The process is that people move from one place to another and this represents the migration flow
- The transformation is that the migrant stock changes as people move into and out of a given place

Conceptual model of migration decision making



Proximate determinants

FIGURE 3 Proximate determinants of migration age profiles



Factors in the act of migration

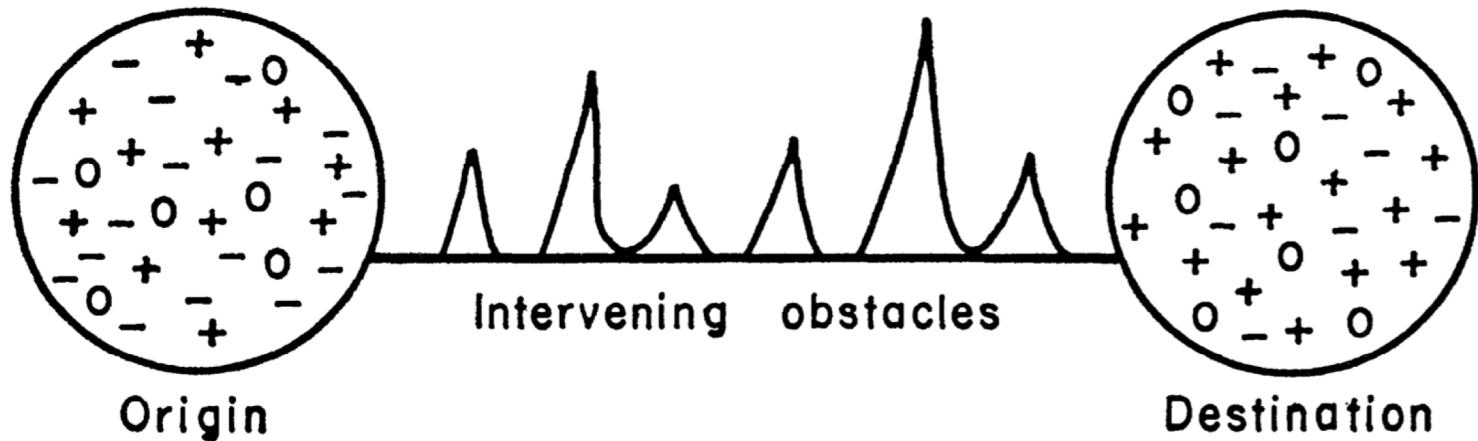
(Lee 1966)

- Factors associated with the area of origin
- Factors associated with the area of destination
- Intervening obstacles
- Personal factors



CHART I

ORIGIN AND DESTINATION FACTORS AND INTERVENING OBSTACLES IN MIGRATION



See text for explanation

Volume of migration

(Lee 1966)

- Volume of migration within a given territory varies with the degree of diversity of areas included in that territory
- Volume of migration varies with the diversity of people
- Volume of migration is related to the difficulty of surmounting the intervening obstacles
- Volume of migration varies with fluctuations in the economy
- Unless severe checks are imposed, both volume and rate of migration tend to increase with time
- Volume and rate of migration vary with the state of progress/development in a country or area



Internal migration

- **Internal migration** is a geographical move resulting in a change of residence that crosses a political or jurisdictional boundary
- Usually a county-type geographical unit in a country

Internal migration

- Over time internal migration is a story of rural population growth leading to a redundancy of that population, so people look for jobs and life elsewhere
- When the population is almost entirely urban (as in the U.S. and most of western Europe), people move between urban places
 - We might call this process as migration evolution, influenced especially by individual characteristics



Mover and migrant

- Any person who changes his/her residence is a **mover**
 - Not all movers are migrants, because a person can move within the same community without involving the crossing of a political boundary
 - All migrants are movers because the residential movement of a **migrant** involves the move of at least a county-level jurisdictional boundary
 - Census Bureau demographers have estimated that a person in the United States may move around 12 times in one's lifetime



Societal consequences of migration

- Impact on receiving and sending communities
 - Donor area (origin) typically loses young adults, which can slow down population growth in those areas
 - Host area (destination) gains those young adults, which can increase population growth and augment youth bulges
 - Remittances from migrants back to sending communities have become important to the economies of those places, and encourage continued migration



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Concepts and definitions

- A permanent residential move either local or jurisdictional is usually defined as “a change in residence, lasting at least a year in duration”
 - The residential migration of persons moving into an area of destination is called **in-migration**
 - The migration of persons leaving an area of origin is known as **out-migration**
- **Return migration:** it is possible that a migrant might move back to one's area of origin during one's life course



Migration terms

- **Internal migration:** permanent changes in residence that occur within a country
- **International migration:** permanent changes in residence that occur between countries

Areas	Internal migration (within countries)	International migration (between countries)
Receiving areas (destination)	In-migration	Immigration
Sending areas (origin)	Out-migration	Emigration

Net-migration & Gross-migration

- When we subtract the number of out-migrants from the number of in-migrants of a given geographical area, we get **net-migration**

$$\textit{Net-migration} = \textit{In-migrants} - \textit{Out-migrants}$$

– The net balance could be positive, negative or zero

- When we add the in-migration and out-migration of an area, we get the **gross-migration**

$$\textit{Gross-migration} = \textit{In-migrants} + \textit{Out-migrants}$$



Migration efficiency

- When we divide an area's net-migration by its gross-migration, we get **migration efficiency**
 - We say migration is positively efficient for an area, when there has been a lot of in-migration and little out-migration
 - Migration is negatively efficient for an area, when there has been a lot of out-migration and little in-migration
 - When the numbers of in-migration and out-migration are about the same, migration efficiency for the area becomes inefficient



Stream and counterstream

(Lee 1966)

- Migration tends to take place largely within well defined streams
- For every major migration stream, a counterstream develops
- The efficiency of the stream is high if the major factors in the development of a migration stream were negative factors at origin
- The efficiency of stream and counterstream tends to be low if origin and destination are similar
- The efficiency of migration streams will be high if the intervening obstacles are great
- The efficiency of a migration stream varies with economic conditions, being high in prosperous times and low in times of depression

Migration stream

- **Migration stream:** group of migrants having a common area of origin and a common area of destination during a specified migration interval
 - A **migration counterstream**, usually smaller in size, moves in the opposite direction as the migration stream during the same time interval
- A **migration interval** is a temporal dimension of migration defined by the researcher
 - Time between two events, namely the time of arriving at the area of destination and the time of departing the area of origin



Characteristics of migrants

(Lee 1966)

- Migration is selective
- Migrants responding primarily to plus factors at destination tend to be positively selected
- Migrants responding primarily to minus factors at origin tend to be negatively selected
- Taking all migrants together, selection tends to be bimodal (positively and negatively selected)
- The degree of positive selection increases with the difficulty of the intervening obstacles
- The heightened propensity to migrate at certain stages of the life cycle is important in the selection of migrants
- The characteristics of migrants tend to be intermediate between the characteristics of the population at origin and the population at destination

Differential migration

- **Differential migration**
 - Analysis of differences in migrant populations according to their demographic, social, and economic characteristics
- **Migration selectivity**
 - The migration process is selective: not everyone stays and not everyone moves
 - Usually related to demographic characteristics: age, race, sex, socioeconomic status...
- Age and education are predictors of migration
 - Americans aged 18–24 are more likely to move due to events such as college and employment



Selectivity by push-pull factors

- Migrants tend to be positively selected
 - When they are responding to positive pull factors in the area of destination
 - Such as economic growth and high employment rate
- Migrants tend to be negatively selected
 - When they are responding to negative push factors in the area of origin, such as economic stagnation
 - These migrants are less likely to have higher socioeconomic status than those responding to pull factors



