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**Project for the Regional
Advancement of Statistics
in the Caribbean**

**Projet régional pour
l'avancement de la statistique
dans les Caraïbes**

Funded by the
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Population Estimates
Component: Household Survey Infrastructure

Funded by the
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Module 3.4

Estimating International Migration

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An important component of pop. change

- Natural increase is getting lower with population ageing
- The economy is becoming more global and interconnected
- Net international migration is extremely sensitive to economic situation, political events, ecological disasters, etc.
- Age structure of international migrants is generally different from that of the total population



Defining migration...

- The term “migration” has in general usage been restricted to relatively ***permanent*** changes in residence between specifically designated political or statistical areas.

- United Nations:

“An international migrant is a person who changes his or her country of abode. A person’s country of abode is the country where that person spends most of his or her daily night rest over a period of a year.”

Source: SHRYOCK, Henry S., Jacob S. SIEGEL and all. 2004. *Studies in Population: The Methods and Materials of Demography*. Washington: Academic Press, Inc.



Defining migration...

- If we are dealing with population estimates based on a *de jure* approach, we need to distinguish permanent and temporary movements
 - Exclude movements that do not generate a change in usual place of residence
 - In some countries, the definition of a “permanent” migration is based on the length of stay (6 or 12 months)
 - In Australia, the rule “12/16” is used meaning that a foreigner will be considered an in-migrant if he/she stays in the country for 12 of the next 16 months.



Many collection systems

1. Statistics collected on the occasion of the **movement** of people across international borders, mostly as by-products of the administrative operations of border control, and “**passenger statistics**” obtained from lists of passengers on sea or air transport manifests.
2. Statistics of passports and of applications for passports, visas, work permits, and other documents for international migration.
3. Statistics obtained in connection with population registers.
4. Statistics obtained in censuses or periodic national population surveys through inquiries regarding previous residence, place of birth, nationality, or citizenship.
5. A new source: social media use, cell phone use (big data)

Source: SHRYOCK, Henry S., Jacob S. SIEGEL and all. 2004. *Studies in Population: The Methods and Materials of Demography*. Washington: Academic Press, Inc.



The border control files: a potential source

- Does every OECS member has access to this information ?
- Montserrat has been using this information for several years
- This information has its limits but still has potential
- Australia developed a method based on this information



Passenger Files: Content of MNI info

- Event
 - **Date, Arrival/Departure**, Sea/Air, Flight Number
- Personal information
 - **DOB, Sex**, Occupation, COB, Nationality, **Immigration Status**
- No Unique Identifier
 - Passport / Visa number
 - Limits the evaluation of the file and E&I processes
 - Mandatory to implement the Australia Method



Limits of the border control data

- Most important source for the **direct** measurement of migration.
- Most frequently available source.
- The quality of data in international migration based on frontier control operations is generally poorer than that of census counts or Vital Stats
 - There are many forms of movements and they are not easy to define or classify
 - The classification based on duration of stay or purposes of migration **depends on statements of intentions**, and the actual movements may not correspond to these statement or intentions.
 - The mere counting of persons on the move is extremely difficult, especially when a country has a very long boundary that is poorly patrolled.
 - **Controls over departures are usually less strict** than over arrivals so that statistics of emigration are more difficult to collect and less accurate than statistics of immigration.

Source: SHRYOCK, Henry S., Jacob S. SIEGEL and all. 2004. *Studies in Population: The Methods and Materials of Demography*. Washington: Academic Press, Inc.



Passenger Files: Quality Assessment

- As it is the case for the base population and vital statistics, the passenger files must be evaluated to see their « fit-for-use » for population estimates purposes
 - Internal quality of information (% missing cases)
 - Demographic indicators: Net migration rates
 - Historical series
 - Comparison with other sources (Census, surveys, other admin data)



Internal quality of information

- The following information is of main interest:
 - Date and Type of movement (Arrival, Departures)
 - Gender, DOB, Immigration Status
- QAC must be done on these variables
 - Errors are more likely to be found in dates
- Define a list of checks to do and E&I processes related to correct inconsistencies



Internal quality of information

- Examples of quality checks:
 - Date of movement > DOB
 - Age and Occupation should be coherent. Which info is of better quality?
 - If you have a case where the person is said to be retired and is 10 years old, where is the error?
 - Can immigration status change overtime?



