# Spatial Analysis of Socio-economic Development in Pacific Island Countries

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# Datasets and possible spatial analysis of socio-economic development

## Census via SPC PopGIS

Pros:

- Covers the whole country
- EA Level data
- Geocoded

Cons

- No urban/rural boundary provided
- Out dated for some countries

Analysis:

- Remoteness and Dispersion analysis
- Mainland/outer island analysis
- Migration patterns

## HIES

Pros:

- More frequent
- Urban vs rural

Cons

- Sample, and not always 100% representative
- representativeness w.r.t. small outer islands is in fact unknown

Analysis

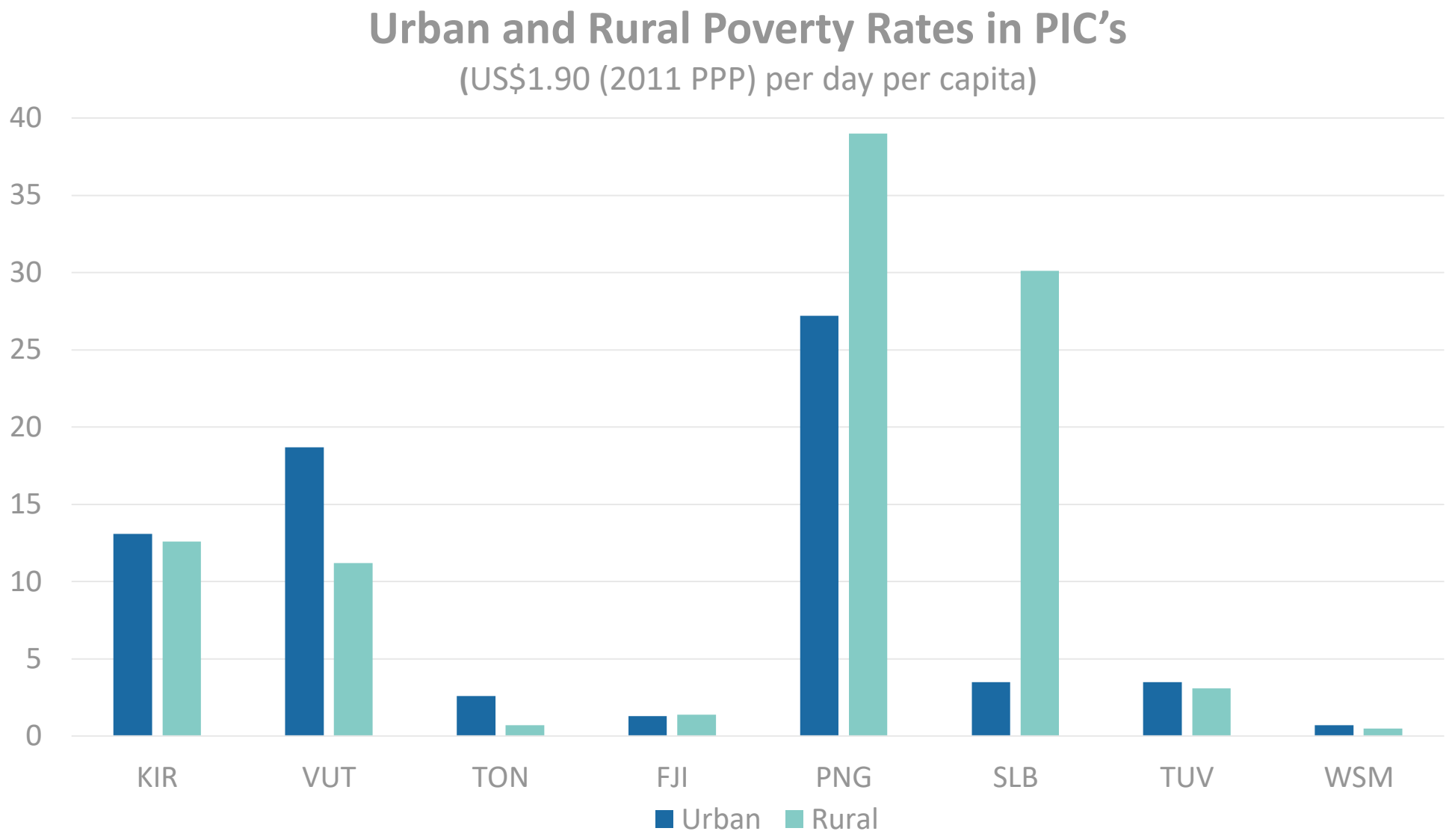
- Urban/rural Poverty analysis
- Livelihood analysis

## Census + HIES

Analysis

- Spatial poverty estimation

# Urban/rural Poverty rate analysis



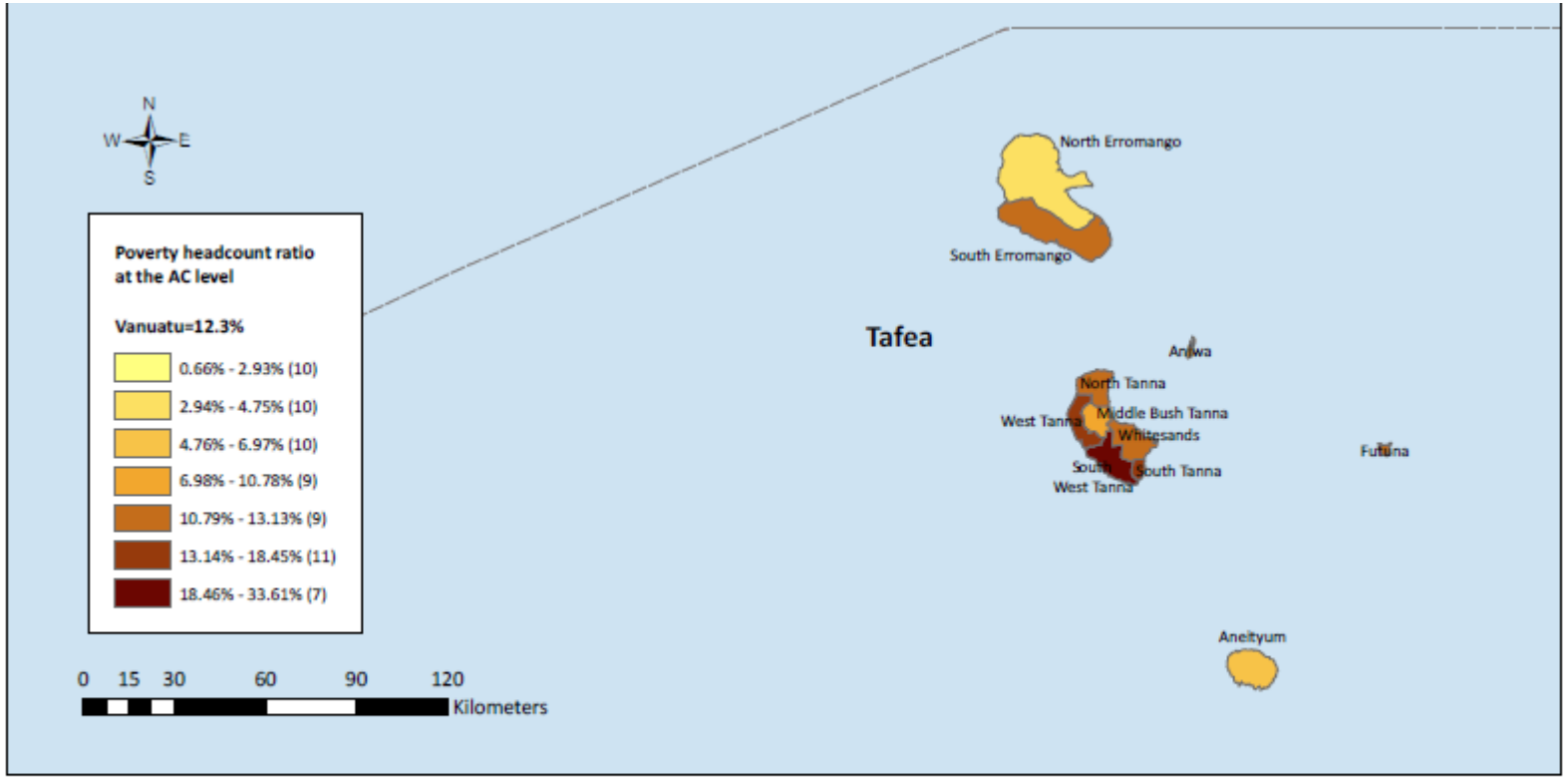

Source: Estimates reported in Poverty and Equity Briefs 2019, based on most recently available HIES data

# Spatial poverty measurement

**Measurement depends on available data:**

- Small area estimation of poverty used for poverty mapping, requires census and HIES data
- Moving from the Urban/Rural dichotomy to Outer Island/Main Island requires a change in focus, but there is conceptual overlap

**Poverty mapping in Vanuatu:**




*Source: Population and Housing Census, 2009 and Household Income and Expenditure Survey, 2010.*
*Note: Number in () next to the category range shows the number of AC that fall into that category;*
*The median values for each category are 1.5%, 4.3%, 5.8%, 10.2%, 12.0%, 16.0% and 24.9% respectively;*
*For each province, the poverty headcount rate is: Torba (17.8%) Sanma (7.2%), Penama (7.6%), Malampa (9.5%), Shefa (13.0%), Tafea (10.3%), Port Vila (18.4%) and Luganville (23.6%);*

# Socio-economic indicator by main island / outer island categories

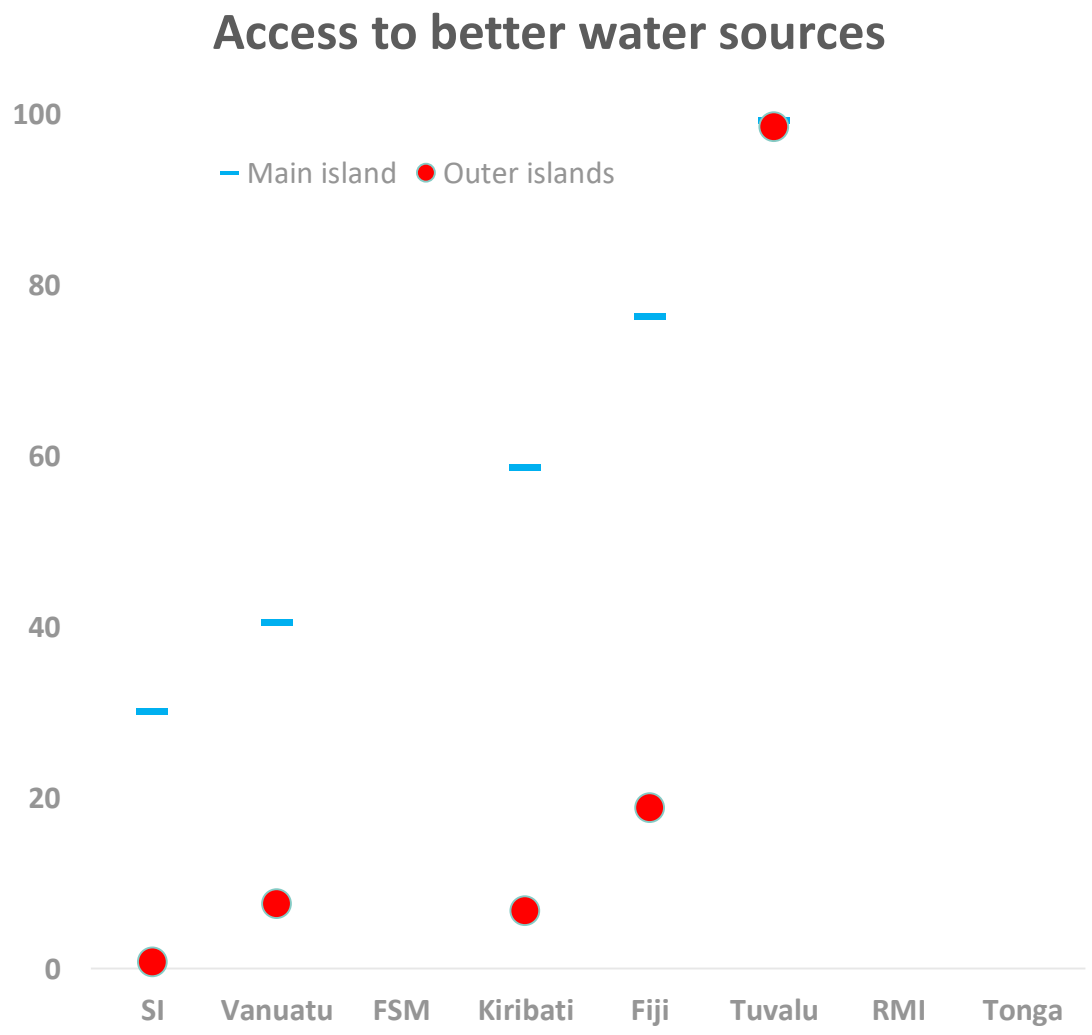
## Solomon Islands 2009

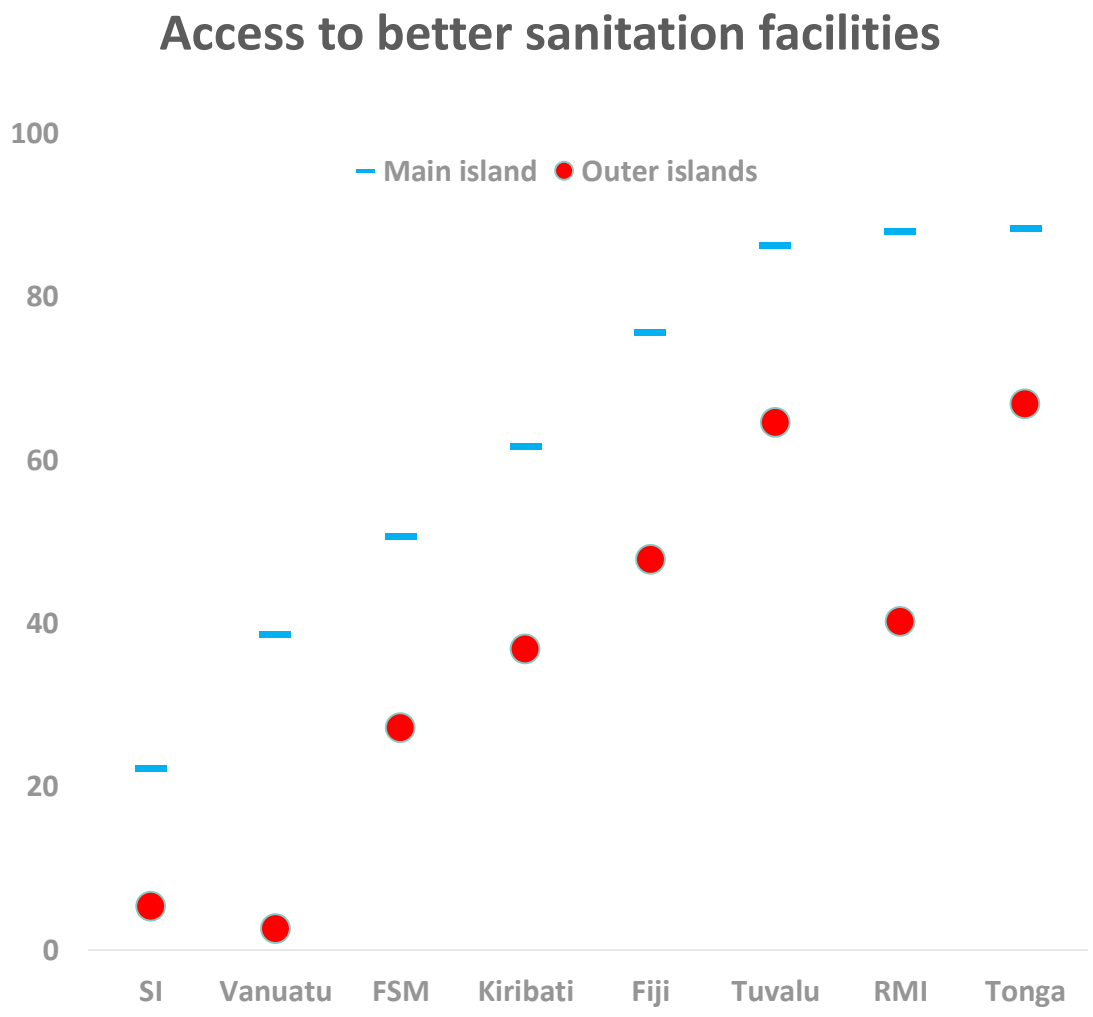
| Main source of drinking water | Main island | Outer Island |
|---|---|---|
| HH using metered SIWA drinking water | 30.1% | 0.8% |
| HH using communal standpipe | 18.8% | 41.7% |
| HH using private water tank | 6.6% | 14.8% |
| HH using communal water tank | 5.4% | 12.7% |
| HH using well - protected | 4.5% | 1.1% |
| HH using well - unprotected | 4.6% | 0.7% |
| HH using river or stream | 26.4% | 23.8% |
| HH using bottled water | 0.7% | 0.6% |

