Does Price Volatility Affect Food Insecurity in Small Island States?

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INTRODUCTION

- A high degree of price volatility is characteristic of world food commodity markets. Studies on high and volatile food prices are of interest to economists, governments and different international institutions .

- Multiple economic forces drive food prices to high levels such as decline in food production and weak economic development (Dewbre et al, 2008).

- Climate changes, such as higher growing season temperatures, drought in tropical areas, natural disasters will influence total global food supply and cause serious food security problems in the future (Battisti and Naylor, 2009; Schmidhuber and Tubiello, 2007).

- High food prices and volatility may be correlated with serious problems such as malnutrition among children and social instability (FAO et al., 2011; Minot, 2014; Tadesse, et al. 2014; Dewbre et al, 2008).

MOTIVATION

- **Small Island Developing States** (SIDS) are recognized as a distinct group of developing countries facing specific social, economic and environmental vulnerabilities.

- Unstable and soaring food price is likely to increase the food insecurity problem in many of the small islands who import large proportion of the food. Thus they are likely to suffer more from food price spikes and variability because of their high food import bill.

- Academic and policy analyses have tended to focus on price levels rather than volatilities (Gilbert and Morgan, 2010); Studies have rarely focused on food insecurity of small islands, hence the need to fill this gap.
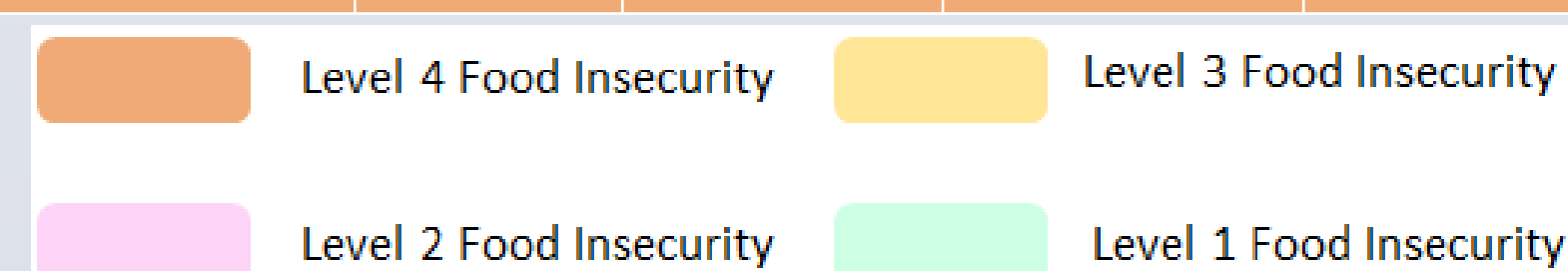
Small islands for this study

Bahamas
Barbados
Belize
Dominican Rep
Jamaica
Saint Kitts and Nevis
St Vincent and Grenadines
St Lucia
Suriname
Trinidad and Tobago
Haiti
Cape Verde
Sao Tome and Principe
Seychelles
Maldives
Singapore
Timor Leste
Fiji
Mauritius

Figure 1: Location of Small islands used for this study

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Table 1: Macro Economic Indicators for 19 Small islands

SIDS Lists	GDP Per Capita	Total Population	Unemployment rate	Food Import over Total Merchandise Export (%)	FIMI
Carbo Verde	3641.11	513,906	4.30	540	33.72
Maldives	7635.48	401,000	2.19	76	27.72
Mauritius	10016.65	1,260,934	7.8	20	19.96
Sao Tome and Principe	1810.72	186,342	13.47	255	33.00
Seychelles	15564.64	91,400	15.4	18	23.70
Singapore	56284.33	5,469,724	3.00	2	25.78
Barbados	15366.29	283,380	2.27	48	21.49
Belize	4831.18	351,706	11.77	19	17.70
Dominican Republic	6163.58	10,405,943	16.64	29	24.80
Haiti	824.16	10,572,029	12.72	117	50.03
Jamaica	5106.08	2,720,554	8.91	35	19.12
Saint Vincent and the Grenadines	6668.89	109,360	7.23	122	22.40
Trinidad and Tobago	21323.75	1,354,483	16.75	5	21.83
Saint Kitts and Nevis	15510.39	54,944	3.56	57	31.27
Saint Lucia	7647.53	183,645	15.52	70	28.35
Bahamas	22217.49	383,054	15.40	51	19.05
Fiji	5112.32	886,450	8.1	27	20.87
Timor-Leste	1169.04	1,212,107	4.7	163	32.41

Level 4 Food Insecurity | Level 3 Food Insecurity
Level 2 Food Insecurity | Level 1 Food Insecurity

OBJECTIVES and HYPOTHESIS

- This study uses a multi-dimensions food insecurity index to measure the food insecurity level of the SIDS.