Passenger Files: MNI Quality Assessment

- By looking at the MNI microdata, we saw that
 - Some missing information
 - Some events (arrivals / departures) are missing
- Is the information coherent?
 - Cases where DOB is later than Date of event
 - Cases where DOB and occupation does not fit
- Overall, the quality was considered sufficient for population estimates purposes



Quality assessment through data analysis

- Net migration rates can be calculated
 - However, migration can fluctuate way more than vital statistics
- Consistency checks based on historical series



Passenger Files: Quality Assessment

- If we look at the MNI data for reference year 2010-2011, it looks pretty stable.

	2010-2011		2011-2012		2012-2013		2013-2014		2014-2015	
	ARR	DEP	ARR	DEP	ARR	DEP	ARR	DEP	ARR	DEP
Jul	1,188	1,555	1,175	1,407	1,231	1,356	1,520	1,549	1,426	1,575
Aug	1,121	1,074	1,215	1,225	1,191	1,259	1,899	1,972	1,786	1,627
Sep	1,167	813	940	810	1,083	927	1,074	1,006	866	935
Oct	917	1,104	940	893	857	854	1,058	1,030	1,110	1,058
Nov	954	872	1,040	954	1,268	1,019	1,243	1,177	1,445	1,231
Dec	1,959	1,244	1,774	1,297	3,769	1,841	1,845	1,348	2,747	1,931
Jan	1,045	1,632	1,128	1,474	964	2,814	1,212	1,560	1,154	1,874
Feb	815	789	927	918	1,132	1,096	1,270	1,127	1,160	1,176
Mar	1,186	1,219	1,369	1,411	1,465	1,605	1,608	1,788	1,899	1,829
Apr	1,133	1,370	1,116	1,298	1,056	1,135	1,392	1,470	1,362	1,648
May	957	899	1,056	1,005	1,200	1,246	1,263	1,228	1,470	1,414
Jun	1,242	1,269	1,020	1,047	970	965	1,385	1,495	1,253	1,283
Total	13,684	13,840	13,700	13,739	16,186	16,117	16,769	16,750	17,678	17,581
Net		(156)		(39)		69		19		97



Quality Assurance Control

- Another way to assess the quality of the file would be to find other sources of information that could also give SDM information on international migration
- Comparison with Census on Census years?
 - Are there questions on international migration in the OECS members Censuses?
- Are there any other existing administrative sources – currently underused or not used at all – that could be employed to benchmark passenger movement files?

How important is NIM for OECS members?

- In some country where passenger movements files are not available, an assumption where $NIM = 0$, can be made.
- But before making this assumption, we should check its validity
- NIM can be estimated by looking at:
 - Population change between censuses
 - Estimating the natural increase between censuses
 - This approach is called the Residual Method, the residual being the NIM



How important is international migration in MNI?

- Let's use the residual method. We know that:
 - MNI Population 2001= 4491
 - MNI Population 2011= 4922
 - Number of births between 2001 and 2011 = 531
 - Number of deaths between 2001 and 2011 = 485
- What was the population growth for 2001-11? (431)
- What was the natural increase for 2001-11? (46)
- What was the net residual migration for 2001-11? (385)



How important is international migration in MNI?