## Kiribati 2010

| Main source of drinking water | Main island | Outer Island |
|---|---|---|
| HH using public system pipe | 58.7% | 6.8% |
| HH using open well water | 20.7% | 50.2% |
| HH using protected well water | 11.8% | 37.4% |
| HH using rain water tank | 8.3% | 4.6% |
| HH using bottle water | 0.3% | 0.0% |
| HH using other | 0.1% | 0.9% |

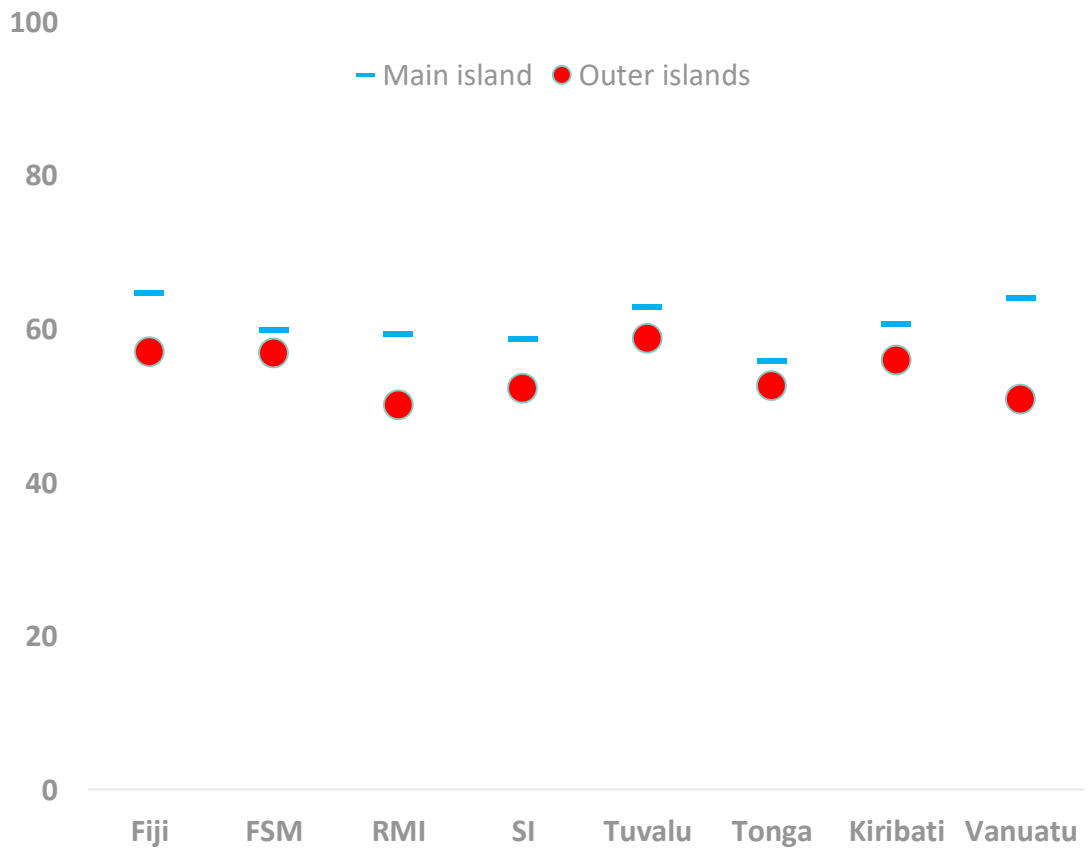
# Main island/outer island in selected socio-economic indicators --By PICs



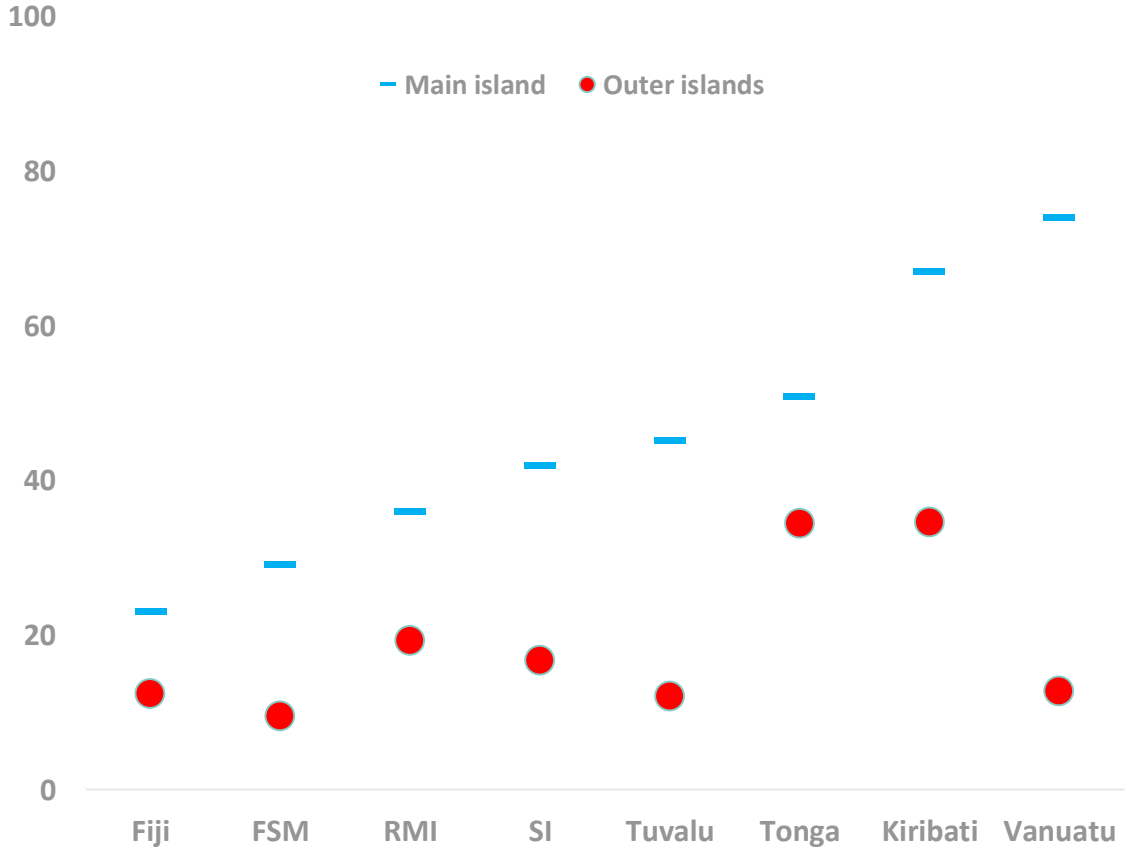



# Main island/outer island in selected socio-economic indicators --By PICs

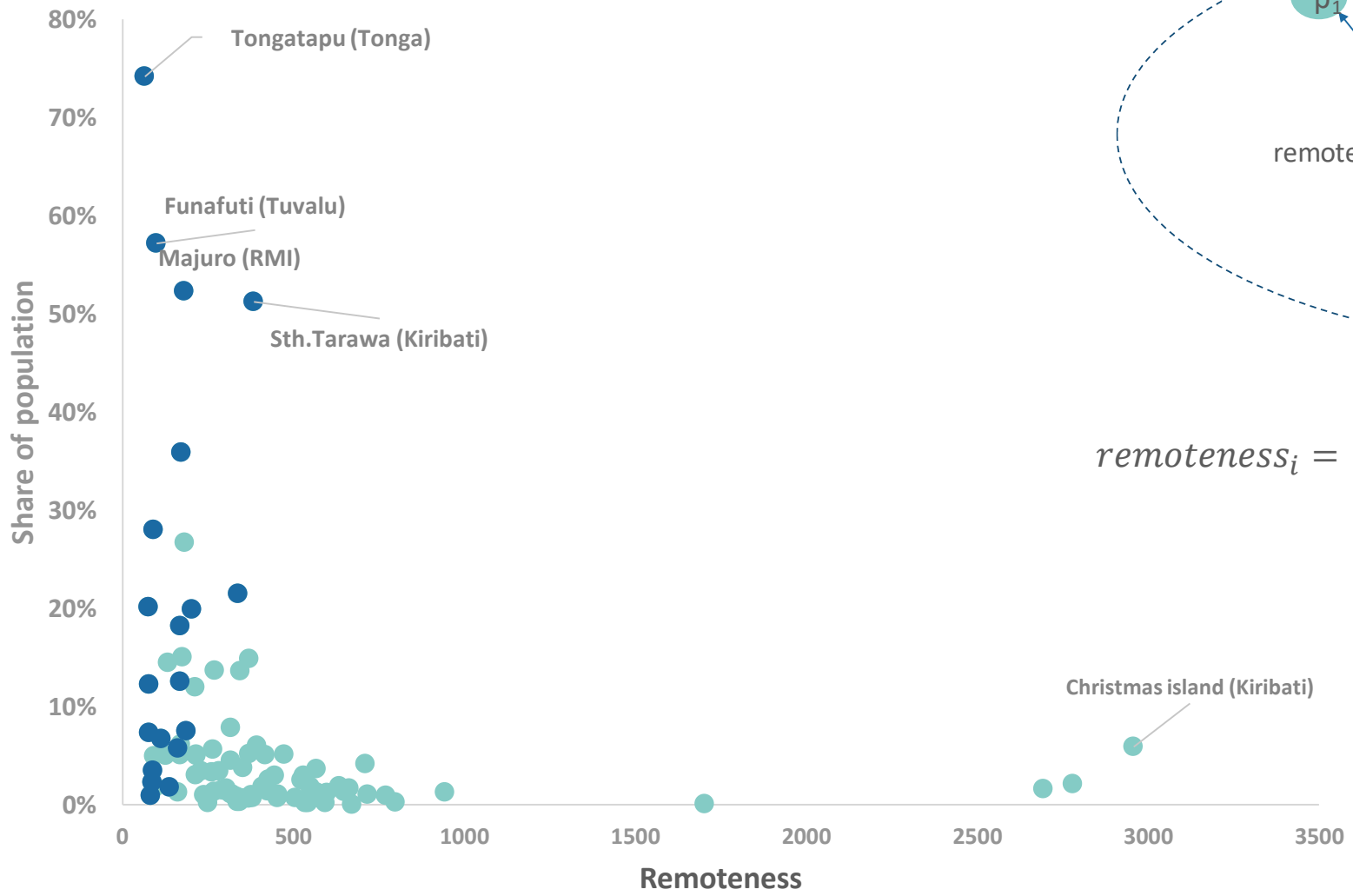
## Share of working age cohort (% of population)

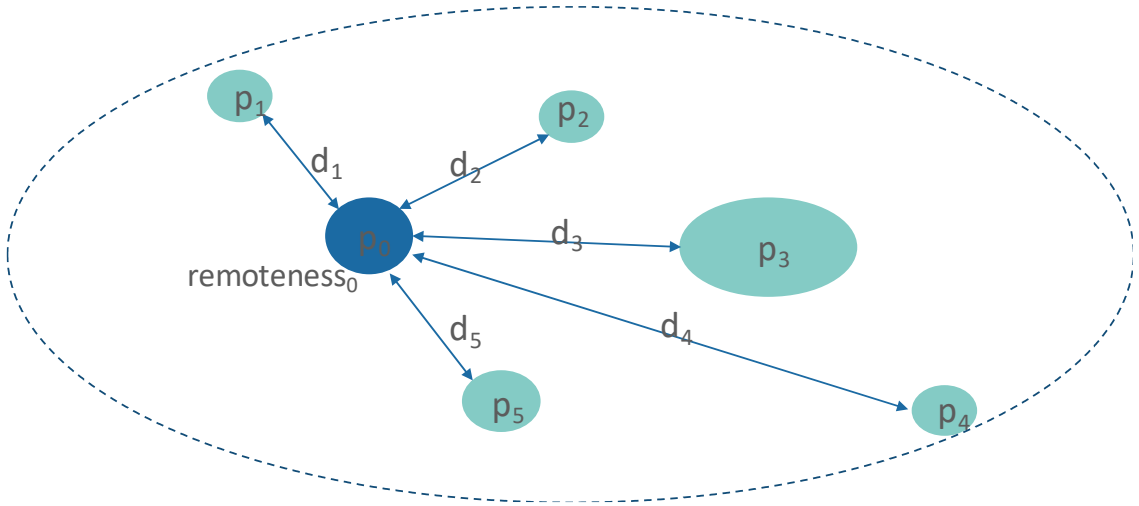



## Wage/salary employment



# Remoteness and Dispersion Analysis-Remoteness

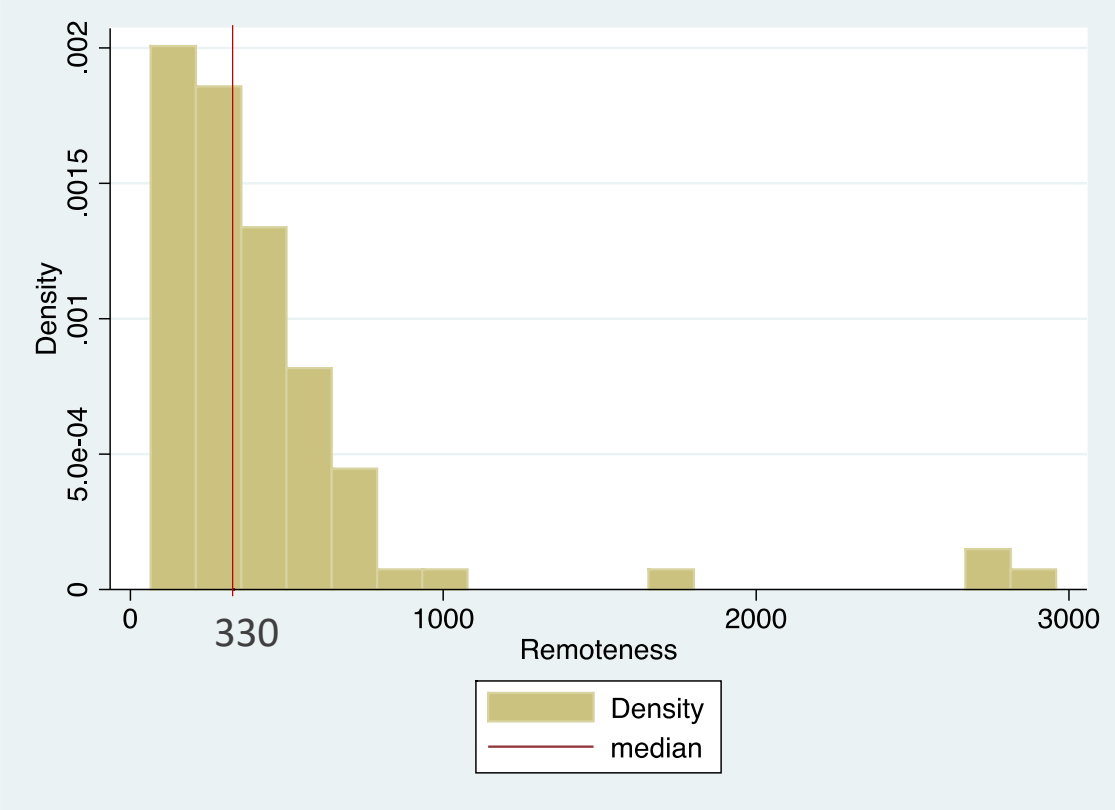


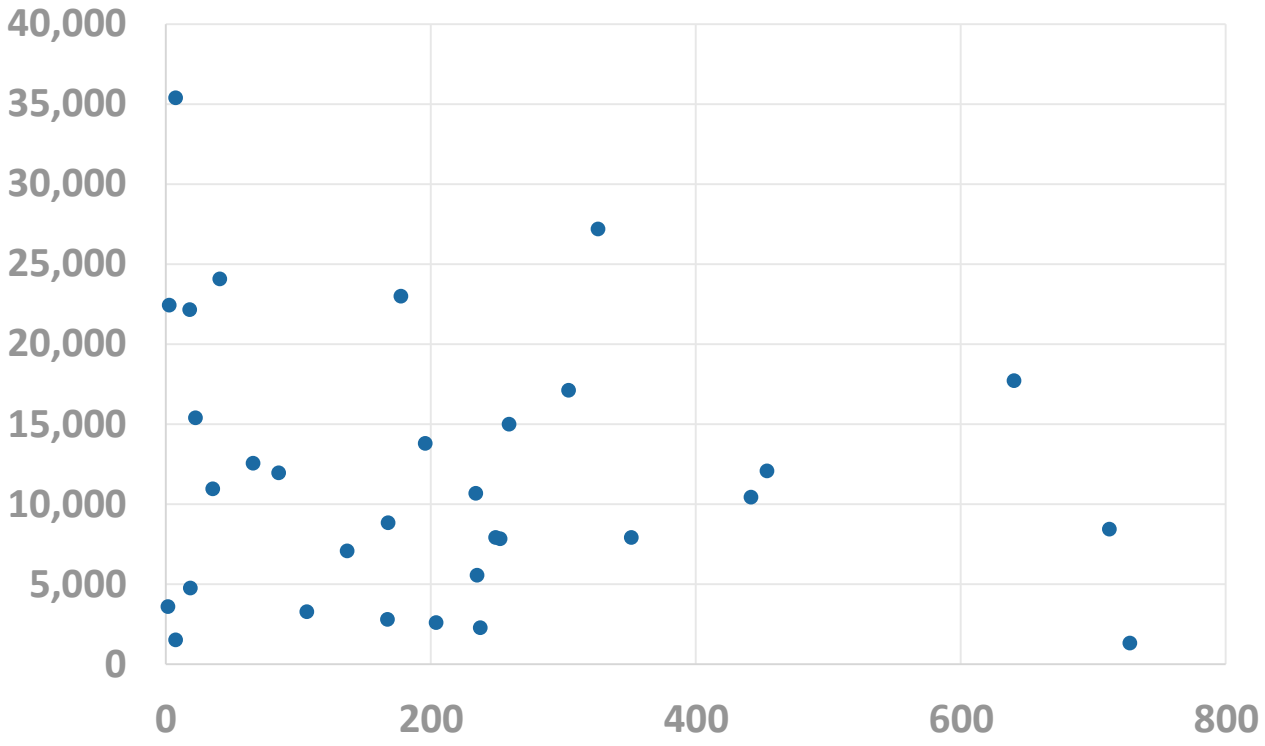

$$remoteness_i = \frac{1}{Population_J} \sum_{j=1}^{J} \left( population_j \times distance_{(i\ to\ j)} \right)$$