FIGURE 1 Typical age profile of migration and key life-course transitions

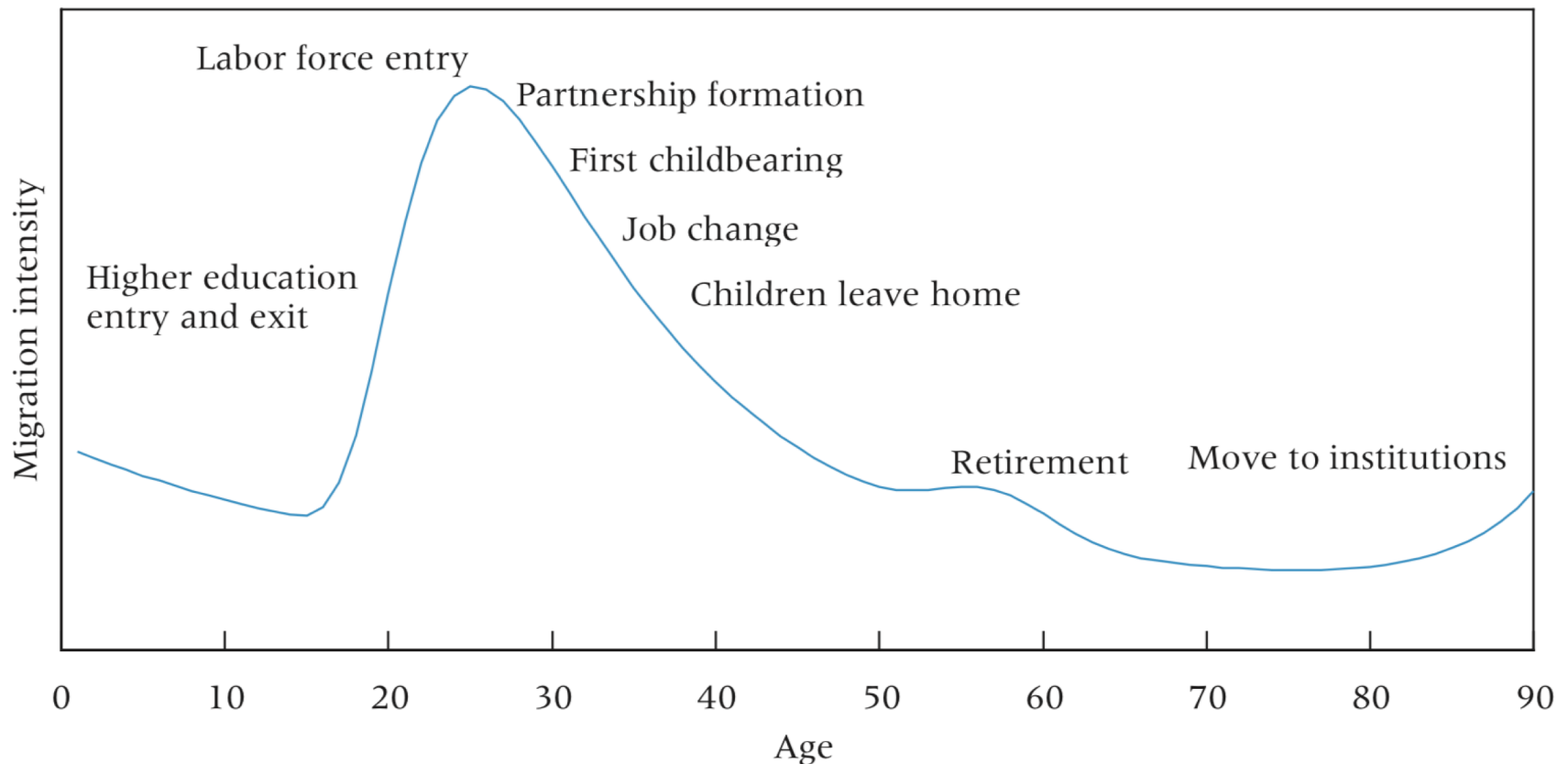
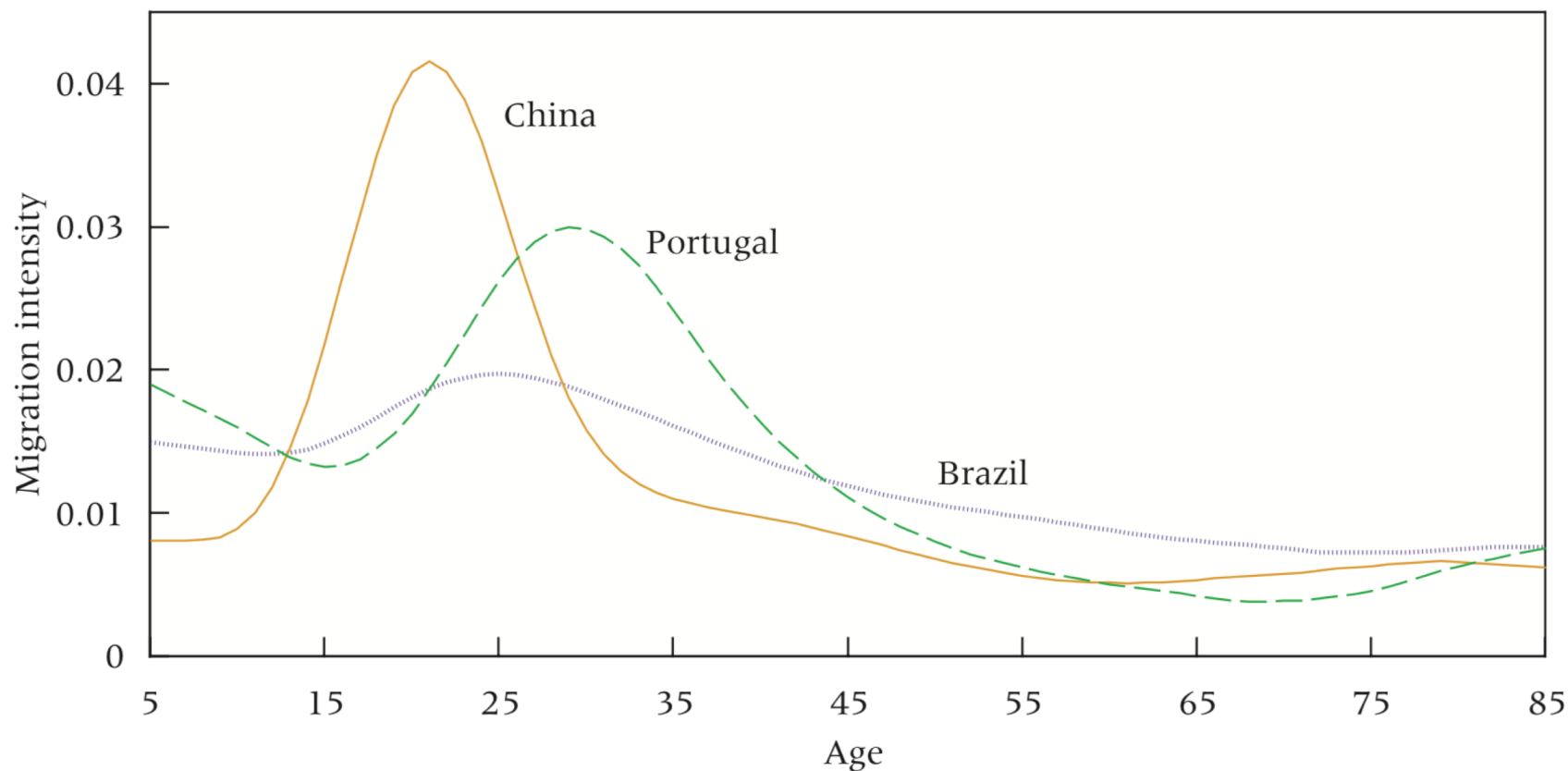
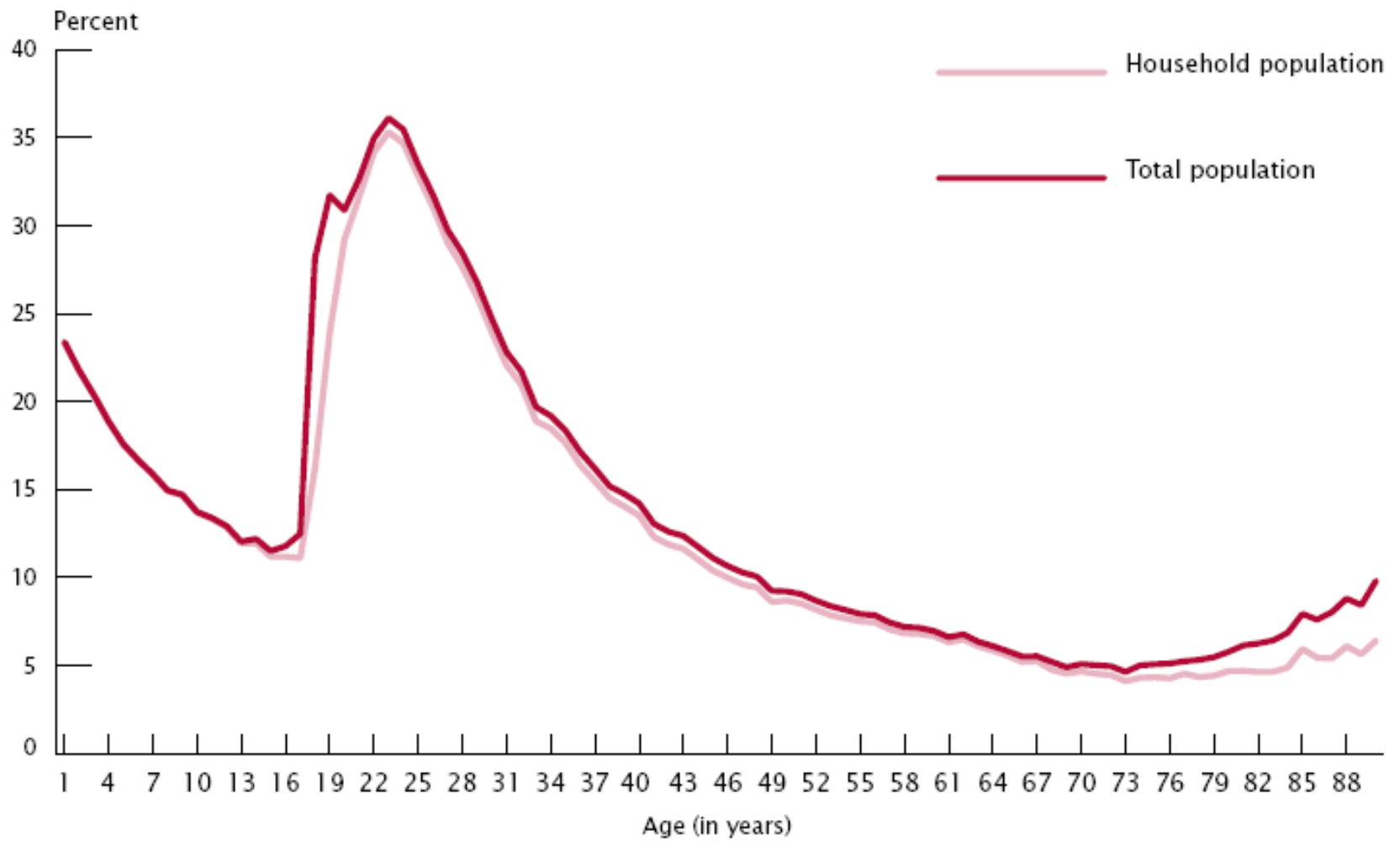


FIGURE 2 Cross-national variations in migration age profiles



SOURCE: Authors' calculations based on five-year-interval migration data reported by single-year age groups. Migration data were normalized to sum to unity and smoothed using kernel regression (Bernard and Bell 2012).

Age-specific Rates of Residential Mobility, United States, 2008-2009



Source: Ihrke, Faber and Koerber, 2011: 4.