- What was the population growth for 2001-11? (431)
- What was the natural increase for 2001-11? (46)
- What was the net residual migration for 2001-11? (385)
- Because of the importance of NIM in the overall MNI population growth, the assumption cannot be used
- This check should be done by every OECS members



Two ways to work with the passenger files

- If the data is fit for use, how can we use it?
- There are two ways to use the passenger files
 - Aggregate approach (SDM current approach)
 - Longitudinal approach
- Both approaches have their pros and cons
- Aggregate approach
 - Cost less but less precise
- Longitudinal approach
 - Cost more but may lead to higher precision



The aggregate approach

- To estimate the NIM for a reference year,
 - You sum the number of entries by age, sex and immigration status
 - You sum the number of exits by age and sex and immigration status
 - You subtract both series and you obtain NMI by age and sex and immigration status
- If on paper, the method is simple, it requires several manipulations of huge files and several edit and imputation processes



The aggregate approach (2)

- In theory, the aggregate approach can allow the use of all records, even those of tourists, as the temporary movements (short stays) should cancel out.
- Montserrat experience showed that this is not always the case.
- In that matter, SDM estimated two sets of estimates starting from reference year 2011-2012
 - The first with all movements
 - The second with movements of usual residents



The aggregate approach (3)

- When Montserrat compared the two population estimates with the 2018 ICC population counts, the estimates produced by using the NIM of usual resident movements gave better results than the estimates using NIM measured from all movements.



Passenger Files: Coverage

- When using the information, SDM is only using movements generated by the green categories

MCR	MNI citizen - living abroad coming home for good
MCA	MNI citizen - normally resident abroad
MC	MNI citizen - living in MNI
MR	MNI resident - private living here but not MNI citizen and not working
MRP	MNI resident - professional, not a MNI citizen, lives in MNI and works for GOM, DFiD, Governors Office, MVO
MRW	Not a MNI citizen lives and works in MNI but not CARICOM
CW	CARICOM Worker
VP	Visitor/Professional: Visiting GOM, DFiD, Governors Office, MVO
VB	Visitor - Business in MNI in pursuit of the business of his/her employer
VC	Visitor - Conference / Course
TD	Tourist - Day Trip
TA	Tourist - Apartment/Rented Villa
TH	Tourist - Hotel
TG	Tourist - Guest House
TR	Tourist - Staying with any person who lives in MNI



Passenger Files: Seasonal Variation

- When using the passenger files in an aggregate way, seasonal variation may lead to biased estimates
- If a lot of people arrive in June and leave in July, the mid-year population estimates will be overestimated
- As we are aiming at producing *de jure* estimates, we want to avoid that.