# Remoteness indicator

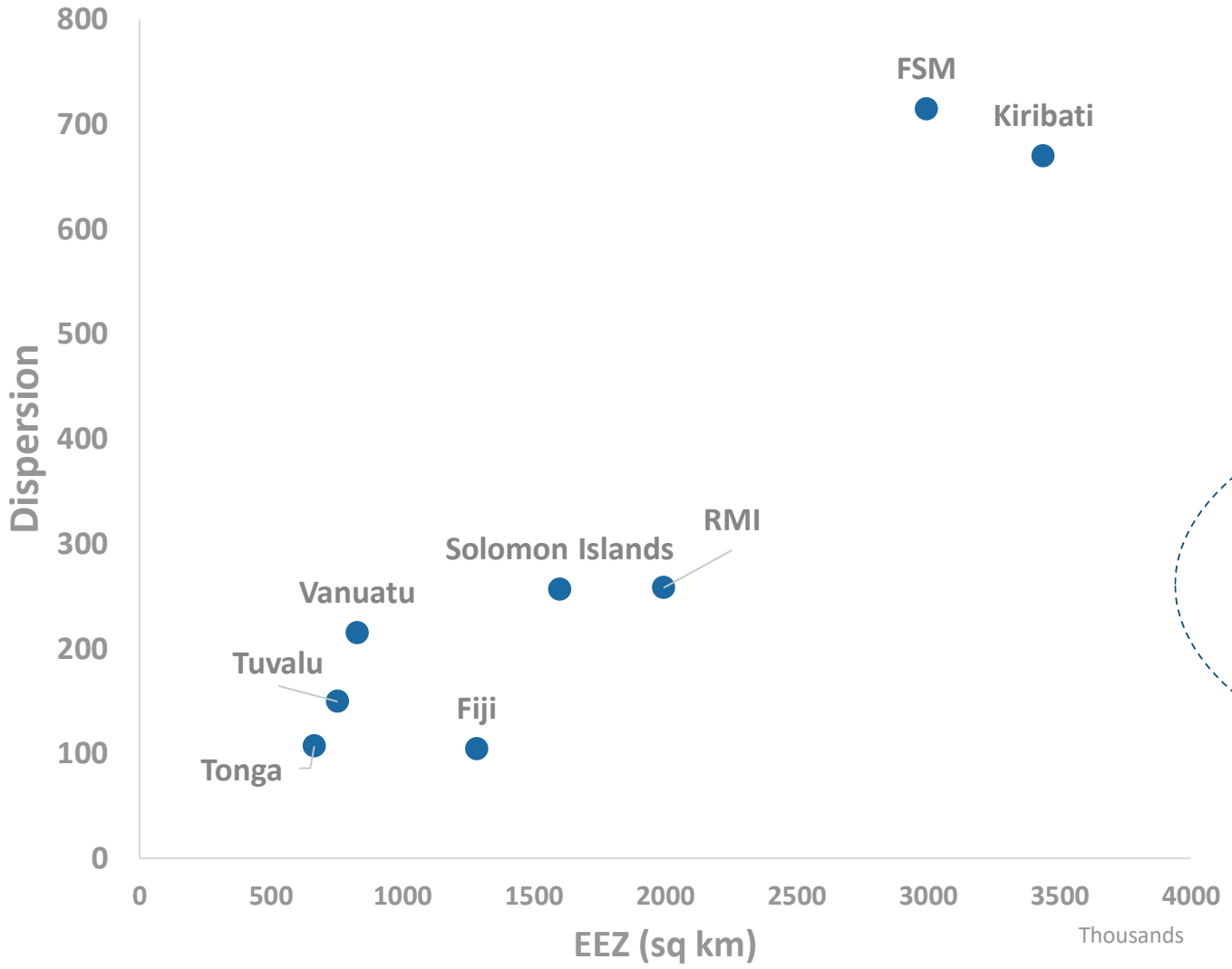
## Distribution of island remoteness



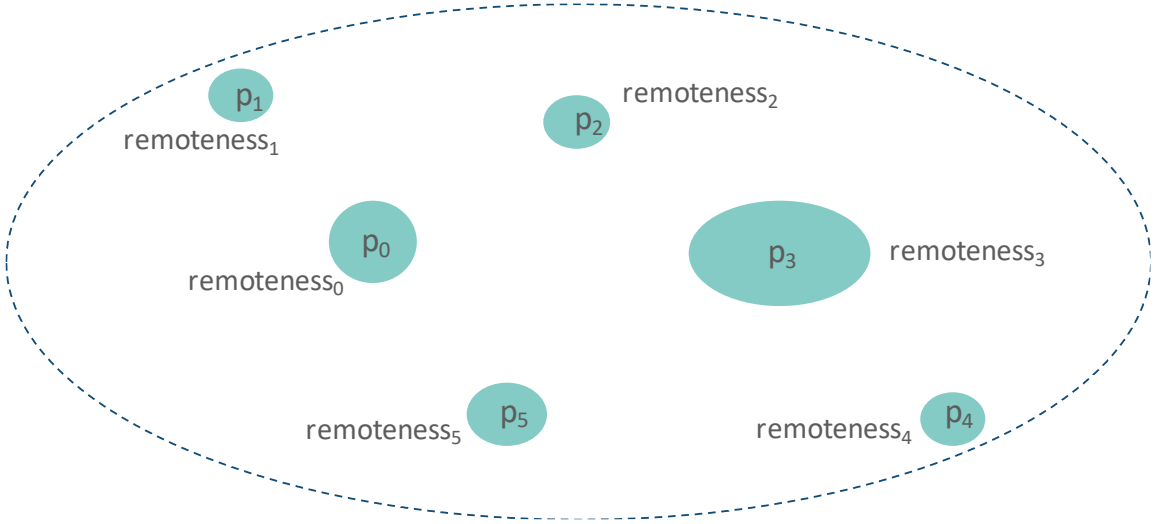

## Remoteness vs per capita income



# Remoteness and Dispersion Analysis-Dispersion

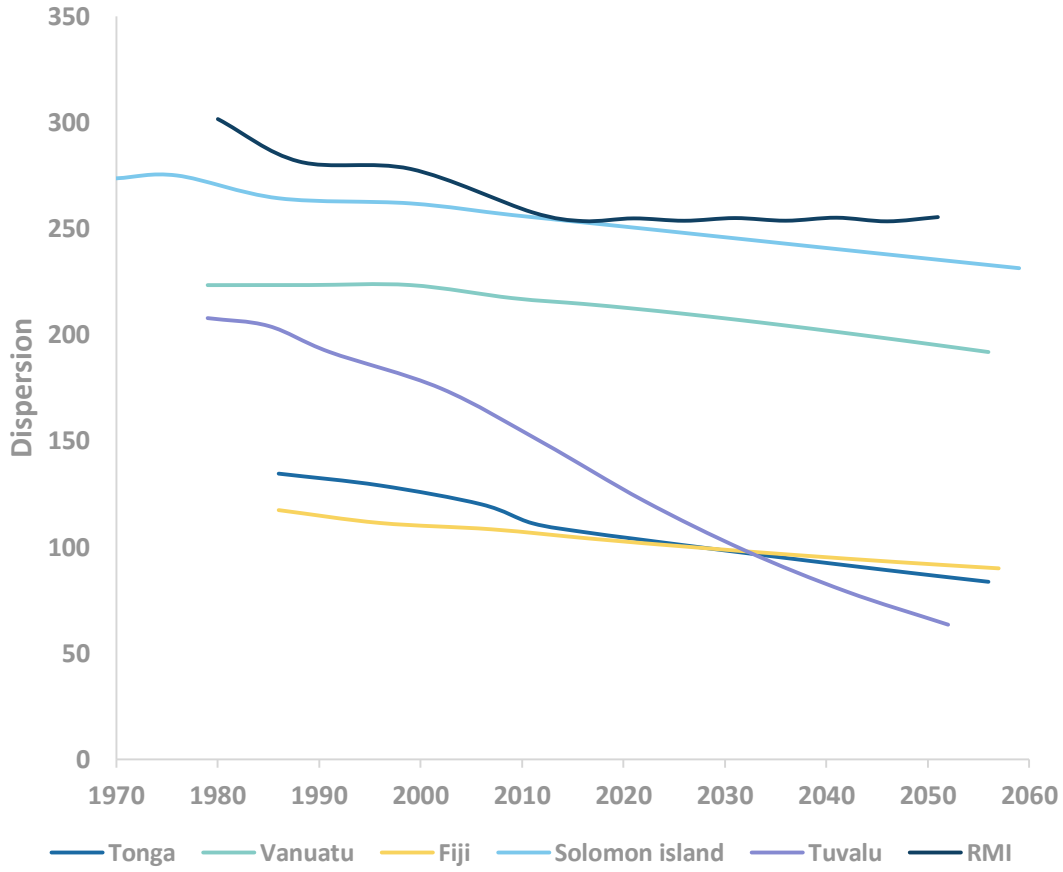



$$Dispersion_J = \frac{1}{Population_J} \sum_{i=1}^{J} (population_i \times remoteness_i)$$