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Migration data across countries

- Bell et al. (2015) investigated migration data for 165 countries
 - 162 collected internal migration information in some form
 - 141 collected such information from Censuses
 - 115 of them have information on place of birth (within the country)
 - 126 collected place of residence at some other prior date
 - 82 have information on duration of residence
- Previous place of residence at some prior time (transition)
 - 28 countries collected residence at a fixed interval of five years
 - 56 utilized a five year interval
 - 34 countries did not specify an interval (captured last transition)
 - 29 countries had some other length interval

Last-move, duration vs. Fixed prior date

- **Last-move data (previous residence) & duration of residence**
 - Best approach to measure migration (Xu-Doeve 2006)
 - The exact date of the move is reported by the duration of residence, which provides the full reconstruction of migration processes as they took place in real time
- **Place of residence at a fixed date in the past**
 - Highlighted as the one suited to estimate internal migration (UNECE 2005)



Last-move & duration of residence

1. Estimation of consistent instantaneous migration rates, along cohort lines, as a function of continuous time and age
2. Estimation of probabilities to make several moves within specified times intervals (multiple moves, trajectories)
3. Estimation of migrant stocks (absolute numbers)
4. Calculation of period rates
5. Adjustment of migration data for incompleteness of enumeration
6. Computation of transitions in any arbitrarily specified discrete interval of time and age



Residence at some fixed prior date

1. Impossibility to estimate cohort instantaneous migration rates as a function of continuous time/age (analysis in discrete time)
2. No proper data to estimate multiple moves, trajectories
3. Estimation of migrant stocks and flows is not properly identified
4. Migration rates obtained are not consistent with the standard definition of occurrence/exposure rates (denominator is not the number of person-years exposed to the risk of migration)
5. No correction for undercount migrant enumeration can be done
6. Only estimation of migration transitions in discrete time and age between fixed date in the past and date of enumeration



Age-specific out-migration rate

(last-move & duration of residence)

- $ASOMR_{x,ij}$ from region i to region j for age group x

$$ASOMR_{ij}^x = \frac{\sum_{t=0}^4 K_{t,ij}^x}{0.5K_{0,i}^x + 1.5K_{1,i}^x + 2.5K_{2,i}^x + 3.5K_{3,i}^x + 4.5K_{4,i}^x + 4.5K_{0,i}^x + 3.5K_{1,i}^x + 2.5K_{2,i}^x + 1.5K_{3,i}^x + 0.5K_{4,i}^x + 5K_{nm,i}^x}$$

- t : duration of residence in current place of residence (years)
- $K_{xt,ij}$: migrants from i to j for age group x
- $K_{xt,j}$: migrants from all regions different than i to region i for age group x
- $K_{xt,i}$: migrants from region i to all regions different than i for age group x
- $K_{xt,nm}$: non-migrants for age group x
- Sum of weights of immigrants ($K_{xt,i}$ for specific destination) and emigrants ($K_{xt,i}$ for specific origin) equals 5 years (length of period)

Age-specific out-migration rate

(place of residence at some fixed prior date)

- $ASOMR_{x,ij}$ from region i to region j for age group x

$$ASOMR_{ij}^x = \frac{\sum K_{ij}^x}{t * \sum \left[\frac{(K_{i.}^x + K_{.i}^x)}{2} + (K_i^x) \right]}$$

- t : years between date of reference and fixed prior date
- $K_{x,ij}$: migrants who lived in region i at the beginning of period and moved to region j at the end of period for age group x
- $K_{x,i.}$: migrants who lived in region i at the beginning of the period and live in another region at the end of period for age group x
- $K_{x,ii}$: population who lived in region i at the beginning, as well as at the end of period for age group x
- $K_{x,i.}$: population who lived in region i at the end of period for age group x

Some considerations

(place of residence at some fixed prior date)

- Denominator is an approximation for period person-years lived, based on estimation of population at the middle of the period
 - Population at the beginning of period for age group x
 $K_{x,i.} + K_{x,ii}$
 - Population at the end of period for age group x
 $K_{x,j}$
 - Population at the middle of period for age group x
 $[(K_{x,i.} + K_{x,ii}) + (K_{x,j})] / 2$
 - Length of the period
 t
- Assumption
 - Rate of migration is the same between those who died and those who survived during the period

Total out-migration rate

- Total non-out-migration rate ($TNOMR_{ij}$) for each time and combination of areas of origin and destination

$$TNOMR_{ij} = \exp(-\sum ASOMR_{x,ij})$$

- It is analogous to the relationship between the survivor function and the force of mortality

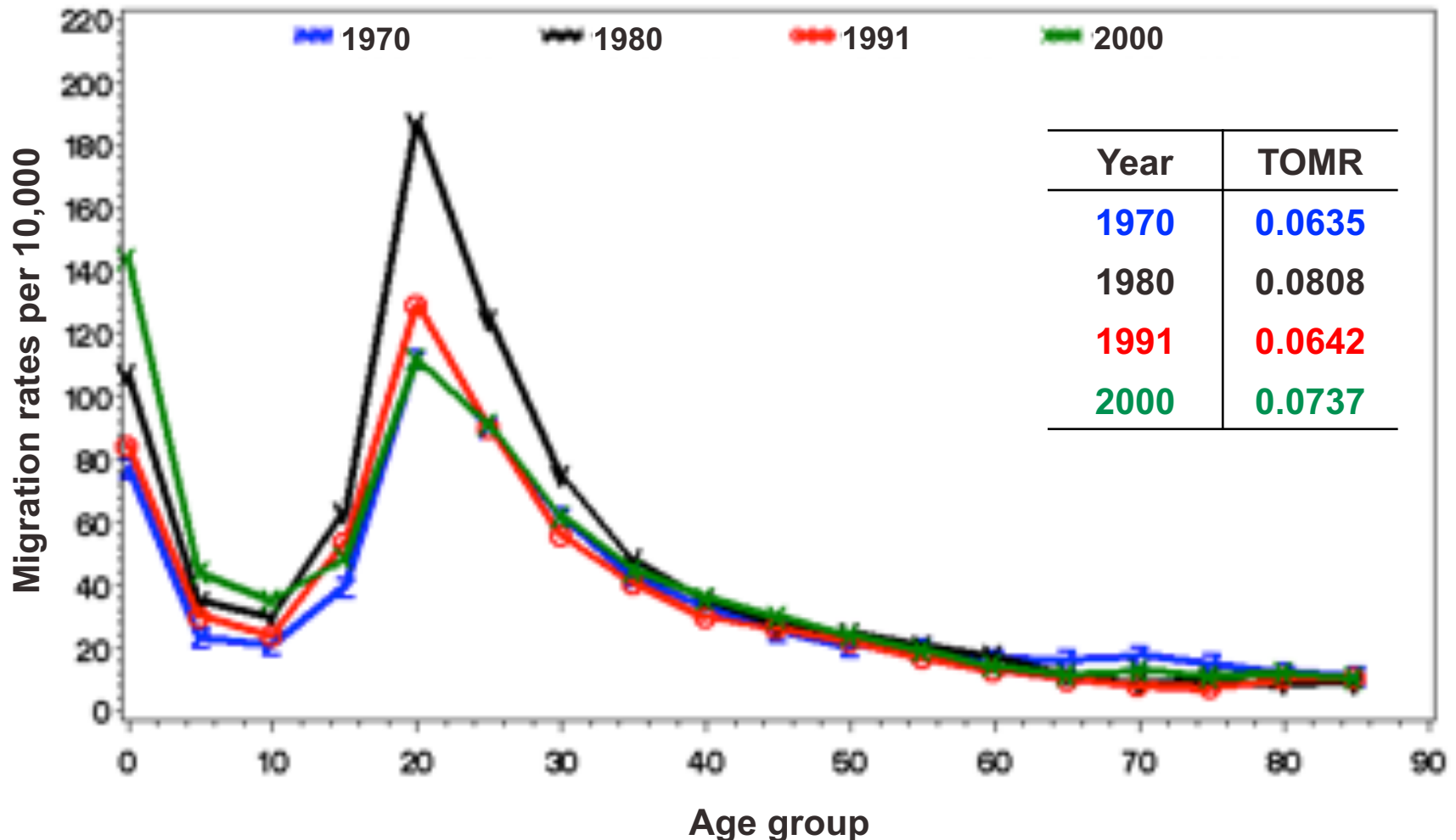
- Total out-migration rate ($TOMR_{ij}$)

$$TOMR_{ij} = 1 - TNOMR_{ij}$$



ASOMR, Northeast to Southeast, Males, Brazil

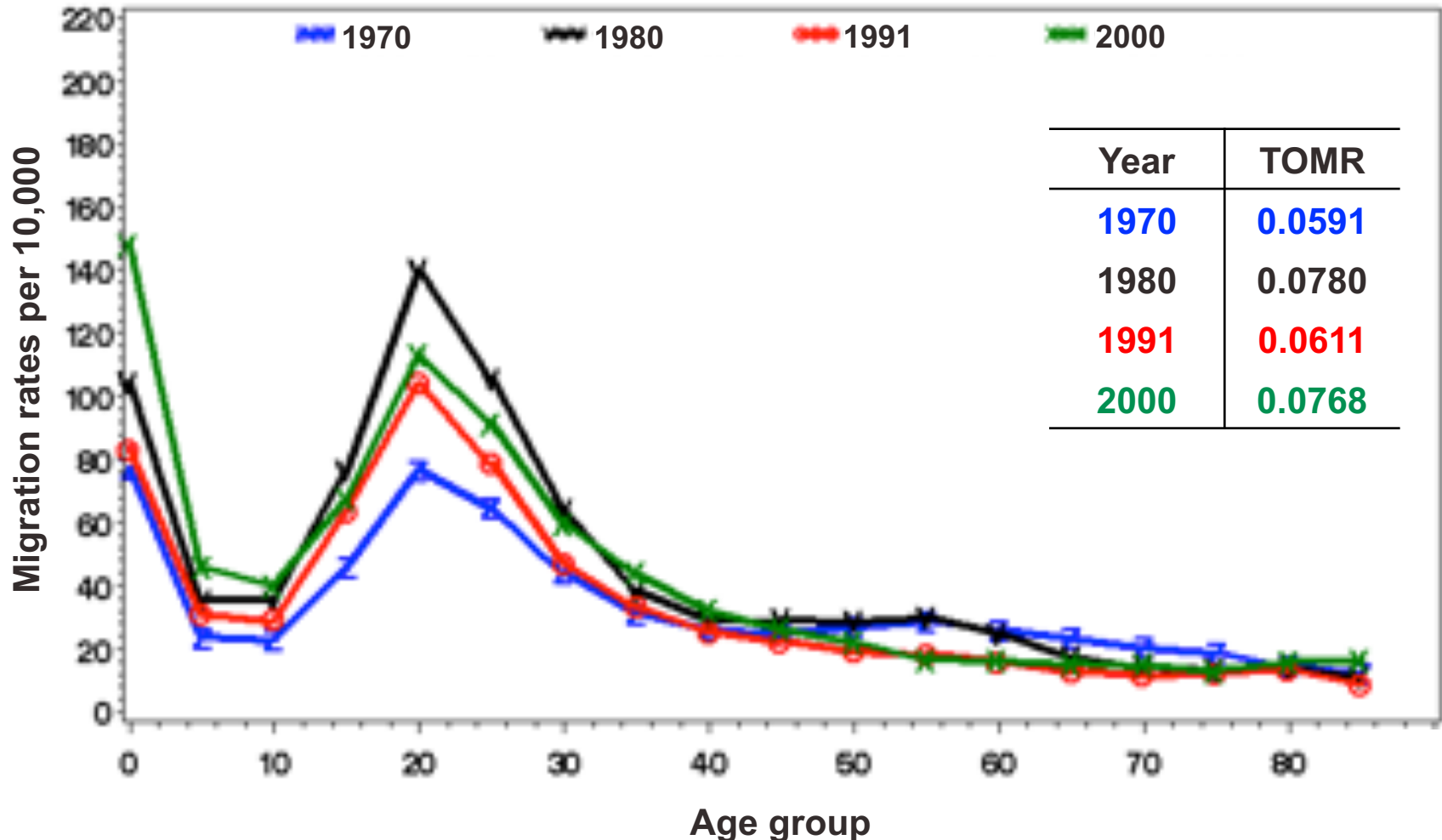
(last-move & duration of residence)



Source: Amaral 2008, pp.13, 22.