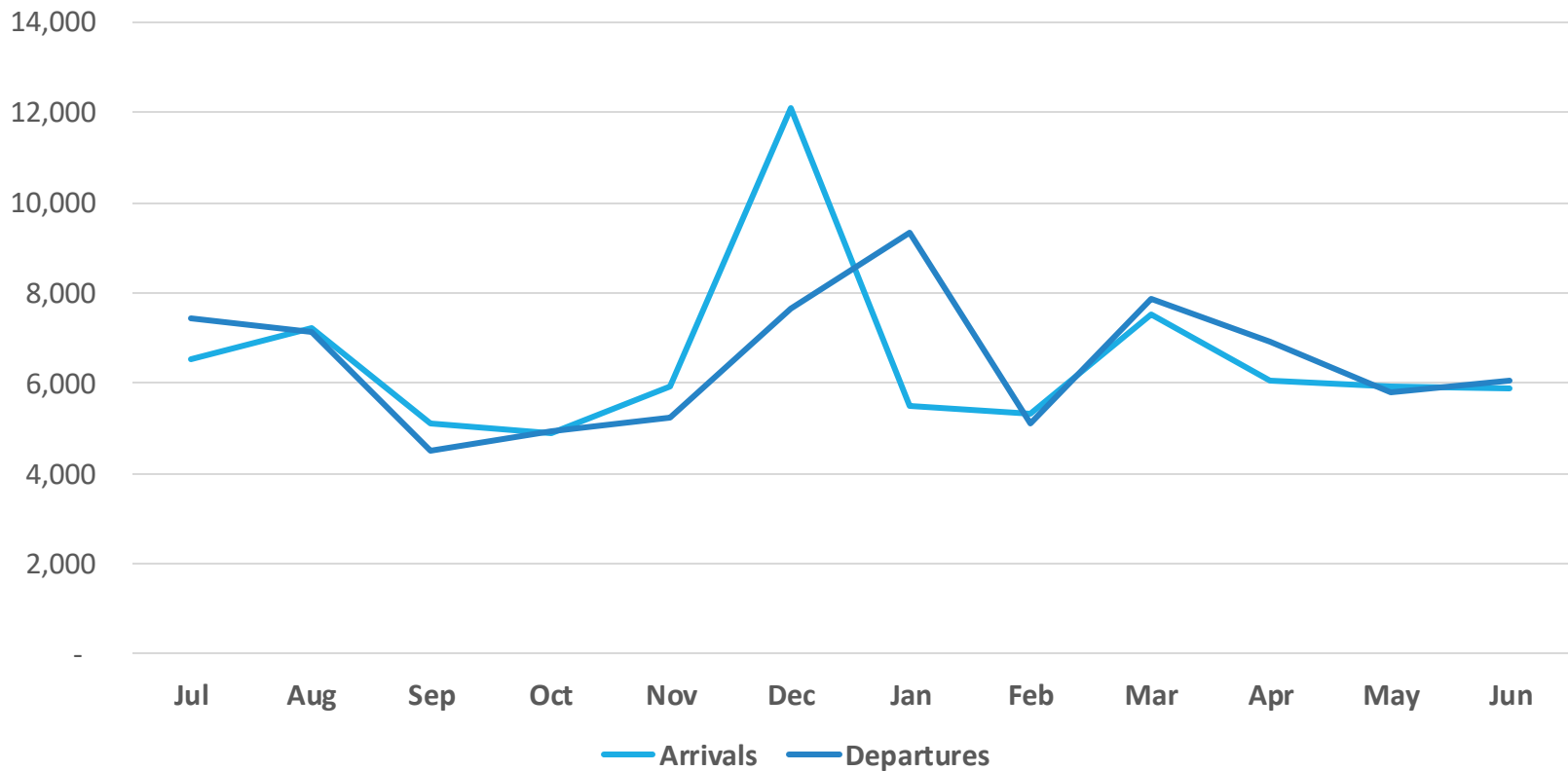
Passenger Files: MNI Seasonal Variation

- Movements from and out MNI are affected by seasonal variations
- Data would not be fit for estimating the *de jure* population as of December 31.
 - Population would go artificially up in December and would go down in January
- Since seasonal variation is low surrounding mid-year, the aggregate approach can be used for estimating the June 30 *de jure* population as entries and exits of tourists are canceling out



MNI Passenger Files: Seasonal Variation

Arrivals and Departures, 07/2010 to 06/2015





The longitudinal approach

- A costly approach
- Requires data manipulation and programming
 - Use of statistical software & need for trained staff
- The microdata is used to create a « migration biography » for each individual
- The Australia approach



The Australia approach

- In 2006, Australia Bureau of Statistics has developed a method using microdata information
- The method is creating biographies for each individual that crossed the border and looks at the length of its stays in and out of the country
- StatCan is developing a software (in R) to reproduce the same method. The software could eventually be used by the OECS members.



The Australia approach (2)

- If a « foreigner » arrives in the country and stays for 12 of the next 16 months, he will be considered an in-migrant
- If a « national » of a « citizen » leaves the country and stays outside for 12 of the next 16 months, he will be considered an out-migrant
- To know more about this method, you can visit the ABS website.



Recommendations

- Keep working on the acquisition of the passenger files
- For each country, evaluate if the $NIM = 0$ assumption is weak or not
 - Calculate the net residual migration for the 2001-2011 period



Recommendations

- While the longitudinal approach (Australia) is not ready, continue to promote the use of an aggregate approach
 - If quality of data is stable
 - If seasonal variation at mid-year is not strong
- OECS should also look at alternative ways to measure NIM
 - Indirect methods to estimate net international migration



Thank you!

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