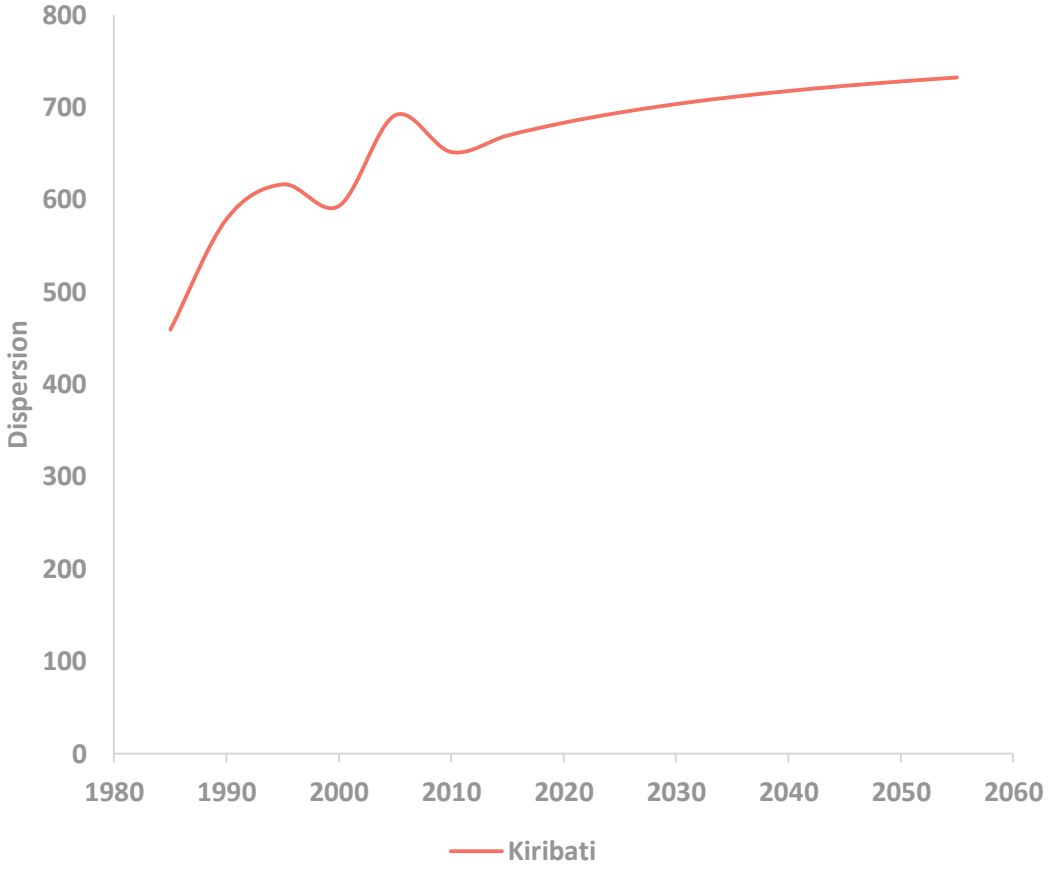


# Populations are gradually clustering--Evidence from dispersion change

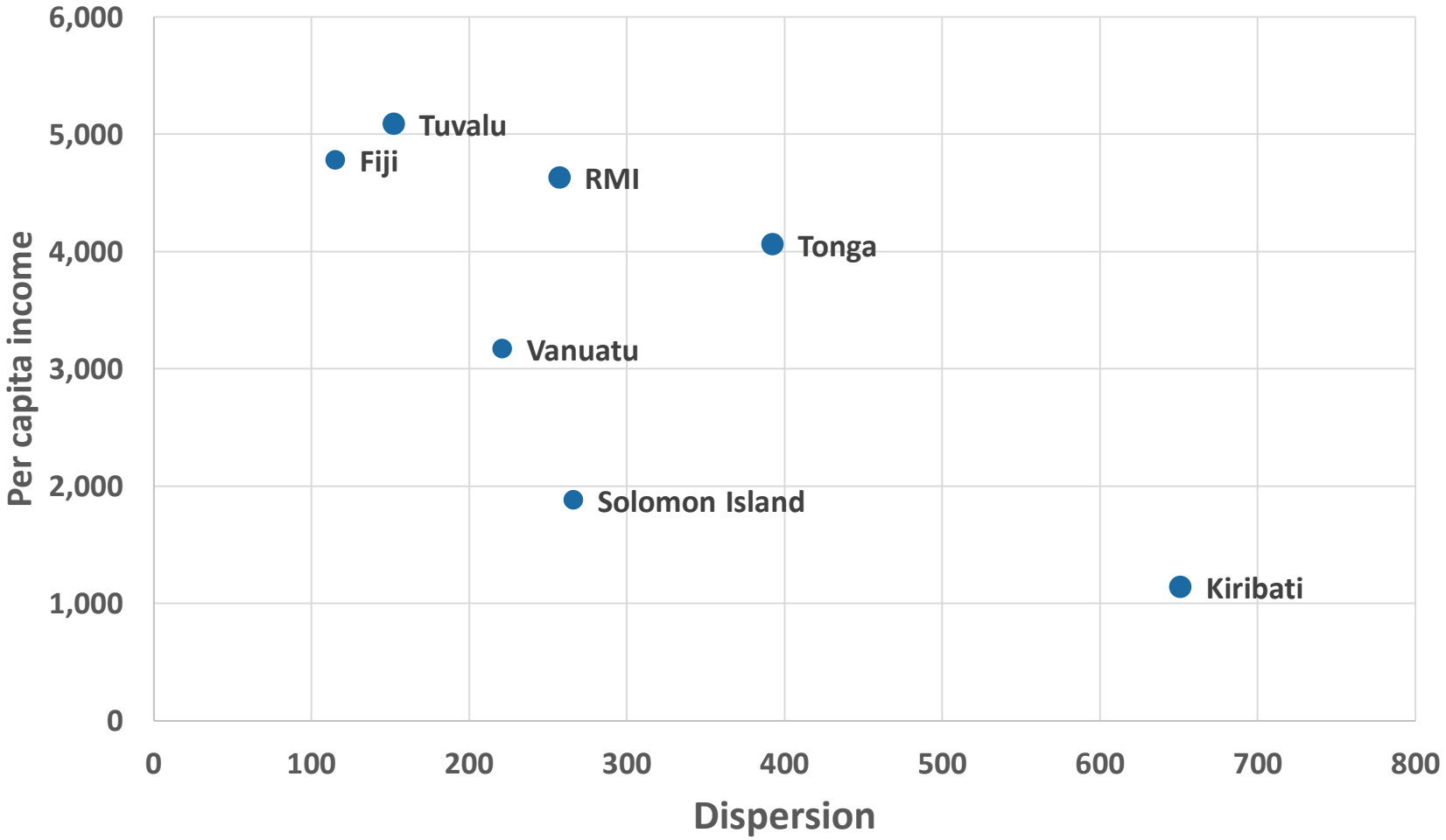
## To one center…




## To two centers…



# Per capita income vs Dispersion



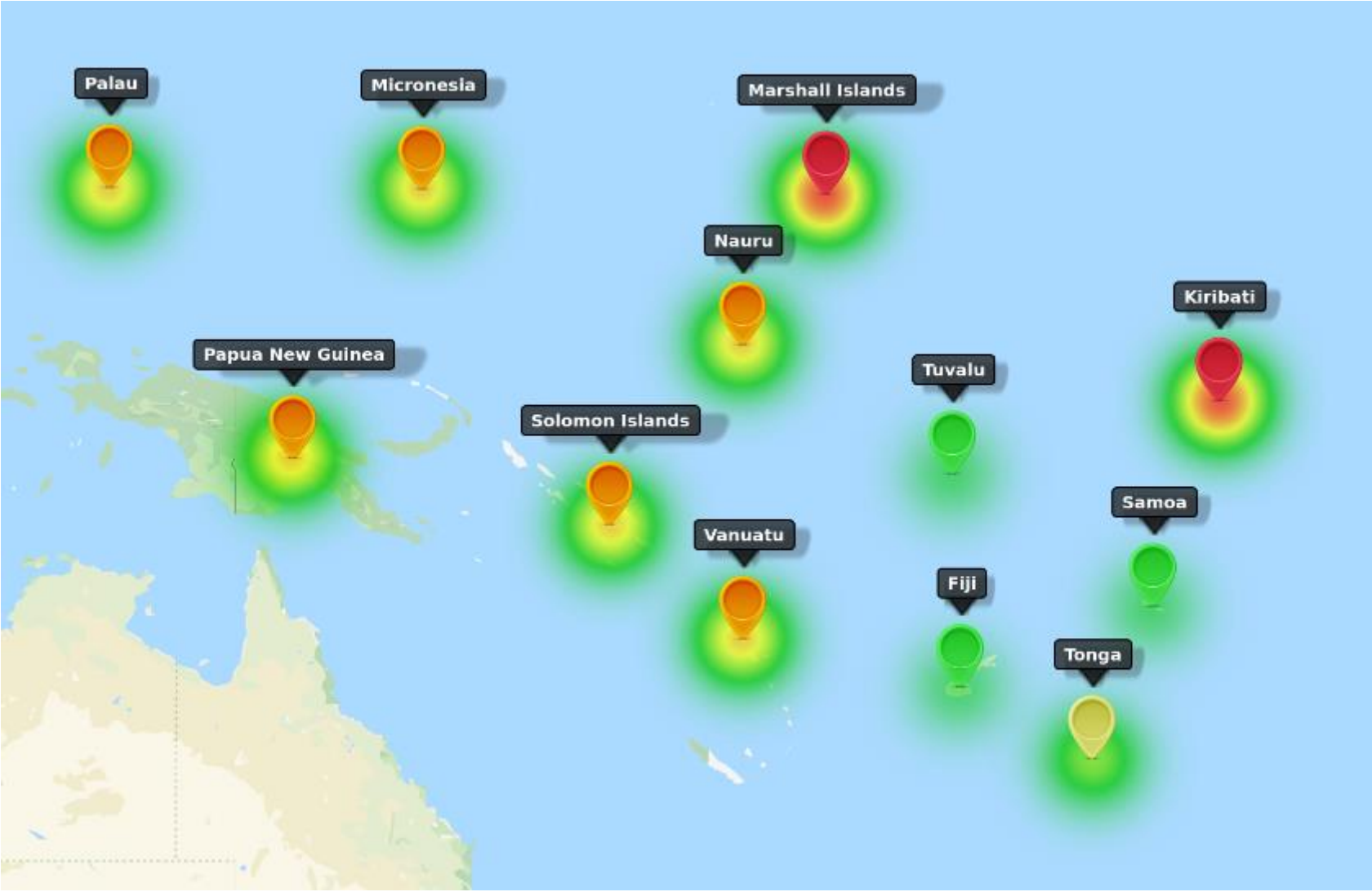
# Key findings from the analysis

- From the available data, see gaps between main islands and outer islands in: employment, services and income
- Using data on distance between islands and their populations it is possible to estimate quantitative measures of the remoteness of islands and dispersion of PICs.
- There is a trend overtime of clustering towards urban centers.
- These findings lead naturally to the question of migration, which will be discussed in a forthcoming presentation.
- Lastly more data needs to be collected, more frequently.

# HIES Data deprivation – a WB priority – is a major issue in the Pacific

**Definitions:**

- Extreme data deprivation = no data sets in last 10 years,
- Moderate data deprivation = 1 data set in last 10 years,
- Vulnerable to data deprivation = 2 data sets >5 years apart,
- Minimum needs met = two data sets <5 years apart



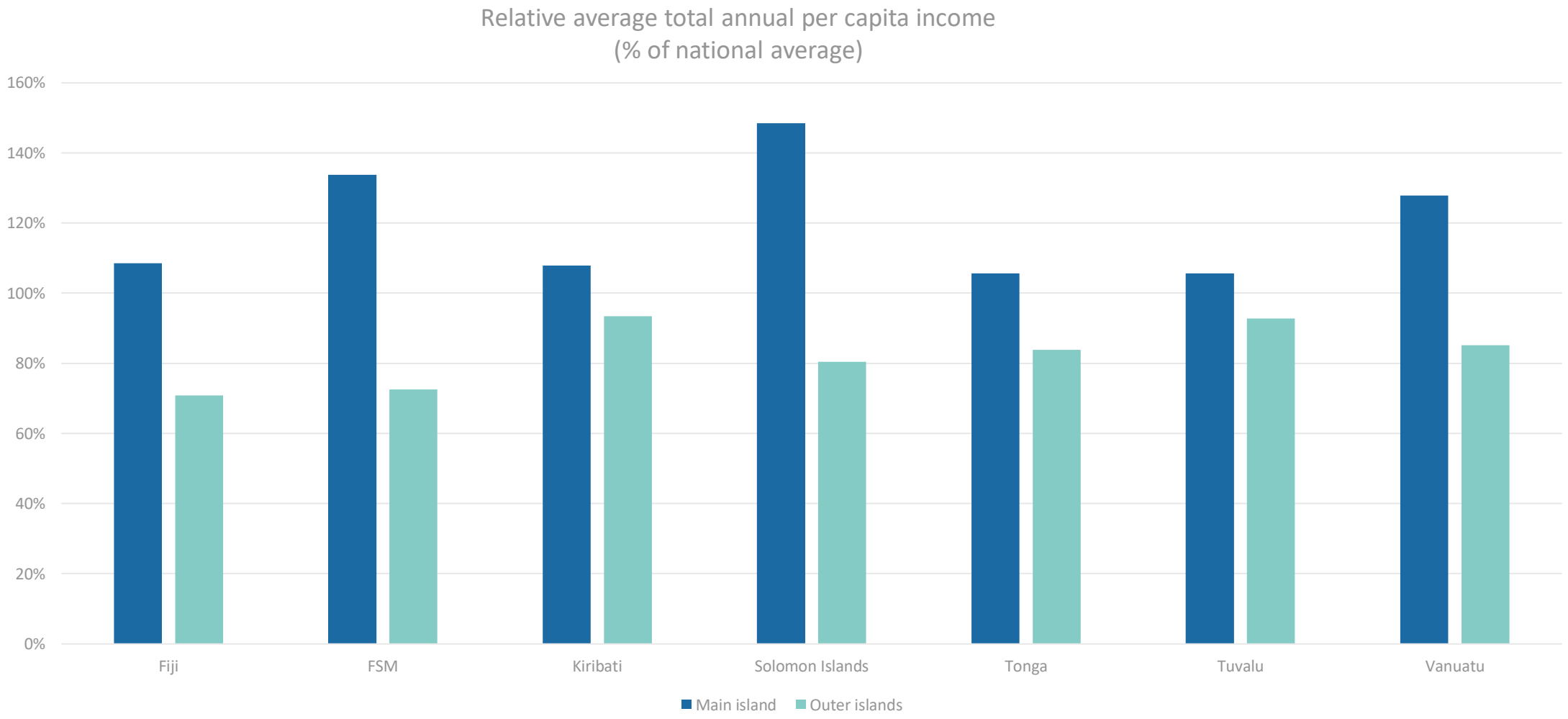
# APPENDIX

Additional graphs and tables for Q&A

## Introduction

- Ideally want to be able to estimate outer island/main islands differences to identify patterns
  - This may inform service provision and other government policy
- The available data make this difficult
  - Census and HIES data- different purposes and limitations
- Given the available data, we can identify a lack of services and lower socio-economic conditions in outer islands

# Main island/outer island income



# Census and HIES calendar

| Country | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FSM | | HIES | | | | | Census | | | HIES | | | | | |
| Fiji | | | | Census | HIES | | | | | HIES | | | | Census | HIES |
| Kiribati | | Census | HIES | | | | Census | | | | | Census | | HIES | Census |
| RMI | | | | | | | | Census | | | | | | HIES | |
| Nauru | | | HIES Census | | | | | Census | HIES | | | | | | |
| Palau | | Census | HIES | | | | | | Census | | HIES | Census | | | |
| PNG | | | | | | HIES | | Census | | | | | | | HIES |
| Samoa | | | | | HIES | | | Census | | HIES | | | Census | | HIES |
| Solomon | | HIES | | | | Census | | | HIES | | | | | | |
| Tonga | | | Census | | | HIES | | Census | | | | HIES | Census | | |
| Tuvalu | HIES | | | | | | HIES | | Census | | | HIES | | Census | |
| Vanuatu | | | HIES | | | Census | HIES | | | | | | Census | | HIES |

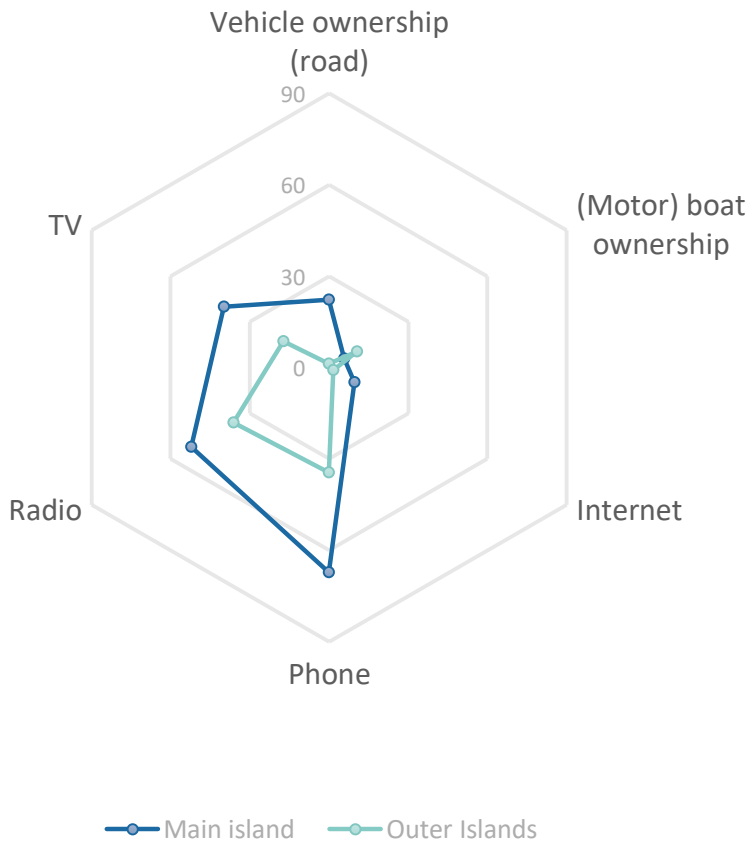
Source: SPC statistics for development division