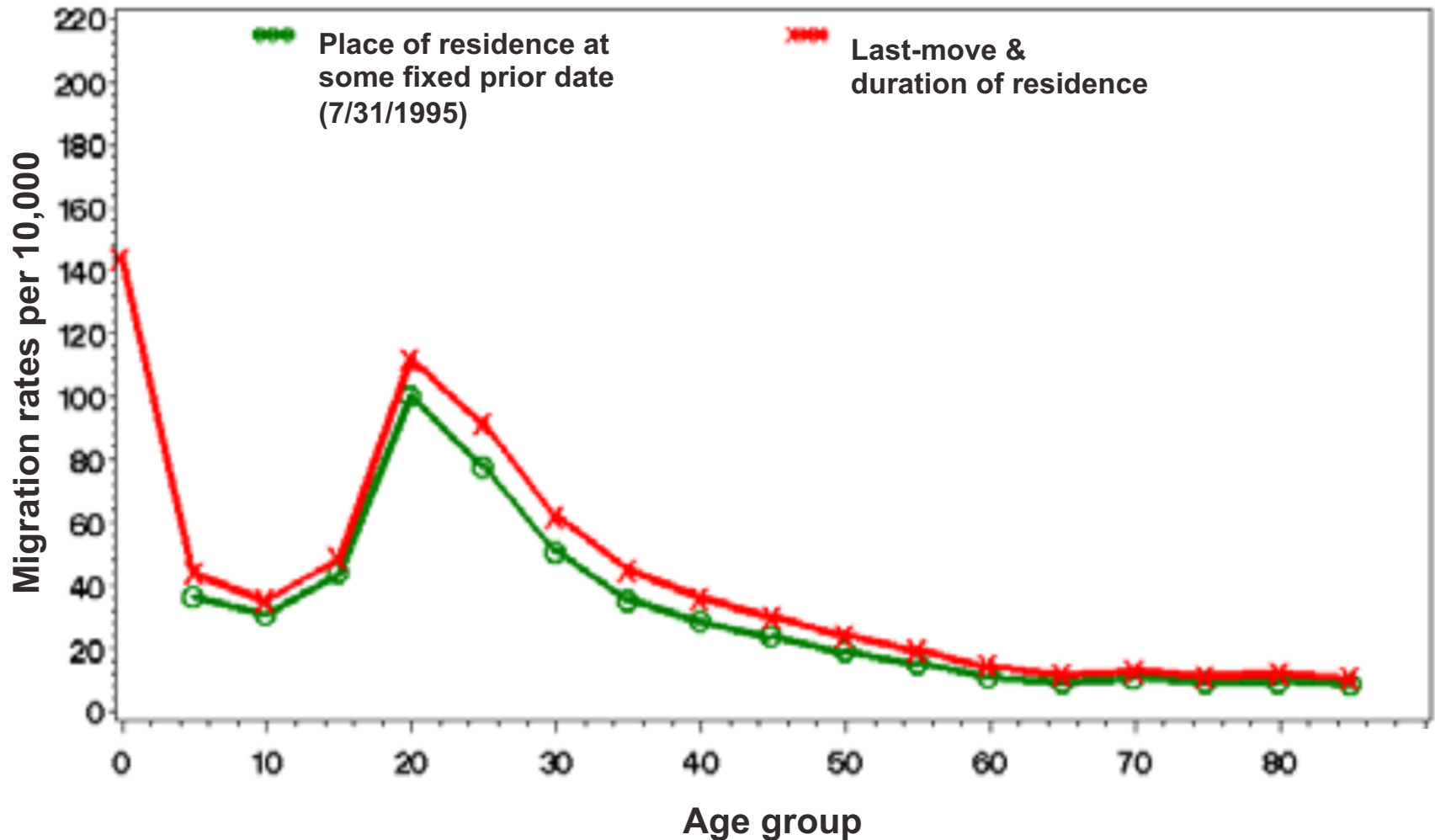
ASOMR, Northeast to Southeast, Females, Brazil

(last-move & duration of residence)



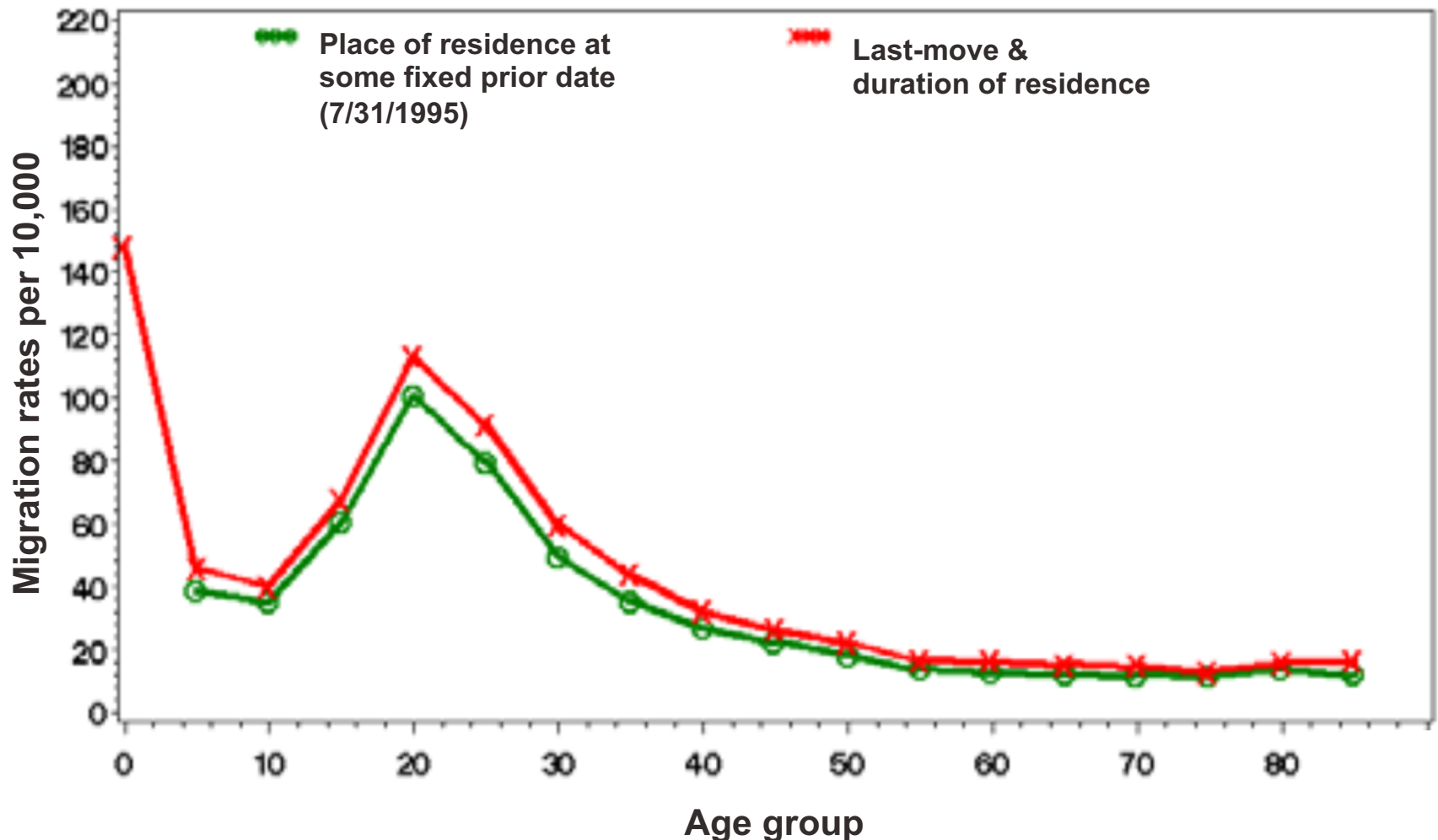
Source: Amaral 2008, pp.13, 22.

ASOMR, Northeast to Southeast, Males, Brazil, 2000



Source: Amaral 2008, pp.18.

ASOMR, Northeast to Southeast, Females, Brazil, 2000



Source: Amaral 2008, pp.18.

Age-specific in-migration rate

(place of residence at some fixed prior date)

- $ASIMR_{x,ij}$ from region i to region j for age group x
 - Denominator is adjusted to estimate the population at the middle of the period for the region of destination

$$ASIMR_{ij}^x = \frac{\sum K_{ij}^x}{t * \sum \left[\frac{(K_{j.}^x + K_{jj}^x) + (K_j^x)}{2} \right]}$$

- This rate is misleading
 - The denominator refers to people living in area of destination, which is not the group of people at risk of moving in
 - These people are precisely the ones who are not at risk of moving in, because they are already there



Measures of migration

- In-migration rate (IMR)

$$\text{IMR} = (I/P) * 1,000$$

- Out-migration rate (OMR)

$$\text{OMR} = (O/P) * 1,000$$

- Net migration rate (NMR)

$$\text{NMR} = [(I-O)/P] * 1,000$$

- Gross migration rate (GMR)

$$\text{GMR} = [(I+O)/P] * 1,000$$

- Migration efficiency ratio (MER)

$$\text{MER} = [(I-O)/(I+O)] * 100$$



Symbols from previous formulas

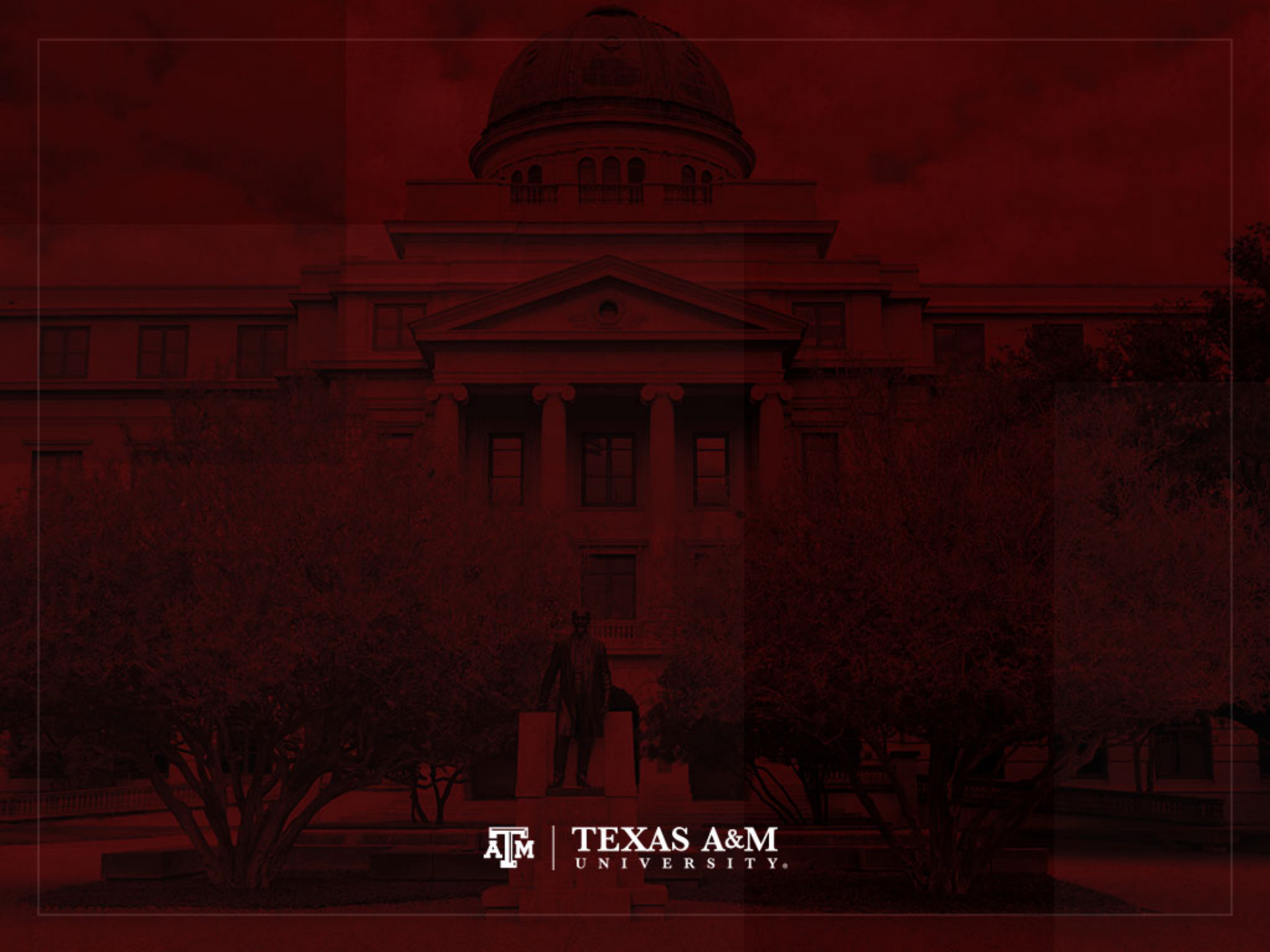
- “**I**” refers to the number of in-migrants moving into a area (of destination) during a specified time interval (usually 1 or 5 or 10 years)
- “**O**” refers to the number of out-migrants moving out to an area (of origin) during a specified time interval
- “**P**” is the denominator of migration rates, and refers to the midyear or average size of the population of the resident area
 - Demographers use the resident population as the denominator to calculate migration rates



State-to-state domestic migration: California, Nevada, New York, and Texas, 2004–2005

	Migration flows			
State	In-migrants	Out-migrants	Gross migrants	Net migrants
California	448,718	717,121	1,165,839	–268,403
Nevada	129,957	103,482	233,439	26,475
New York	226,065	465,913	691,978	–239,848
Texas	503,251	378,709	881,960	124,452

	Migration measures				
State	IMR	OMR	GMR	NMR	MER
California	12.9	20.5	33.4	–7.7	–23.0
Nevada	56.4	44.9	101.3	11.5	11.3
New York	12.2	25.1	37.3	–12.9	–34.7
Texas	23.4	17.6	41.0	5.8	14.1

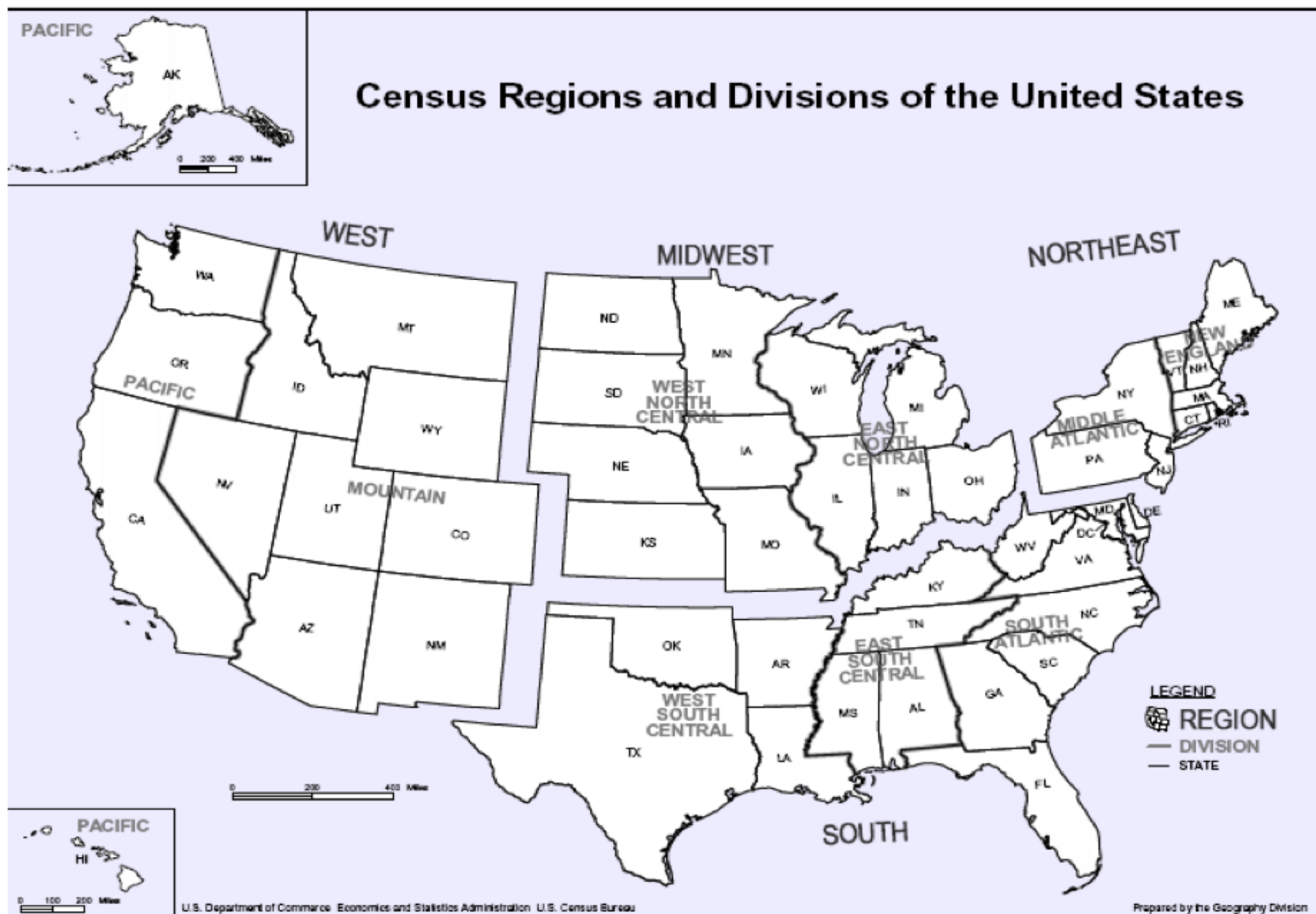


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Domestic migration in the U.S.

- During the 19th and early 20th centuries, there was a steady stream of migration settling beyond the Mississippi River
- Between the late 1800s and 1960s, the South had been the major exporter of people
- Since the 1970s, the major inter-regional migration flows within the United State have been from East to West and from North to South





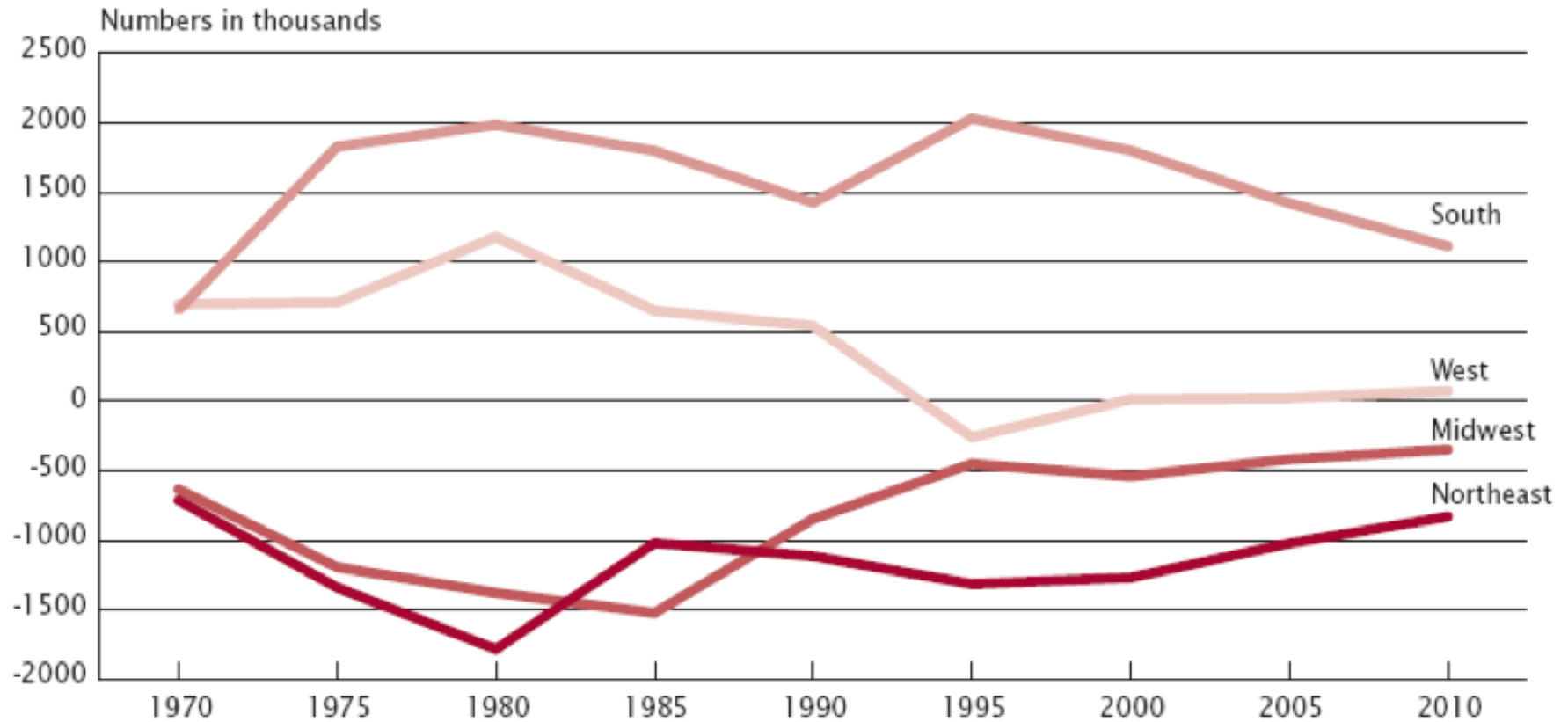
Source: U.S. Census Bureau: http://www2.census.gov/geo/pdfs/maps-data/maps/reference/us_regdiv.pdf (accessed April 29, 2016)