Census HIES

# Mainland/outer island in selected socio-economic indicators --average for PICs

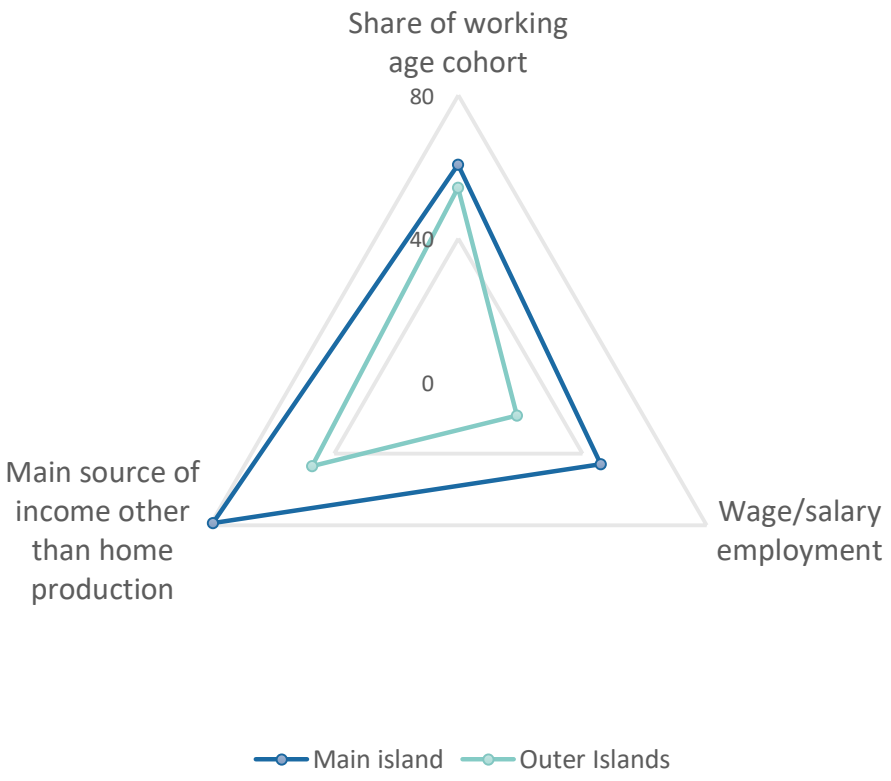
## Access to service

## Connectivity

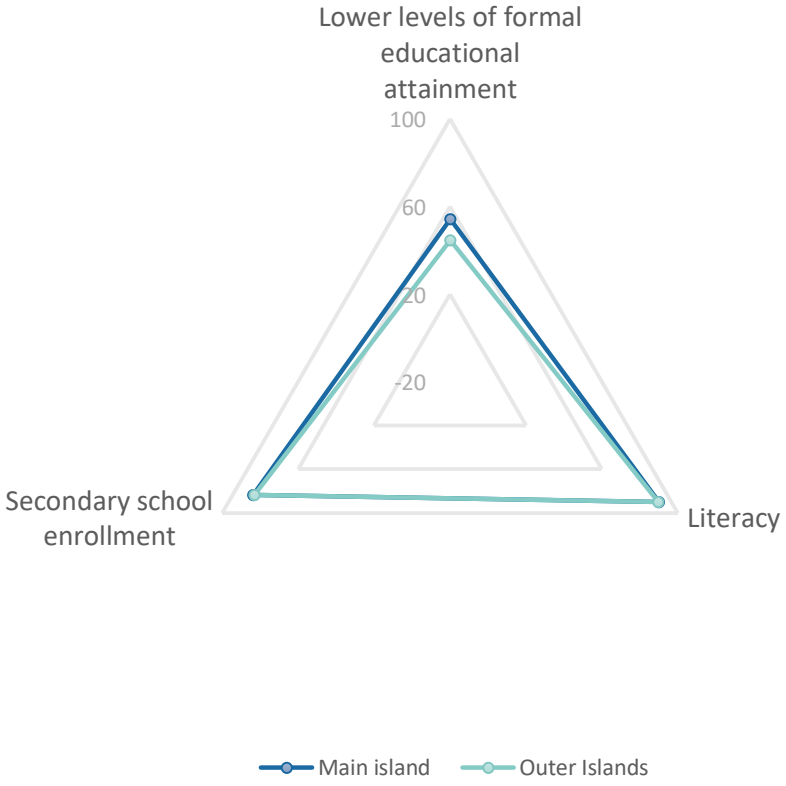


# Mainland/outer island in selected socio-economic indicators --average for PICs

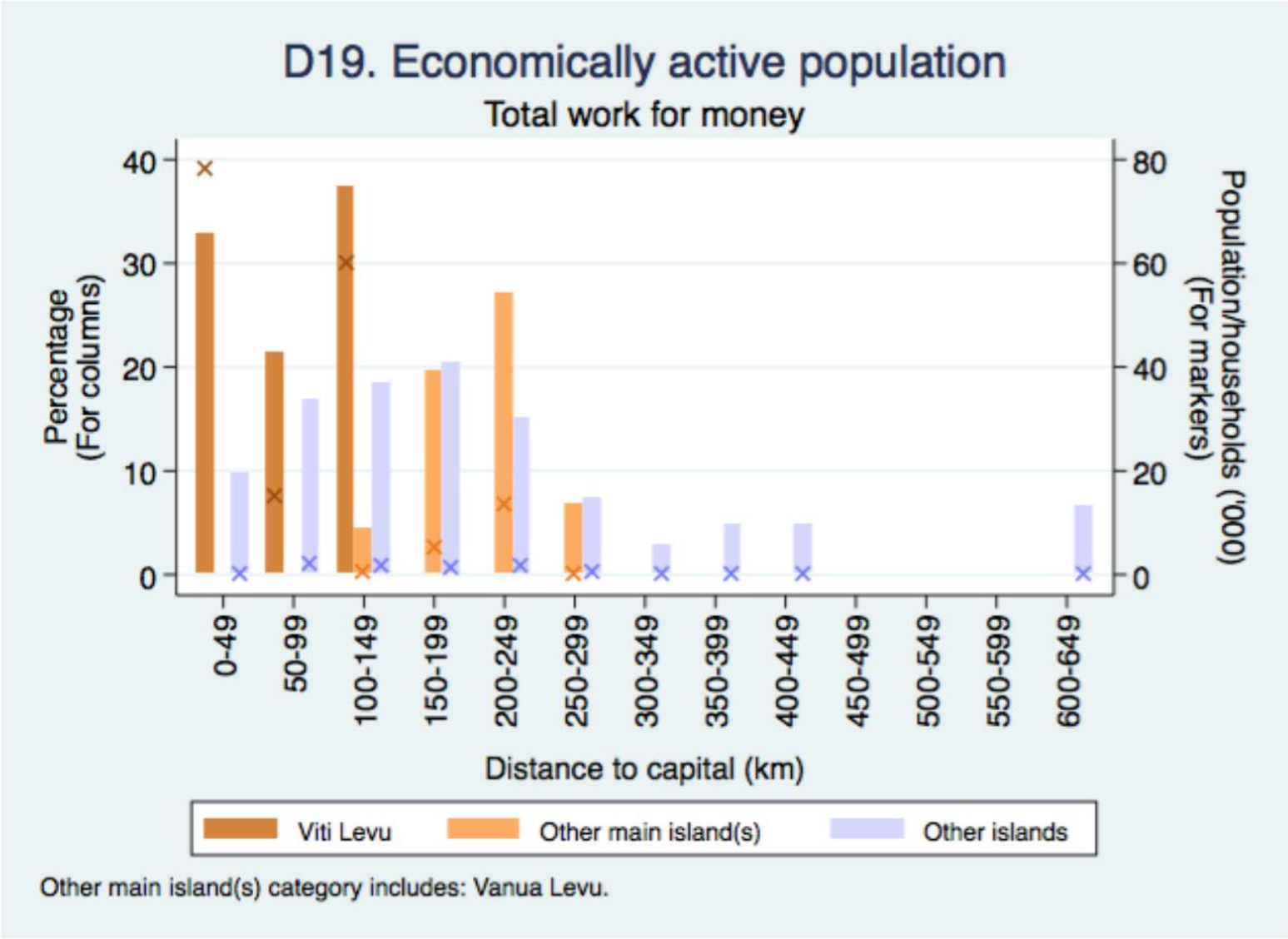
## Employment




## Education

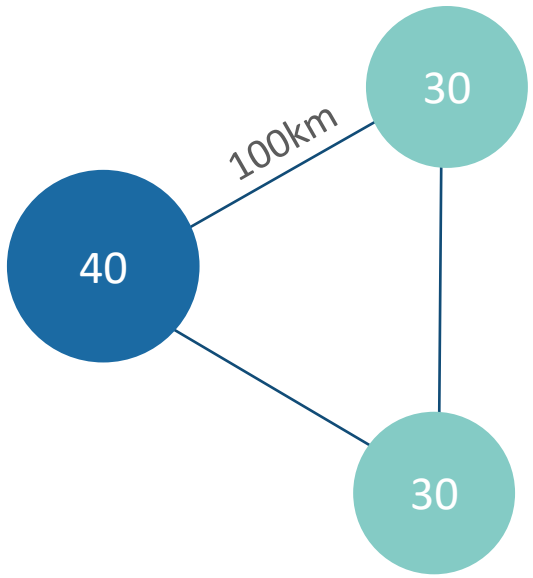


# Socio-economic indicator by continuous distance measure

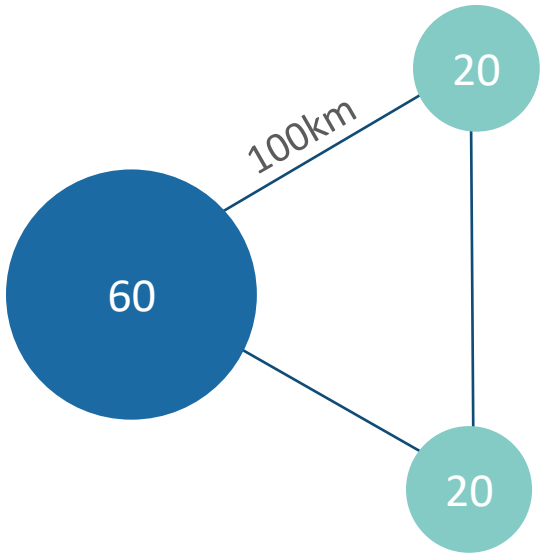


# Property of Dispersion Indicator

- Dispersion is **lower** for countries with a greater share of the population **concentrated in one island**.



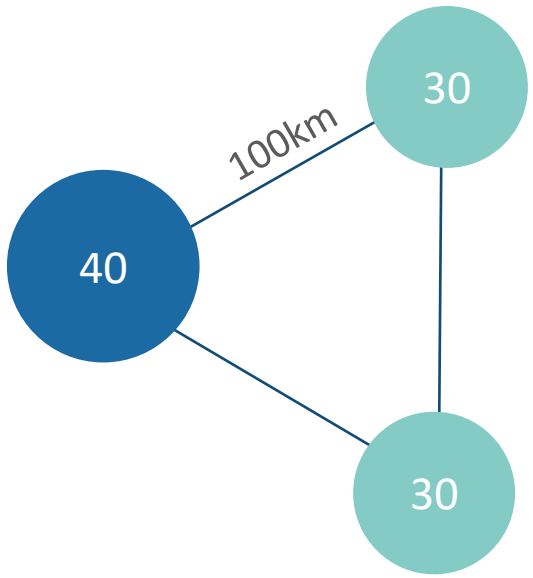

**Dispersion=66**



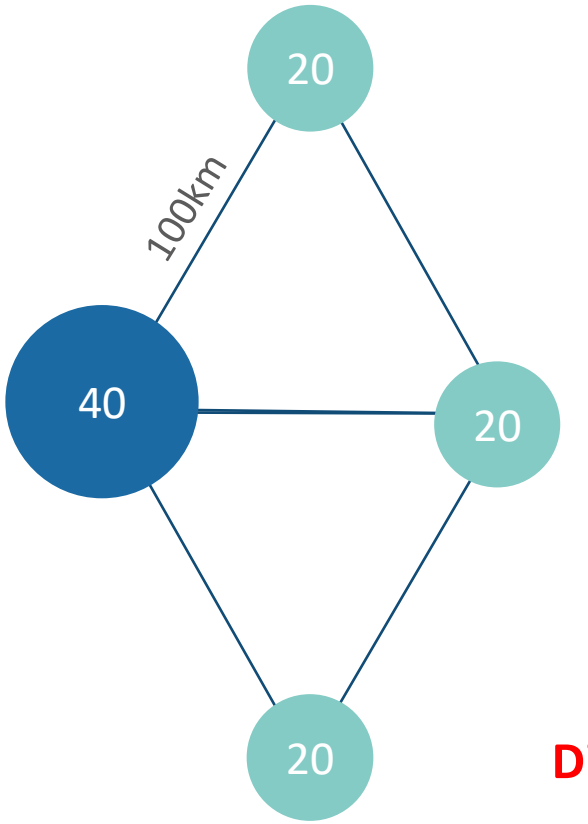

**Dispersion=56**

# Property of Dispersion Indicator

- Dispersion is **higher** if population is spread over a **larger number of islands**.



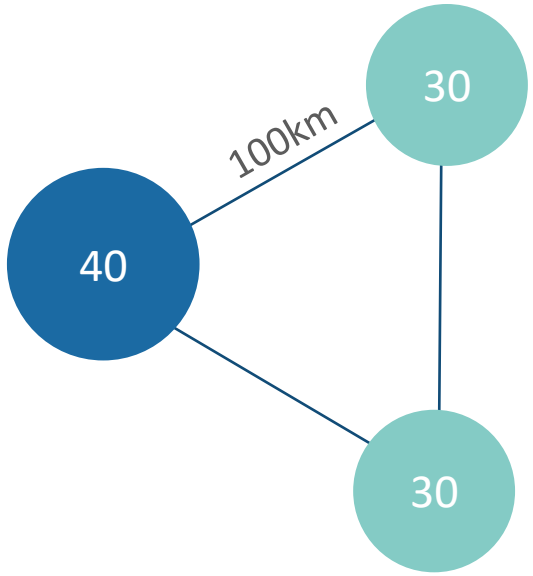

**Dispersion=66**



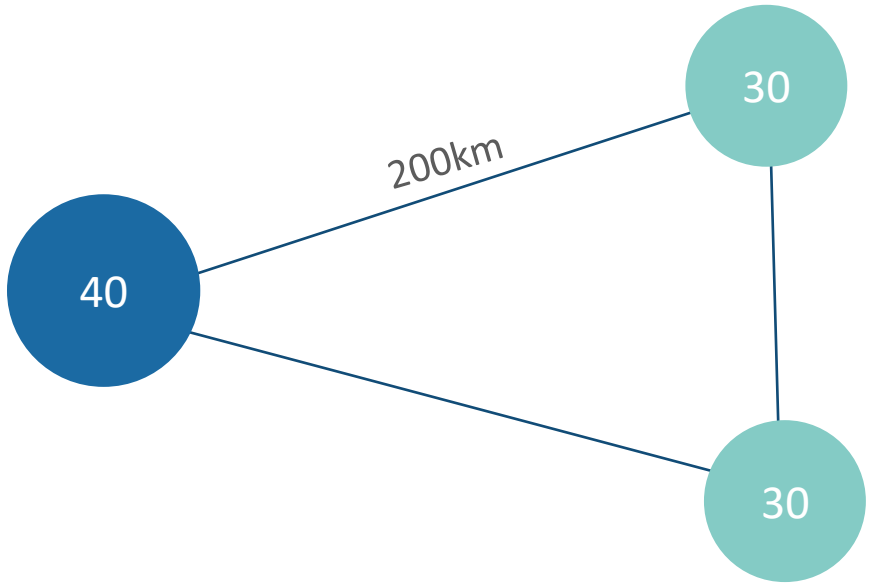

**Dispersion=77.6**

# Property of Dispersion Indicator

- Dispersion is **higher** if outer islands are more **remote**.