Regional migration patterns

- For every 5-year period between 1970–2010, the South has been the only region to have continuously experienced positive net migration
- The West region has moved from positive to negative in 1995, and to slightly positive in 2010
 - The South and West were popular destinations particularly among graduate degree holders who are 25 years old and older
- The Midwest and Northeast regions have continuously had negative net migration



Five-year domestic net migration by region, 1970–2010



Great Migration

- During the **Great Migration** (1910–1970), over 6 million blacks moved out of the rural South to the Midwest, Northeast, and Pacific Coast
- Almost 90% of African Americans were living in the South in 1900
- By 1970, the states of New York, Illinois, and California had received large numbers of African Americans



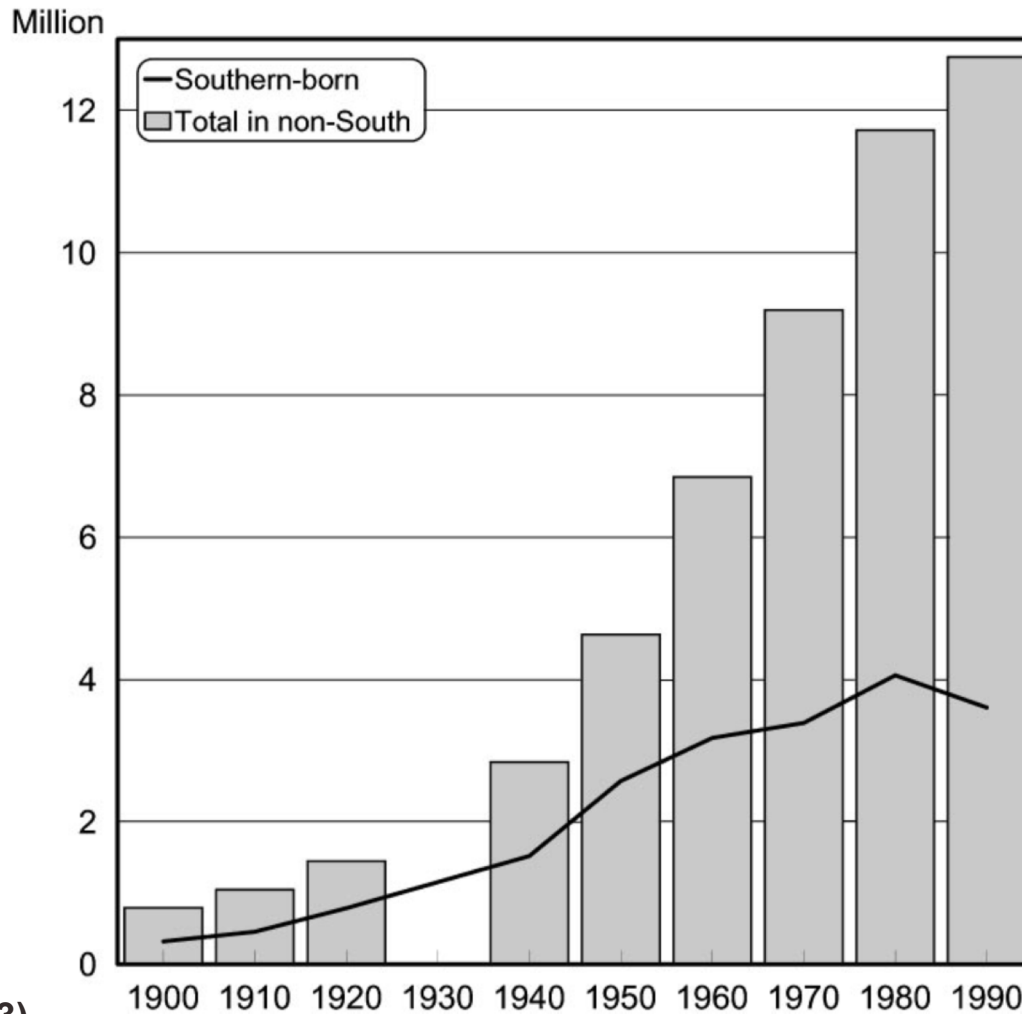
African American Great Migration

(Tolnay 2003)

- African American Great Migration from the South to the North happened during the 20th century
- African Americans were seeking better socioeconomic opportunities for their families
- This migration contributed to social, economic, demographic, and cultural transformations in northern cities



African Americans in nonsouthern areas



Source: Tolnay (2003).



The Great Migration, 1916–1930



Map by Michael Siegel
Rutgers Cartography 2005

Source: "The Atlas of African-American History and Politics"

The Second Great Migration, 1940–1970



Map by Michael Siegel
Rutgers Cartography 2005

Source: "The Atlas of African-American History and Politics"

Racial and ethnicity hierarchy

(Tolnay 2003)

- Whites also moved to the North in large numbers between 1910 and 1970
- However, whites did not experience disadvantaged positions as blacks in the South
- Segregation and concentration of poverty in the growing northern ghettos, limited residential mobility of African Americans
- This historical process has to be understood in order to further investigate black migration and mobility



Post-Great Migration

(Tolnay 2003)

- After the Great Migration, changes contributed to the desire by black inner-city residents to relocate to the suburbs and to better neighborhoods within the North
- Cross-generational familial and cultural connections contributed for blacks returning to the South
- Only after changes took place in the South, towards socioeconomic and political equality for blacks, return migration became attractive



Recent migration

- After the 1970s, we see a reversal migration
- Younger, college-educated migrants moving to a more prosperous and post-civil rights South
- Cities and metro areas of Atlanta, Dallas, and Houston are among the most popular destinations for Whites, Blacks, and new immigrant minorities



Migration by age

- Today, young adults (20–29) are more likely to move than anyone else
 - Reasons are related to school, employment, and marriage
- People 40+ are much less likely to move
 - Older people are more likely to stay in an area

Migration by education

- Highly educated people are more likely to migrate
- The farther the move, the more likely education will play a major role in the decision of moving



Migration by occupation

- White collar workers are the most mobile occupational group
- Farm and service workers are the least mobile
- Manual workers are more likely to move locally
- People who are not in the labor force are also likely to move



Consequences of migration

- Decision to migrate
 - Likely reached when advantages of moving to destination outweigh disadvantages of staying in origin
- Population movements (small or large) have effects on the places of origin and destination
 - They affect movers and non-movers
- The effect of moving for an individual migrant differs from the effect of an aggregate migrant population



Effects of individual migrant

- Major effect of migration to an individual migrant
 - Whether social, economical, political, or physical characteristics of a new environment are more favorable or preferable than those of previous residence
- These preferences usually depend on
 - Migrant's personal observations and experiences
 - Whether migrant possesses the right skills to adapt to the new area
 - Whether migrant is readily accepted



Effects of aggregate migration

- The area of origin is affected by the number and the type of migrants moving out of the area
- A large out-migration will significantly affect an area's potential population growth
- For instance, if the net migration rate is highly negative and the population staying is largely elderly

Effects of in-migration

- Two ways that in-migration contributes to the increase of population in the area of destination
 - Net number of in-migrants constitutes a **direct** effect of population increase
 - Number of children born to the in-migrants after their arrival is the **indirect** effect
- Magnitude of effects
 - Magnitude of **direct** effect depends on the relative size of migrants, compared to receiving population
 - Magnitude of **indirect** effect depends on the relative levels of reproductive behavior of migrants, compared to receiving population





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Internal migration in China

- In China, a permanent change in residence requires the government approval
- With this approval, individuals can officially transfer their household registration (*Hukou*) from an area of origin to an area of destination

Hukou system

- The *Hukou* system is a household registration system first enacted in 1948
 - It acted as a barrier to prevent rural residents from moving into urban areas
- Urban residents were entitled to subsidized housing, social insurance, medical care, and formal employment
- Rural residents were denied these rights and entitlements

Changes in the 1970s

- In the late 1970s, Deng XiaoPing, who succeeded Mao Zedong, began making major economic reforms
- He opened many low-level construction, manufacturing, and household service job opportunities for rural agricultural workers

Floating migration in China

- Two types of internal migration in China
 - Permanent change in the place-of-household registration, formally approved by the government
 - Move with no approval by the government
- Floating migration is the residential movement of crossing a political boundary without the government permission
 - Movers of this type of migration are known as **floaters**
 - They have not altered their permanent registration in a household registration office



Recent levels of floaters

- In the 2010 census, there were more than 220 million floaters in China
- These migrants are mainly young and unmarried males and females looking for blue-collar, service and household jobs
- Overall, they are more educated than the rural population, but they are less educated than the general population

Recent levels of floaters

- For every legally permitted migrant, there are about 12 to 13 inter-province floating migrants
 - Floaters comprise about 40% of the country's total urban population in China
- Floaters make 20% to 40% less than their permanent urban worker counterparts
 - Their wages in the big cities are still several times greater than the wages they would make in their home rural villages
 - They usually remit a large proportion of their salaries to their families in the home villages



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Analysis of spatial association

(Anselin 1995)

- In spatial association analysis, it has long been recognized that the assumption of stationarity or structural stability over space may be highly unrealistic
 - Especially with a large number of spatial observations (areas)
- In exploratory spatial data analysis (ESDA), the predominant approach to assess the degree of spatial association ignores this potential instability
 - It is usually based on global statistics such as Moran's I
- The local indicator of spatial association (LISA) was suggested to identify local clusters and spatial outliers



Local spatial autocorrelation

- Local indicators of spatial association (LISA) allow for the decomposition of global indicators (e.g., Moran's I) into the contribution of each individual observation (area)
- LISA allows for a classification of significant locations as
 - **High-high** and **low-low** spatial clusters
 - **High-low** and **low-high** spatial outliers
- Reference to high and low is relative to the mean of the variable
 - It should not be interpreted in an absolute sense
- GeoDa: An introduction to spatial data analysis
 - <https://spatial.uchicago.edu/geoda>

Source: https://geodacenter.github.io/workbook/6a_local_auto/lab6a.html.

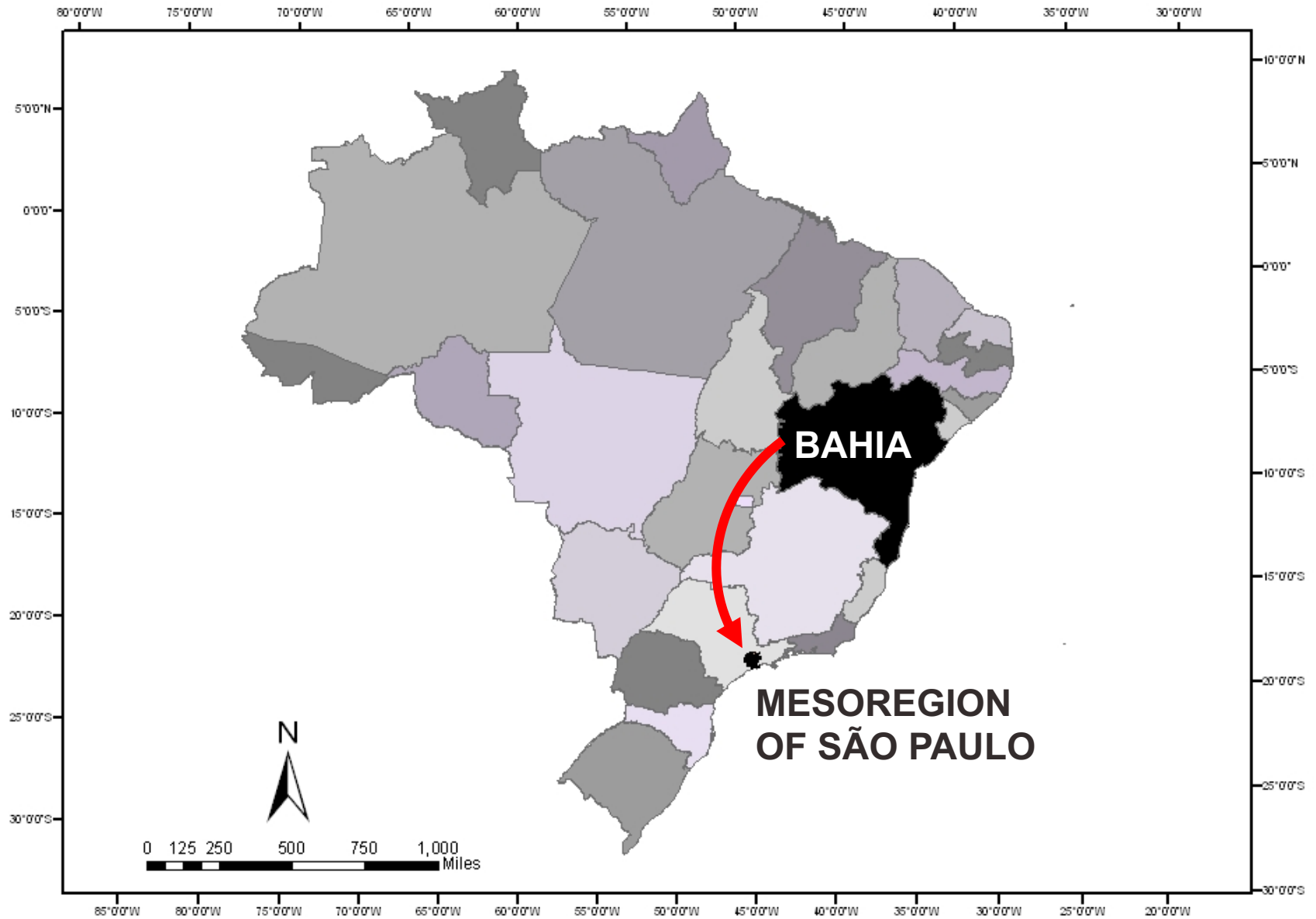


LISA example

- Analyze concentration of in areas of origin and destination
- 2000 Brazilian Census has migration data
 - Areas of origin: 415 municipalities in the state of Bahia
 - Areas of destination: 875 groups of census tracts in the mesoregion of São Paulo
- Migrants: men with at least 23 years of age (N=4,553)
 - Avoids familial migration: women and children
 - At least 23 years old: only those who migrated with at least 18 years of age