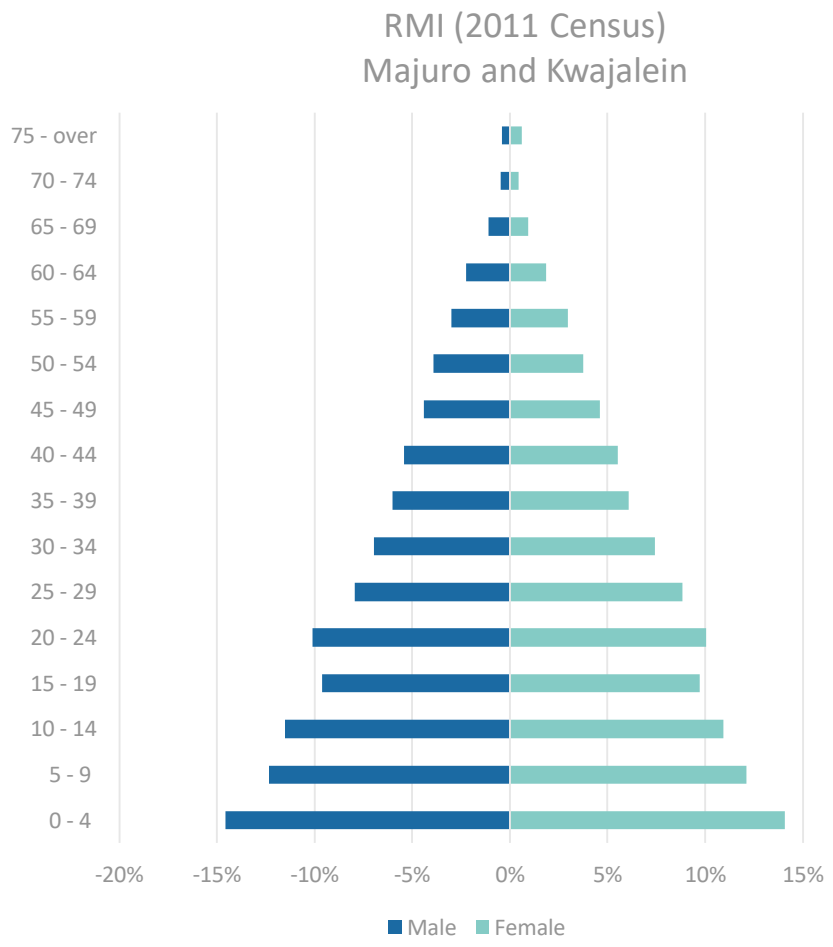


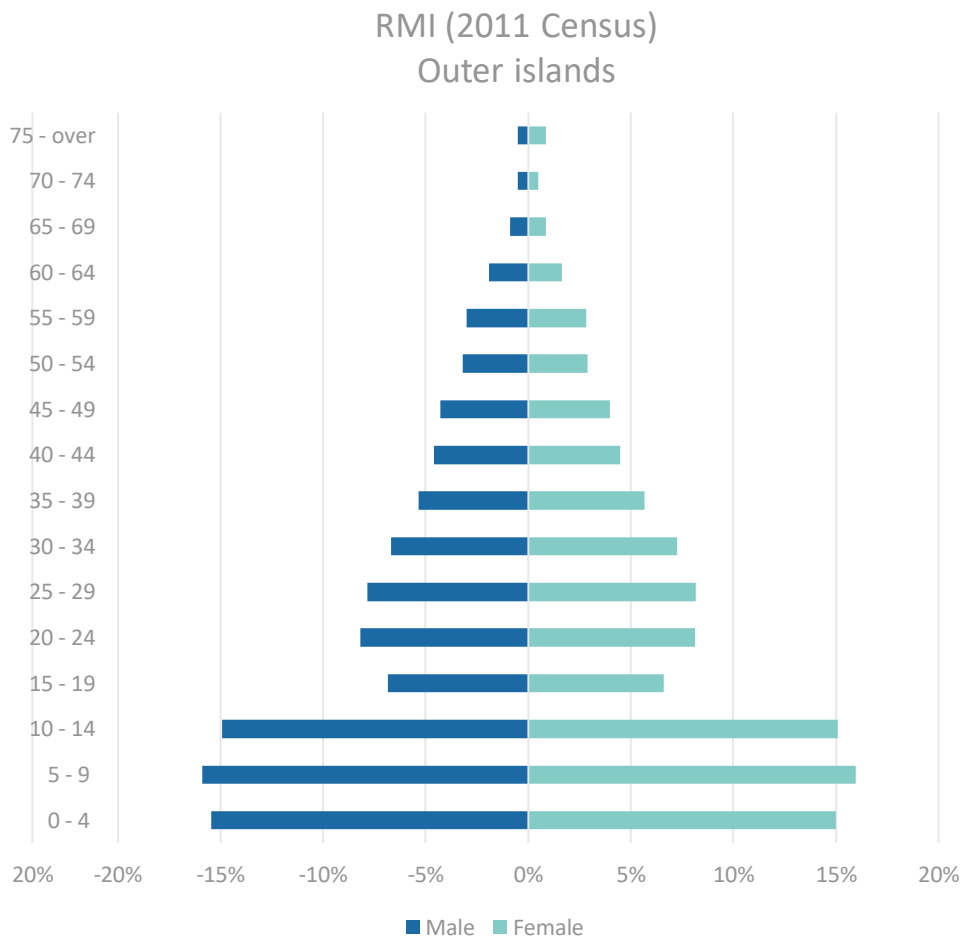

**Dispersion=66**



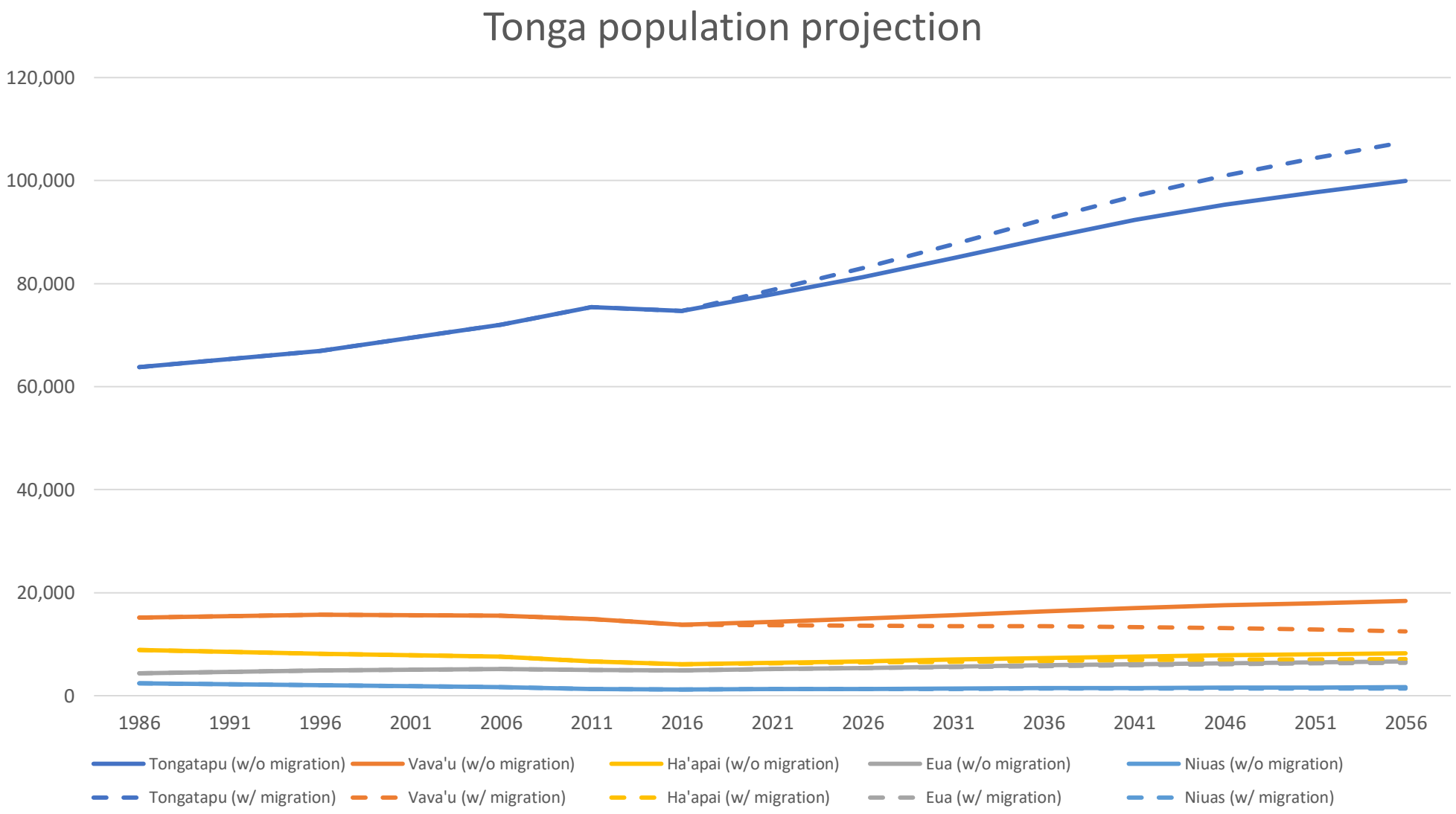

**Dispersion=114**

# Migration affects population structures

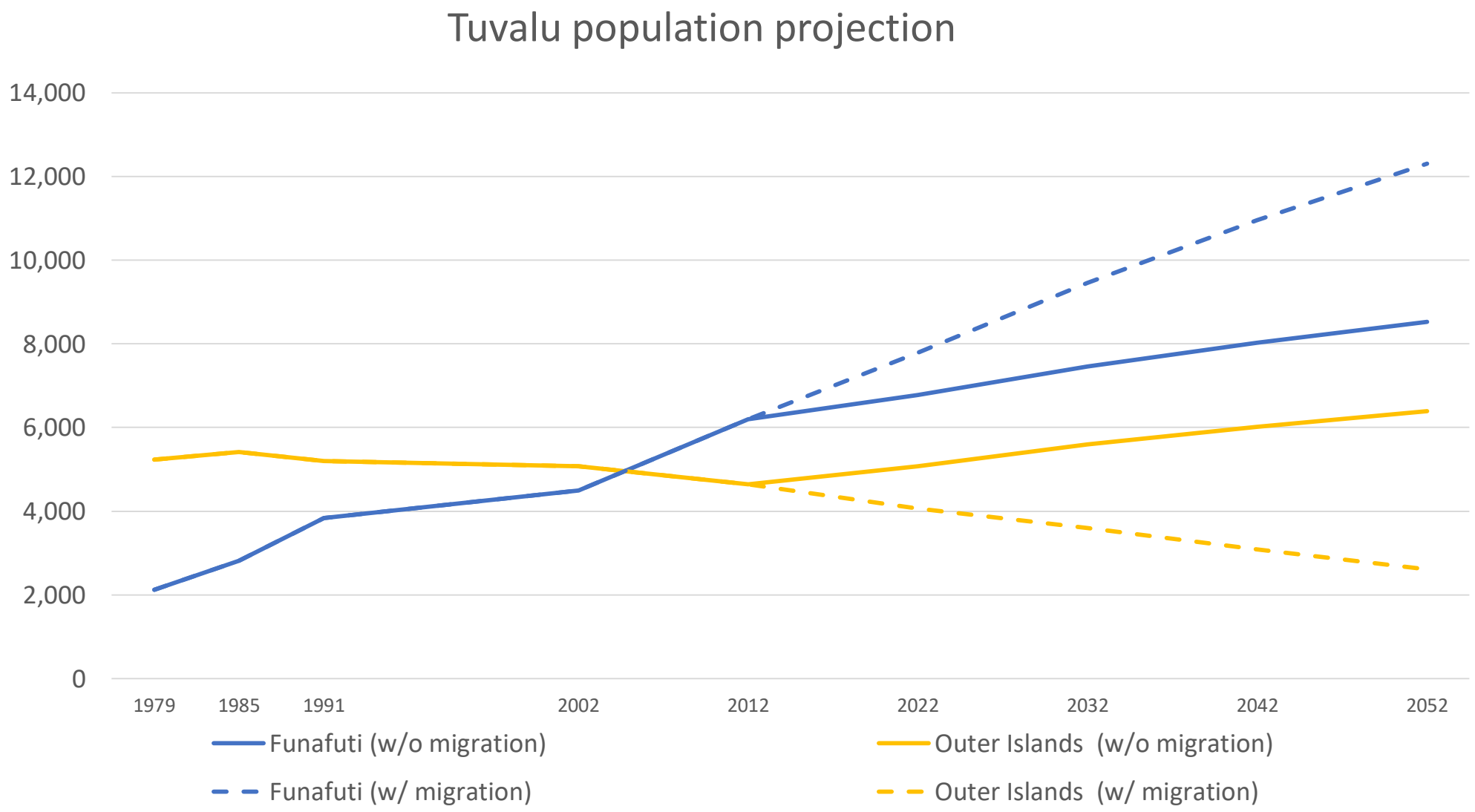


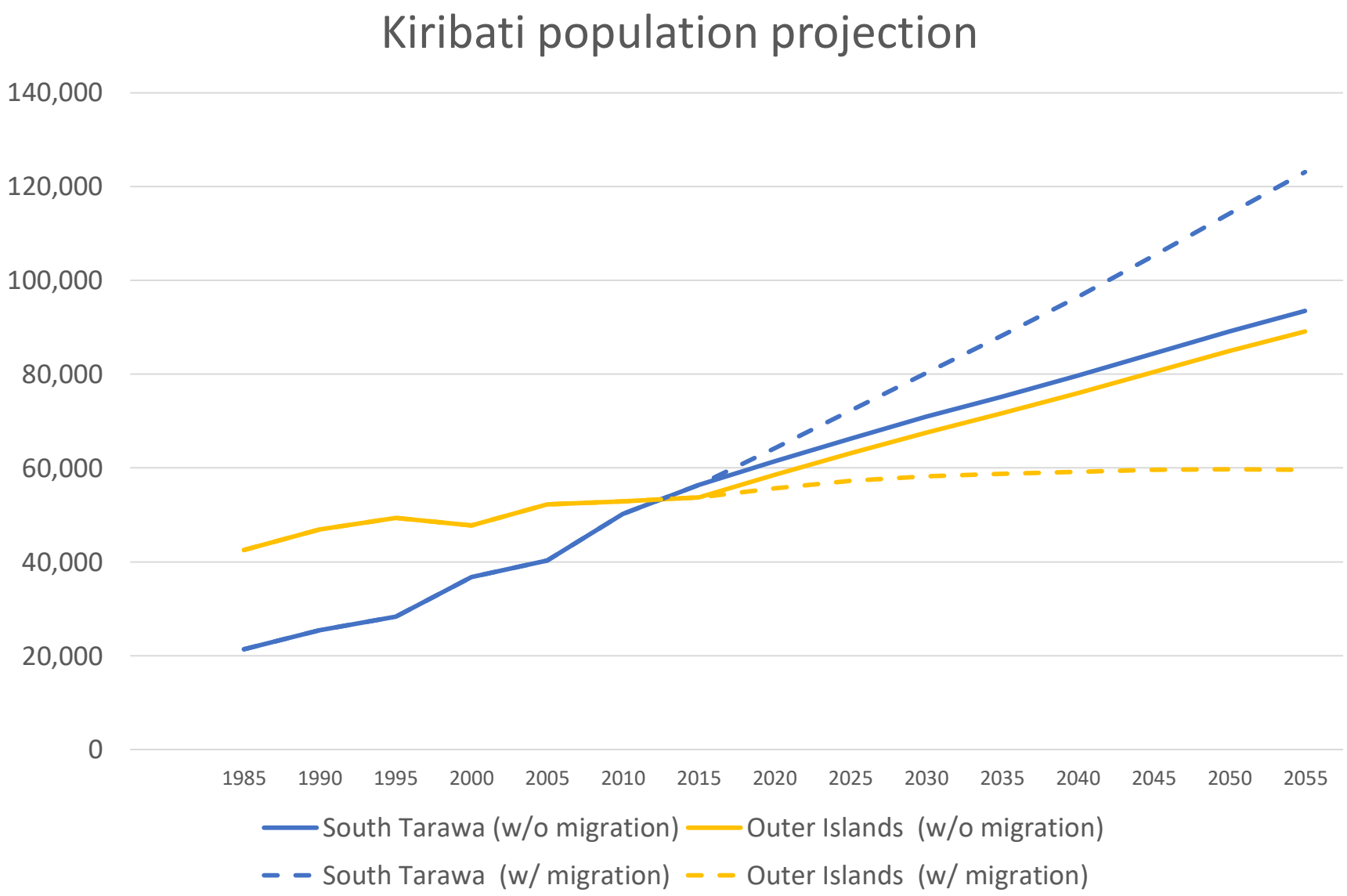



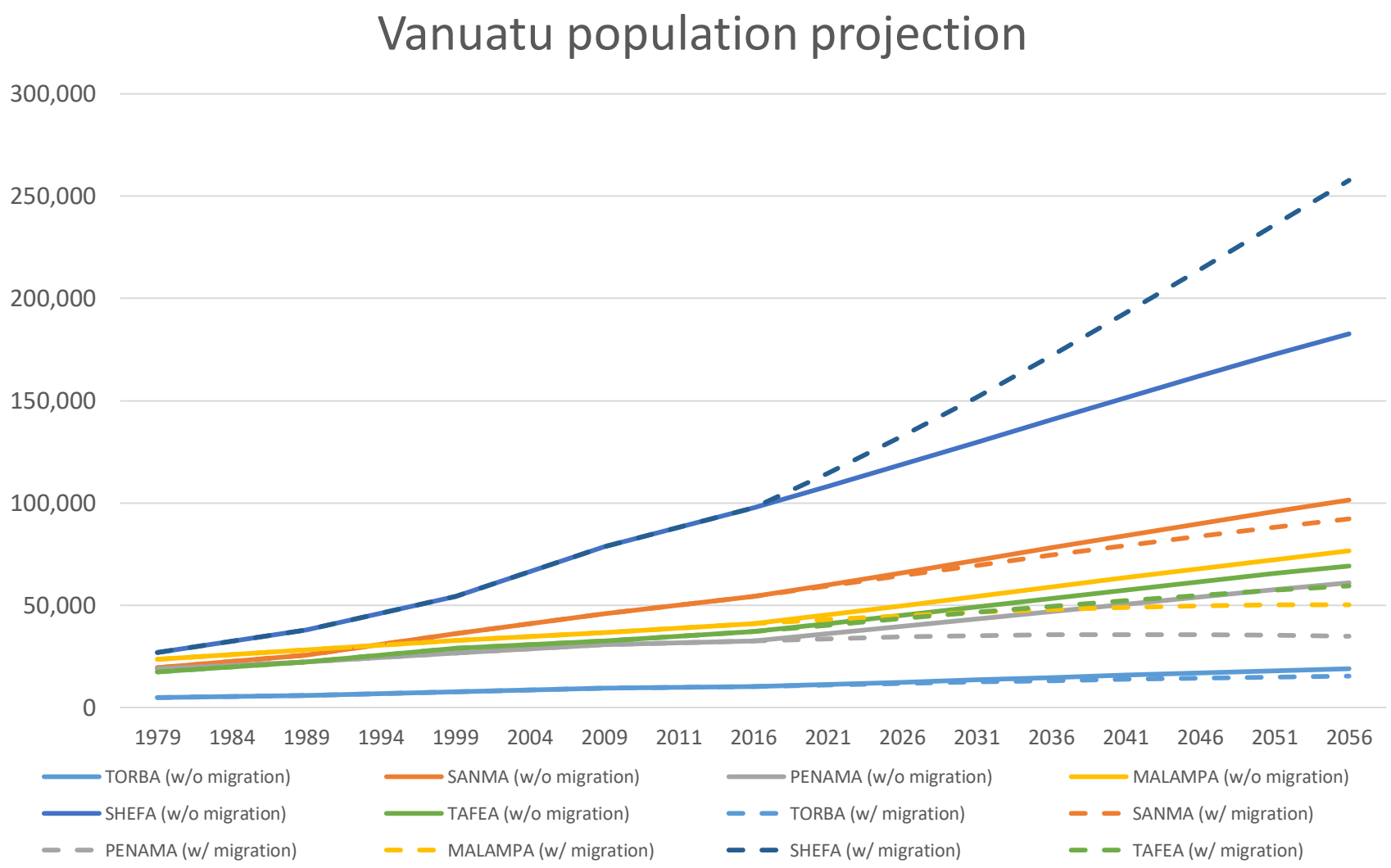
# Population projection with migration



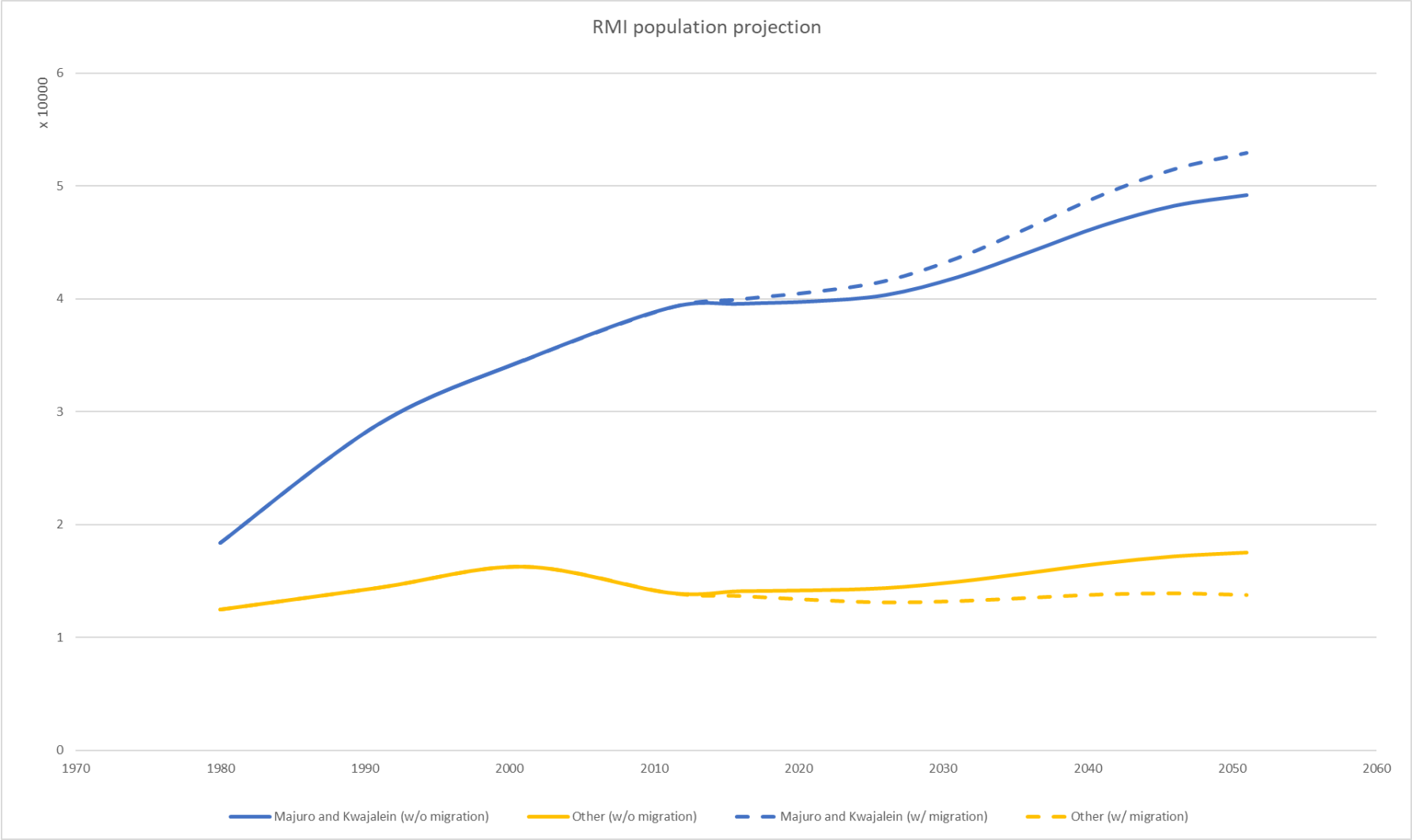
# Population projection with migration



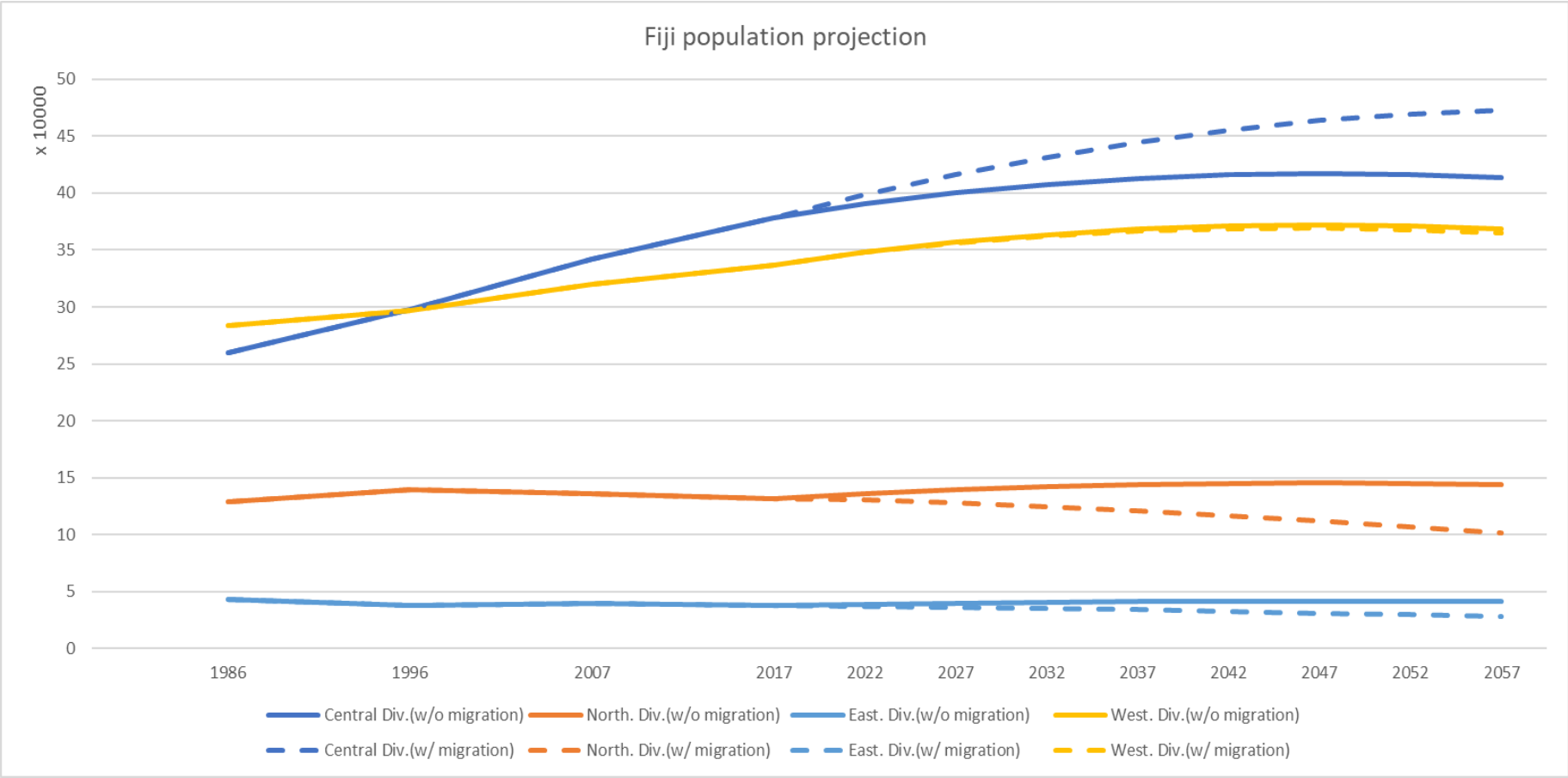

Kiribati population projection
140,000
120,000
100,000
80,000
60,000
40,000
20,000
0
1985
1990
1995
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
South Tarawa (w/o migration)
Outer Islands (w/o migration)
South Tarawa (w/ migration)
Outer Islands (w/ migration)


Vanuatu population projection
300,000
250,000
200,000
150,000
100,000
50,000
0
1979
1984
1989
1994
1999
2004
2009
2011
2016
2021
2026
2031
2036
2041
2046
2051
2056
TORBA (w/o migration)
SANMA (w/o migration)
PENAMA (w/o migration)
MALAMPA (w/o migration)
SHEFA (w/o migration)
TAFEA (w/o migration)
TORBA (w/ migration)
SANMA (w/ migration)
PENAMA (w/ migration)
MALAMPA (w/ migration)
SHEFA (w/ migration)
TAFEA (w/ migration)