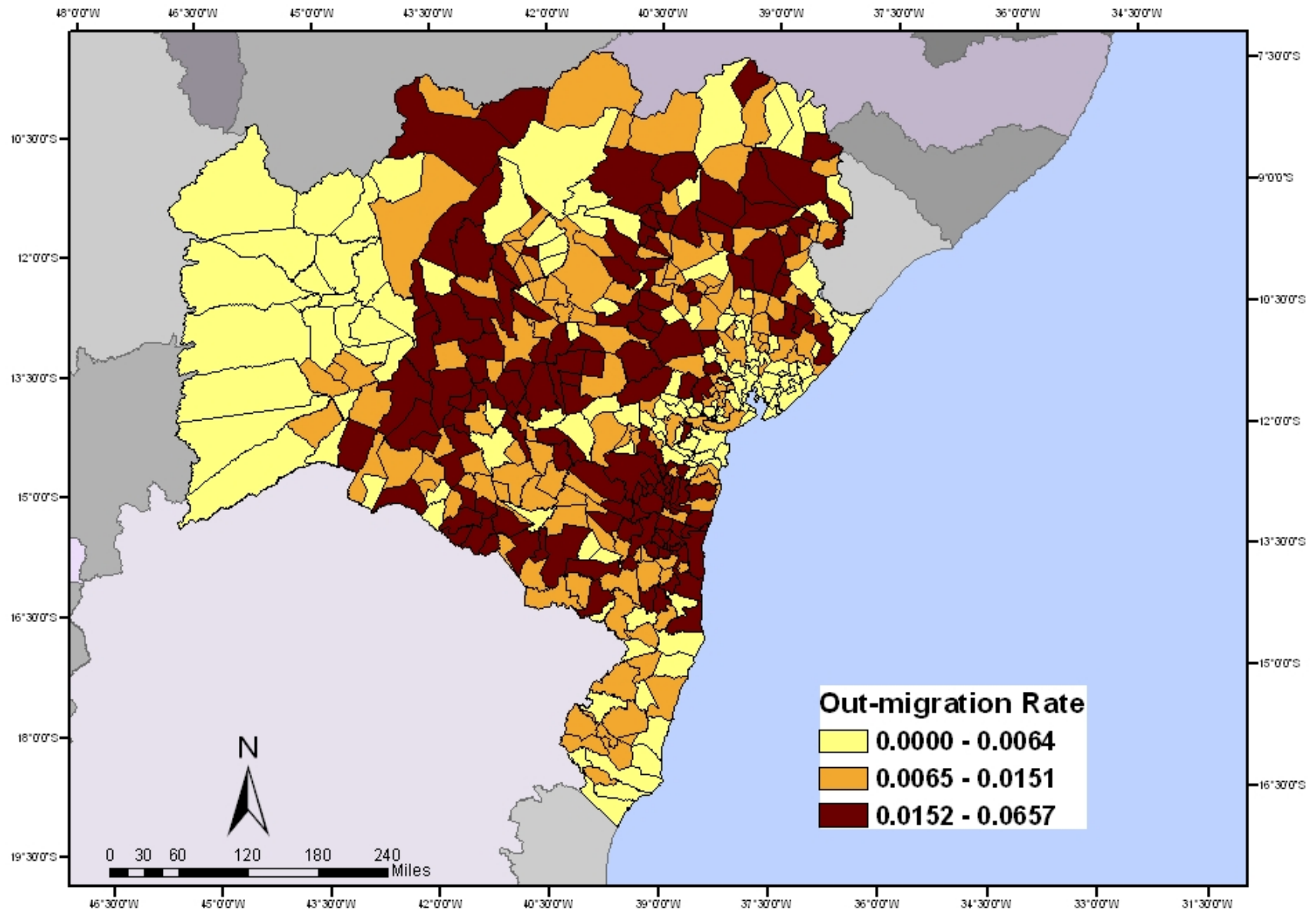


Brazil



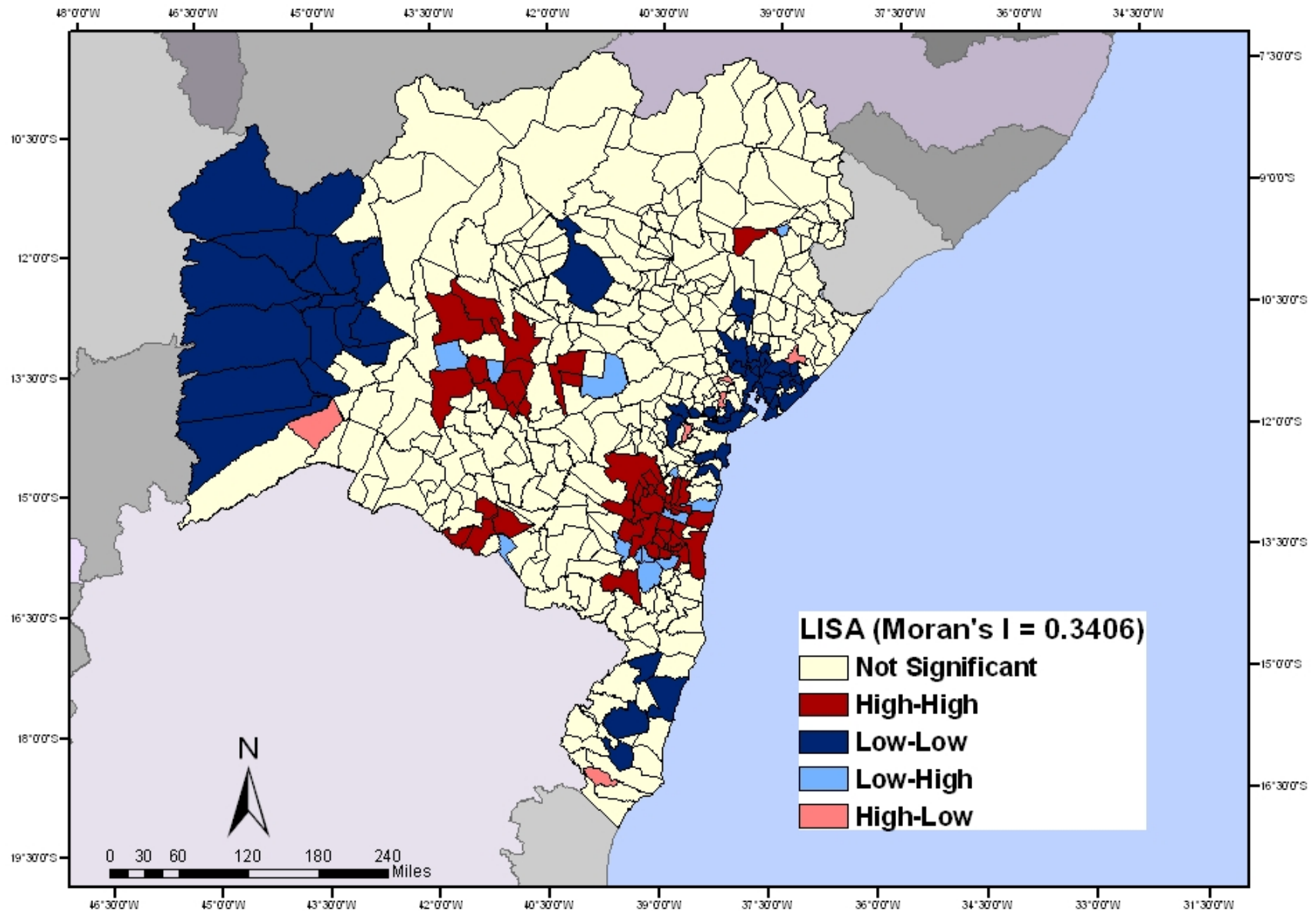
Source: Amaral 2011.

State of Bahia (area of origin)



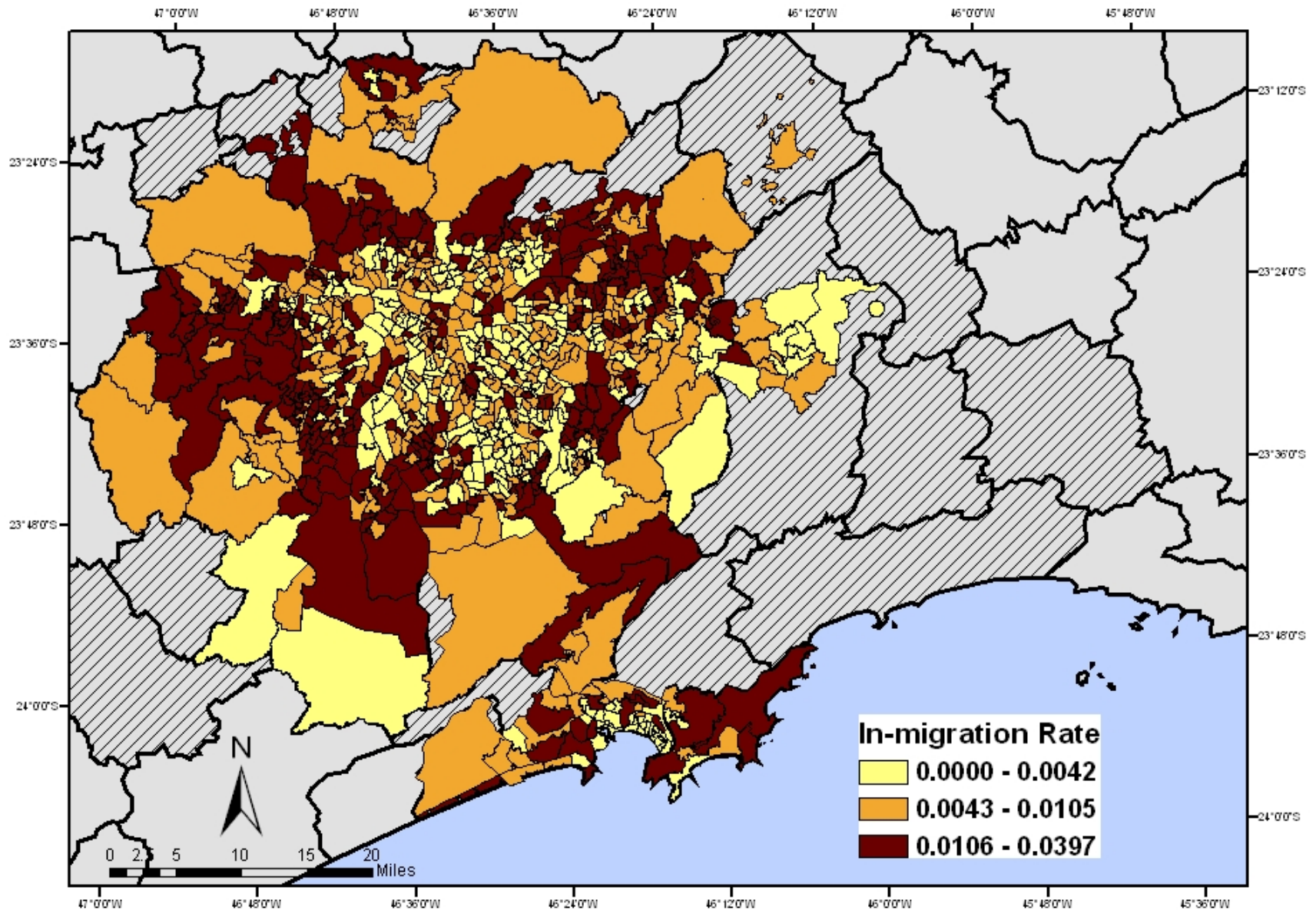
Source: Amaral 2011.

LISA Clusters (Moran's $I = 0.3406$)



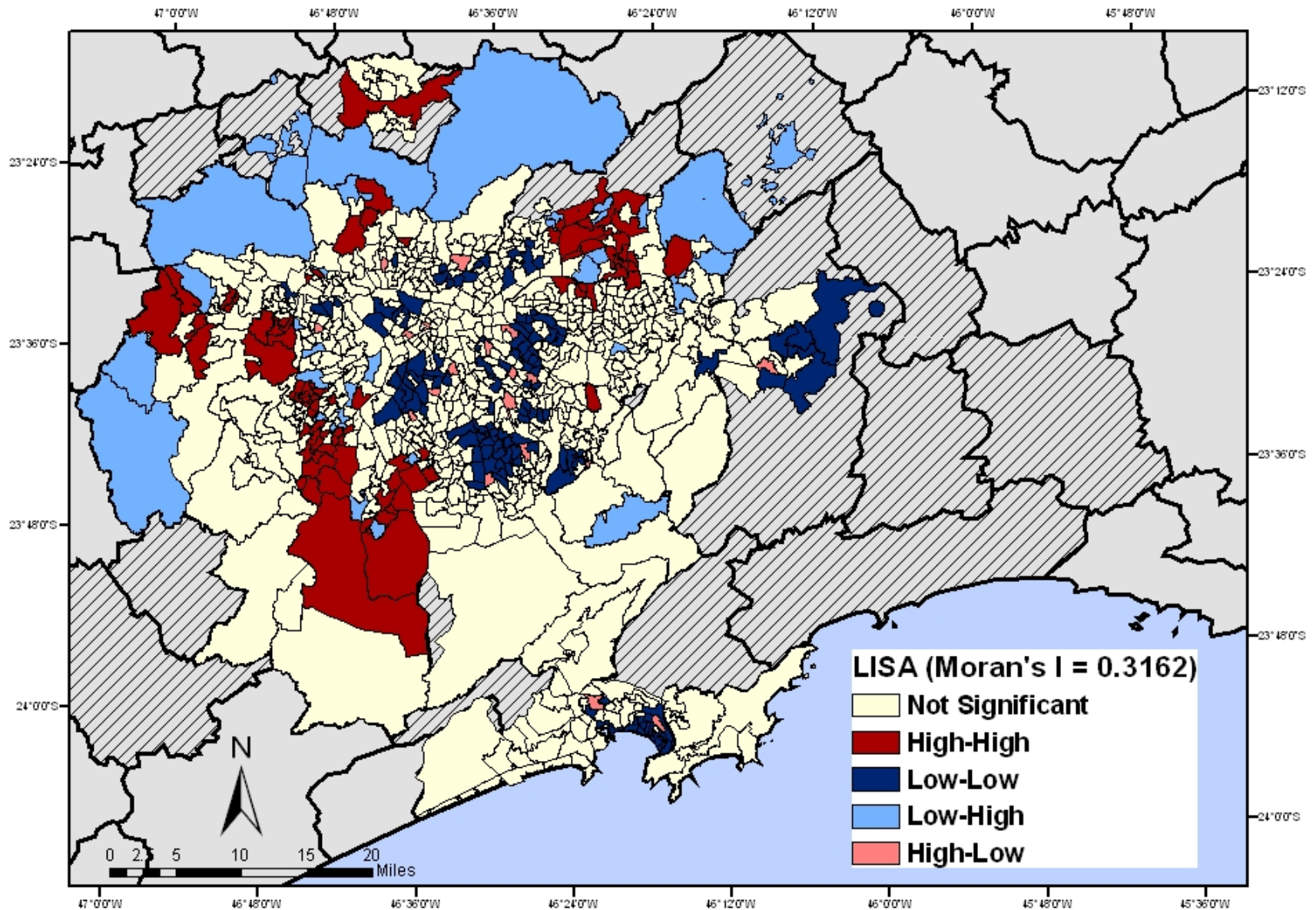
Source: Amaral 2011.

Mesoregion of São Paulo (area of destination)



Source: Amaral 2011.

LISA Clusters (Moran's $I = 0.3162$)



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TEXAS A&M
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