# Marshall Islands



# Fiji

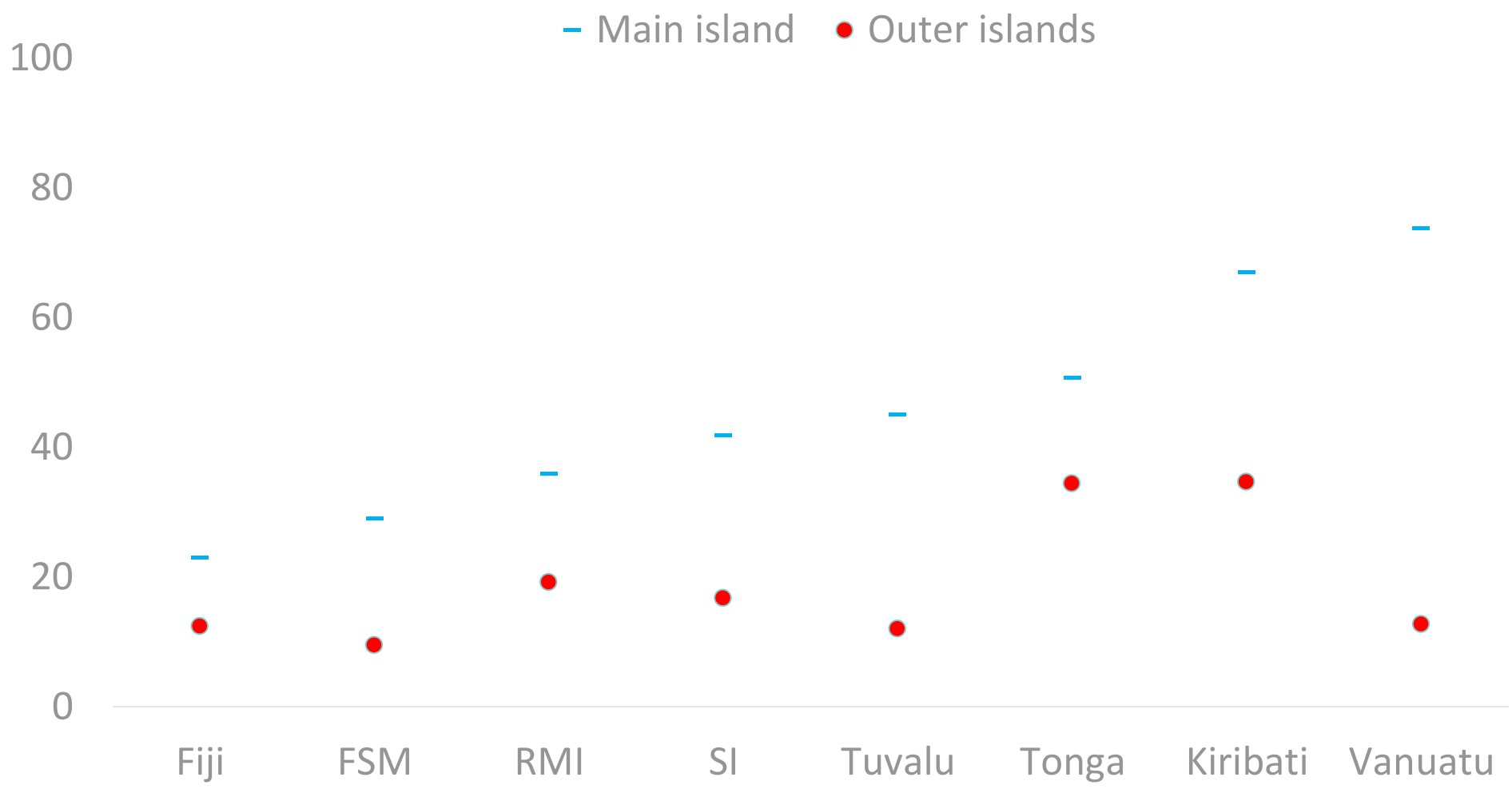

Fiji population projection
x 10000
50
45
40
35
30
25
20
15
10
5
0
1986
1996
2007
2017
2022
2027
2032
2037
2042
2047
2052
2057
Central Div.(w/o migration)
North. Div.(w/o migration)
East. Div.(w/o migration)
West. Div.(w/o migration)
Central Div.(w/ migration)
North. Div.(w/ migration)
East. Div.(w/ migration)
West. Div.(w/ migration)

# Migration and development

- **Migration is a rational economic strategy.** Households and individuals move to where there are economic opportunities – both between nations, and within nations
- **Such movement is a central part of the development process.** The movement from low productivity jobs to high productivity jobs increases incomes
  - In the USA, for example, 40% of the labour force was employed in the agriculture sector in 1900 (often in jobs with low levels of productivity and income). Today just 2% of the labour force works in agriculture

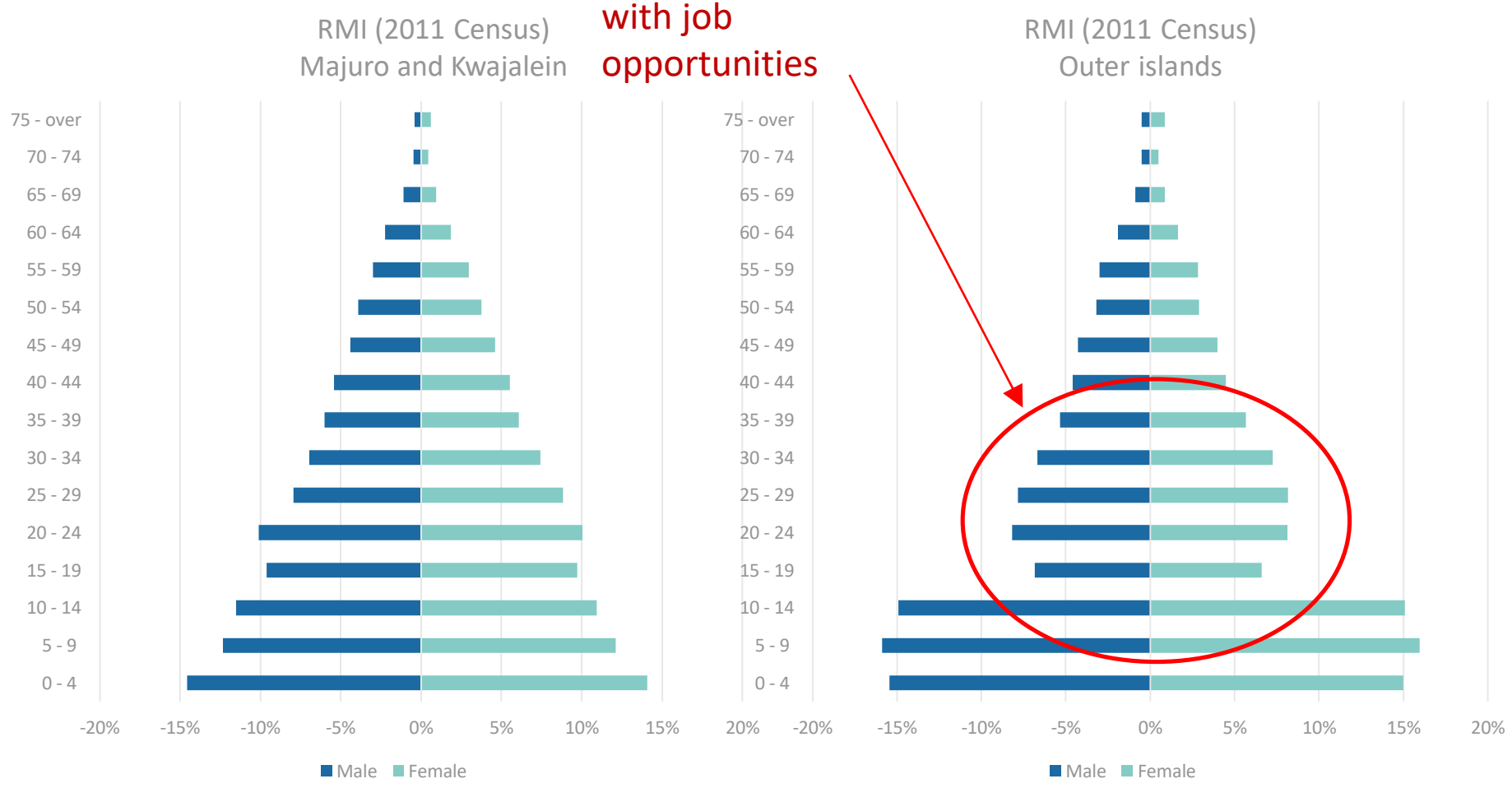
- **Migration in the Pacific takes the form of movement from:**
  (i) rural to urban areas, and
  (ii) islands/regions that are more remote and have smaller populations to those that are less remote and have larger populations/markets

# Wage/Salary employment is higher in main islands

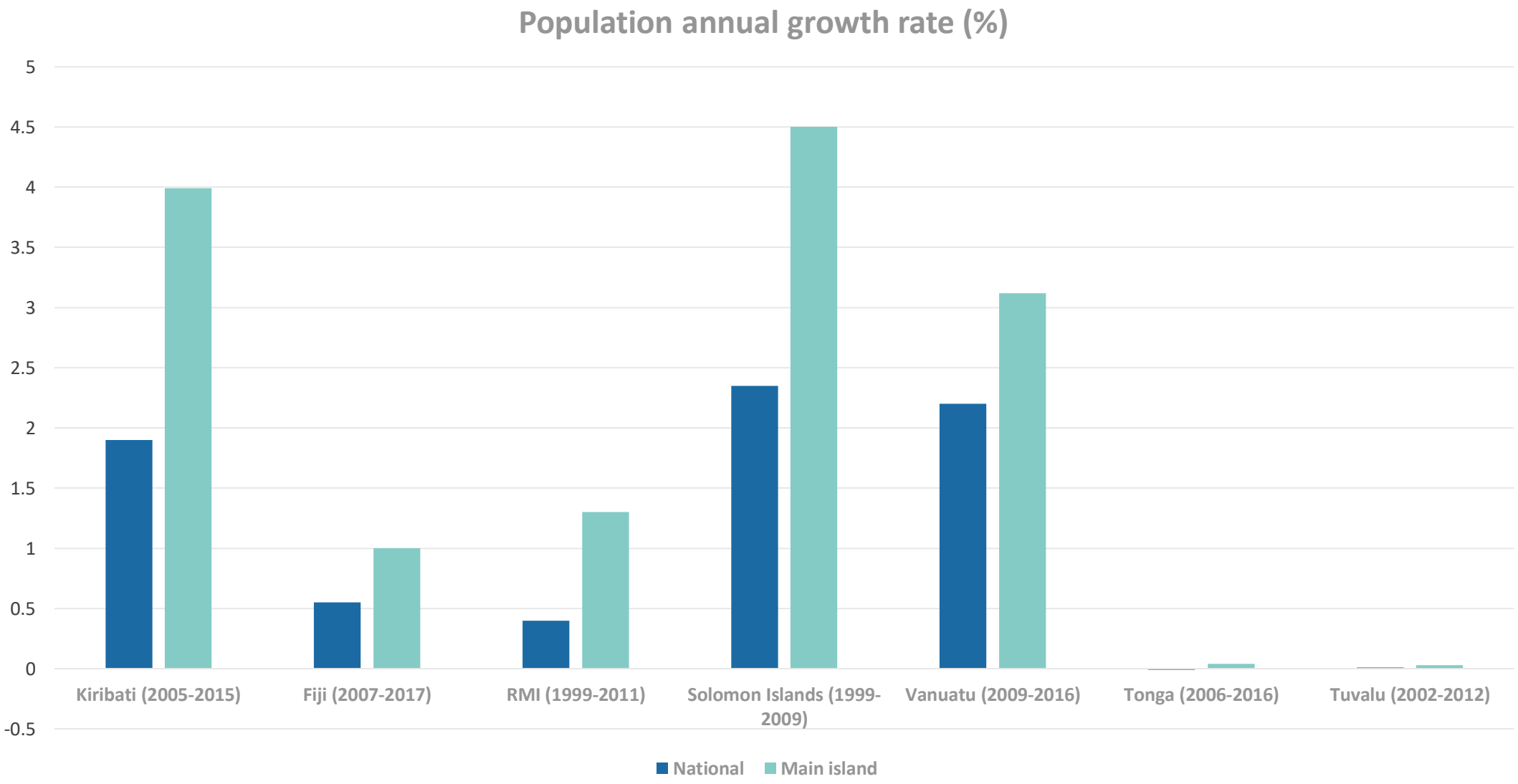


# Migration affects population structures

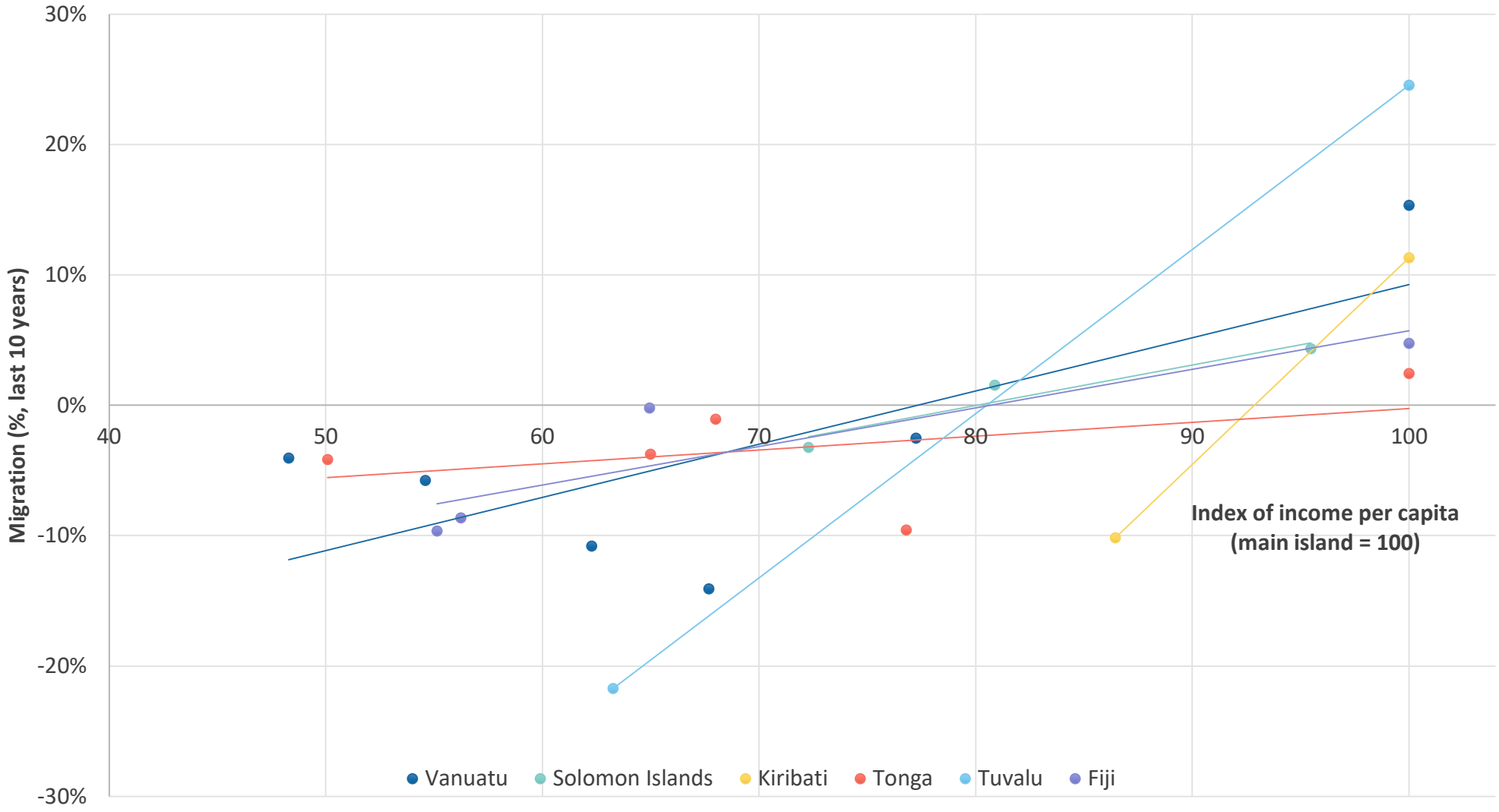
Note the missing middle – people of working age migrate to islands with job opportunities



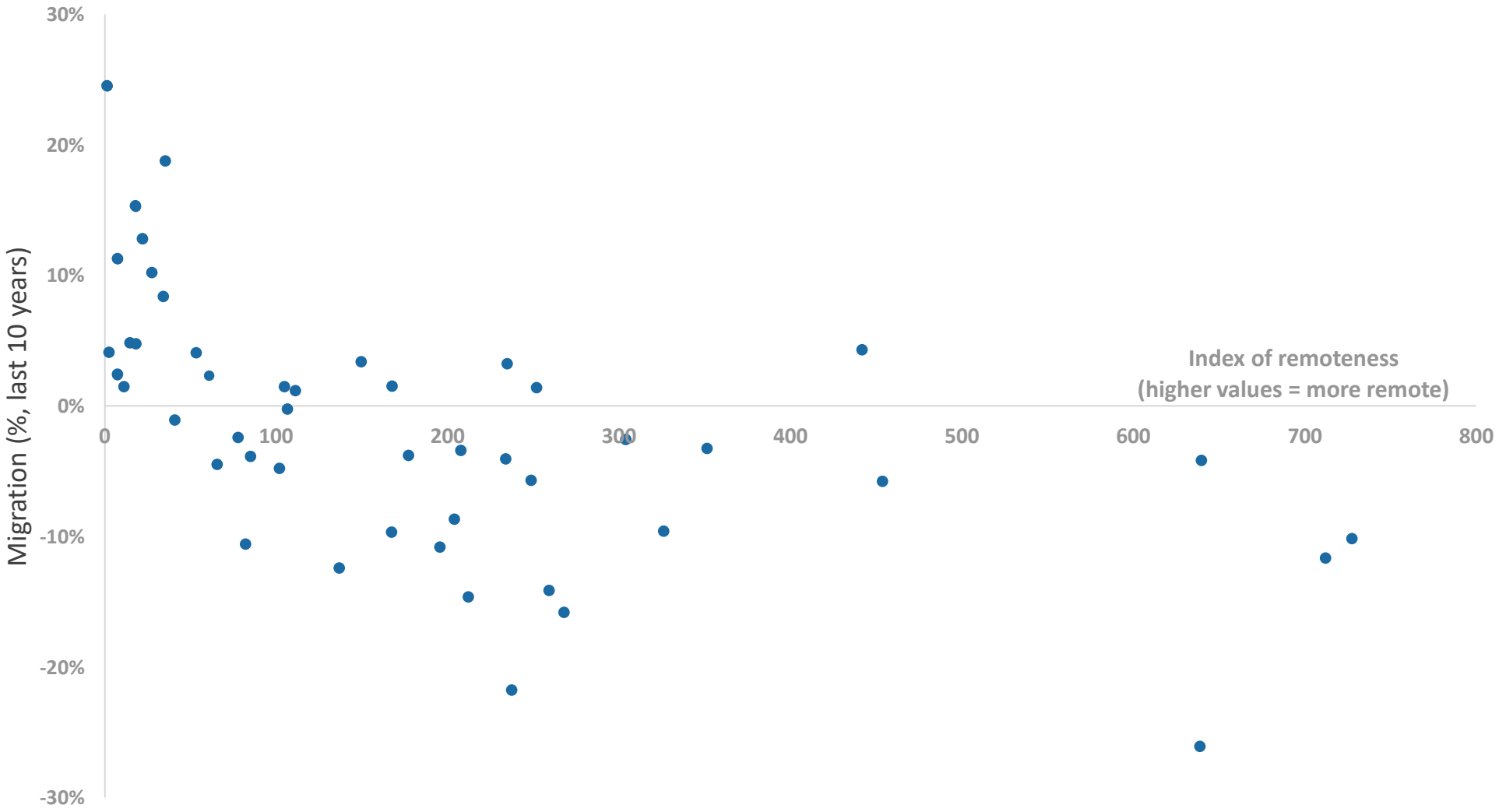
# Populations are gradually clustering--Evidence from Population growth



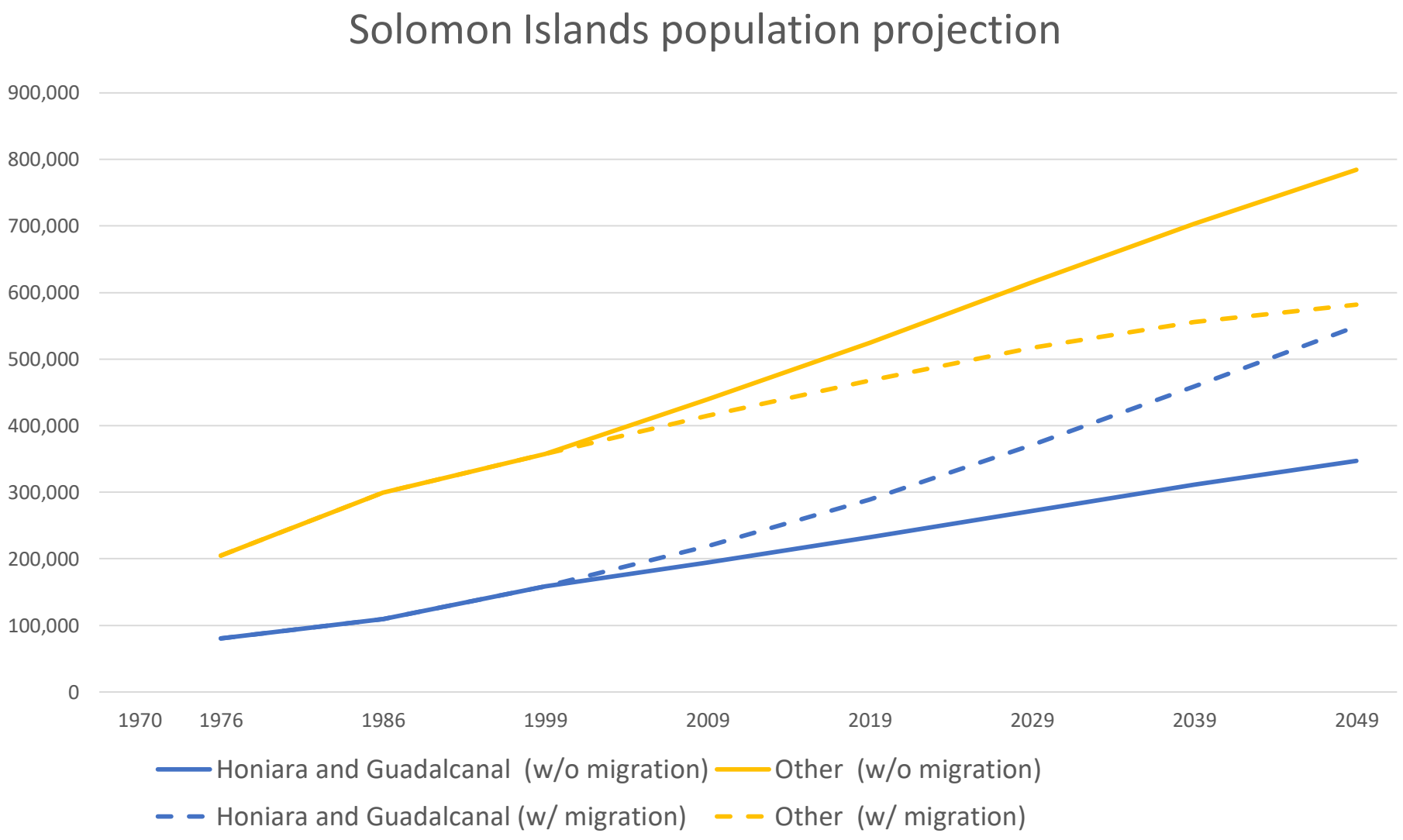
# Migrants move to islands where there is economic opportunity and incomes are higher



# Migrants move to less remote islands



# Population projection with migration continue



## What should be done?

- **Policy makers should not be aiming to stop such migration.** Movement to areas where there is economic opportunity increases incomes, both for migrants and the economy as a whole. Migration is a natural part of the development process.
- **However, policy-makers should focus on improving service delivery** in outer islands, in order to ensure that migrants are moving in pursuit of economic opportunities and not due to lack of services in their islands of origin.
- **This should not come at the expense of services for migrants** in main islands / urban and peri-urban areas. Failure to provide services to migrant communities limits the contribution they can make to the economy, and can lead to social issues
- **Better linking outer islands with main islands** can reduce regional inequalities and increase economic opportunities in outer islands.

# Poverty assessment timelines for PICs, in chronological order

| Country | Most recent HIES | Next planned HIES | Poverty report timeline |
|---|---|---|---|
| **Tuvalu** | 2015/2016 | Jul 2021 – Jun 2022 | Jul – Dec 2018 (for 2015/16 HIES) |
| **Samoa** | 2013/14 | Jan – Dec 2018 | Jan – Sep 2019 |
| **Vanuatu** | 2010 | Oct 2018 – Sep 2019 | Oct 2019 – Jun 2020 |
| **Kiribati** | 2007 | Mar 2019 – Feb 2020 | Mar – Dec 2020 |
| **FSM** | 2013/14 | Mar 2019 – Feb 2020 | Mar – Dec 2020 |
| **Palau** | 2014 | Mar 2019 – Feb 2020 | Mar – Dec 2020* |
| **RMI** | 2002/03 | Mar 2019 – Feb 2020 | Mar – Dec 2020 |
| **Fiji** | 2013/14 | 2019-2020 | 2020/2021 |
| **PNG** | 2009/10 | 2019-2020** | 2020/2021** |
| **Nauru** | 2012/13 | 2019-2020 | 2020/2021 |
| **Solomon Islands** | 2012/13 | Jul 2020 – Jun 2021 | Jul 2021 – Mar 2022 |
| **Tonga** | 2009 | Jul 2020 – Jun 2021 | Jul 2021 – Mar 2022 |

* No official request yet for WB support on poverty assessment
** TBC

# Data deprivation – a WB priority – is a major issue in the Pacific

| Country | 2018 data deprivation status | Last HIES | 2nd-to-last | Next planned |
|---|---|---|---|---|
| FSM | Moderate deprivation | 2013/2014 | 2005 | 2019 |
| Fiji | Minimum needs met | 2013/2014 | 2008/2009 | 2019 |
| Kiribati | Extreme deprivation | 2006 | n/a | 2019 |
| Nauru | Moderate deprivation | 2012/2013 | 2006 | 2019 |
| Palau | Moderate deprivation | 2014 | 2006 | 2019 |
| PNG | Moderate deprivation | 2009 | 1996 | 2019 |
| RMI | Extreme deprivation | 2002 | n/a | 2019 |
| Samoa | Minimum needs met | 2013/2014 | 2008 | 2018* |
| Solomon Islands | Moderate deprivation | 2012/2013 | 2005/2006 | 2022 |
| Tonga | Vulnerable to deprivation | 2015/2016 | 2009 | 2020 |
| Tuvalu | Minimum needs met | 2015/2016 | 2010 | 2021 |
| Vanuatu | Moderate deprivation | 2010 | 2006 | 2018* |

**Note:** Extreme = no data sets in last 10 years, moderate = 1 data set in last 10 years, vulnerable = 2 data sets >5 years apart, minimum needs met = two data sets <5 years apart

***:** In the field at time of writing