- The study hypothesizes that both high food prices and high food price volatility will increase food insecurity in small islands.

EMPIRICAL FRAMEWORK

- A food insecurity multidimensional index (FIMI) is developed for small island states which synthesizes the four dimensions of food security (Figure 2).

- The FIMI is calculated by giving equal weights to all dimensions and indicators. All the indicator values are normalized.

- Normalized value= $\dfrac{Actual\ value - minimum\ value}{maximum\ value - minimum\ value}$

- Panel data consists of 19 small island developing states over a period of 15 years (2000-2014).

AVAILABILITY
Average value of food production
Arable land (% of land area)
Food production index (2004-2006=100)
Cereal yield (kg per hectare)

ACCESS
CPI (2010=100)
Depth of the food deficit
Prevalence of food inadequacy
Improved water resource, rural (%of rural population with access)

STABILITY
Cereal import dependency ratio
Per Capita food production variability
Per capita food supply variability
Value of food imports over total merchandise exports

UTILIZATION
% of anemia among children under 5 years old
% of anemia among pregnant women
Access to improved sanitation facilities
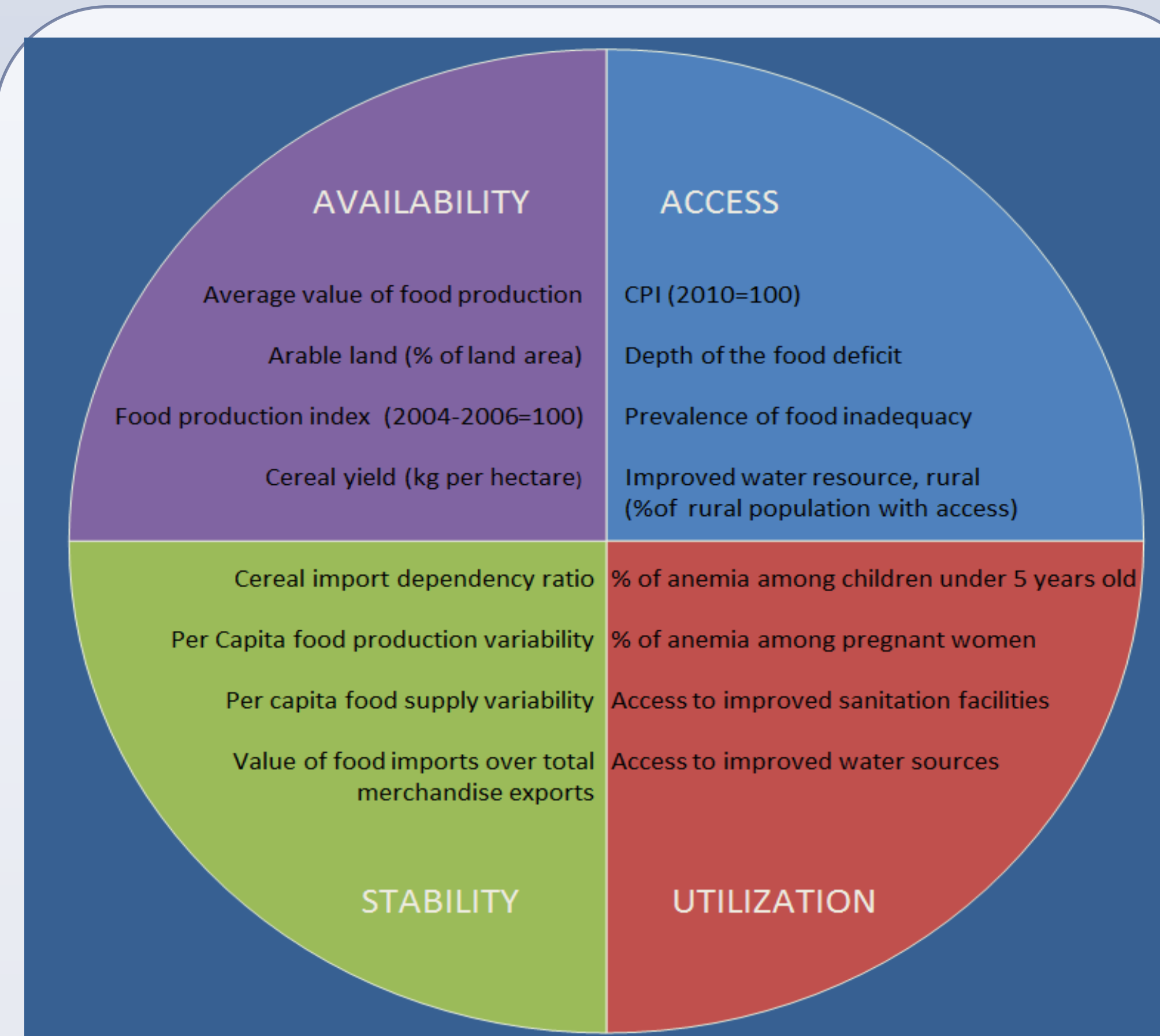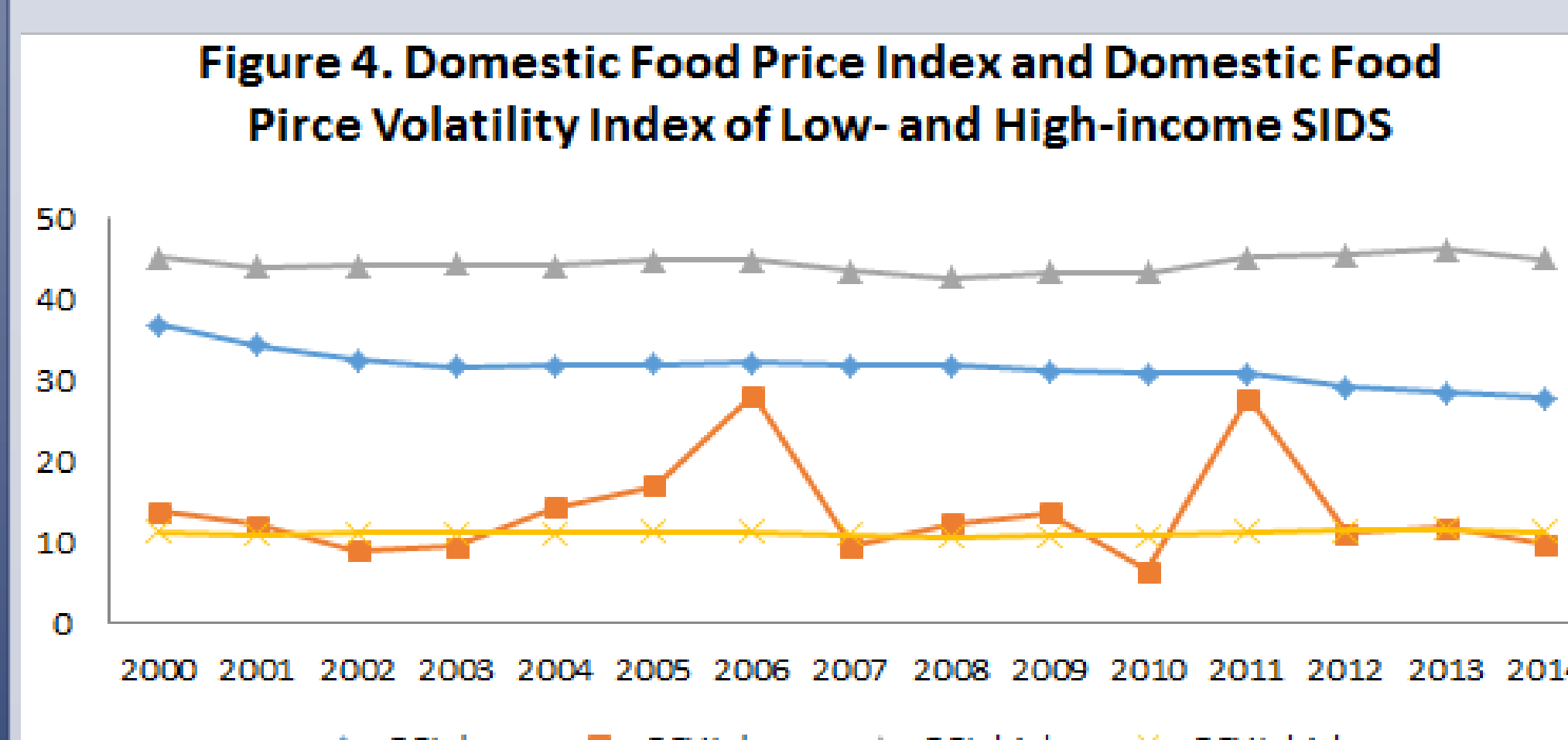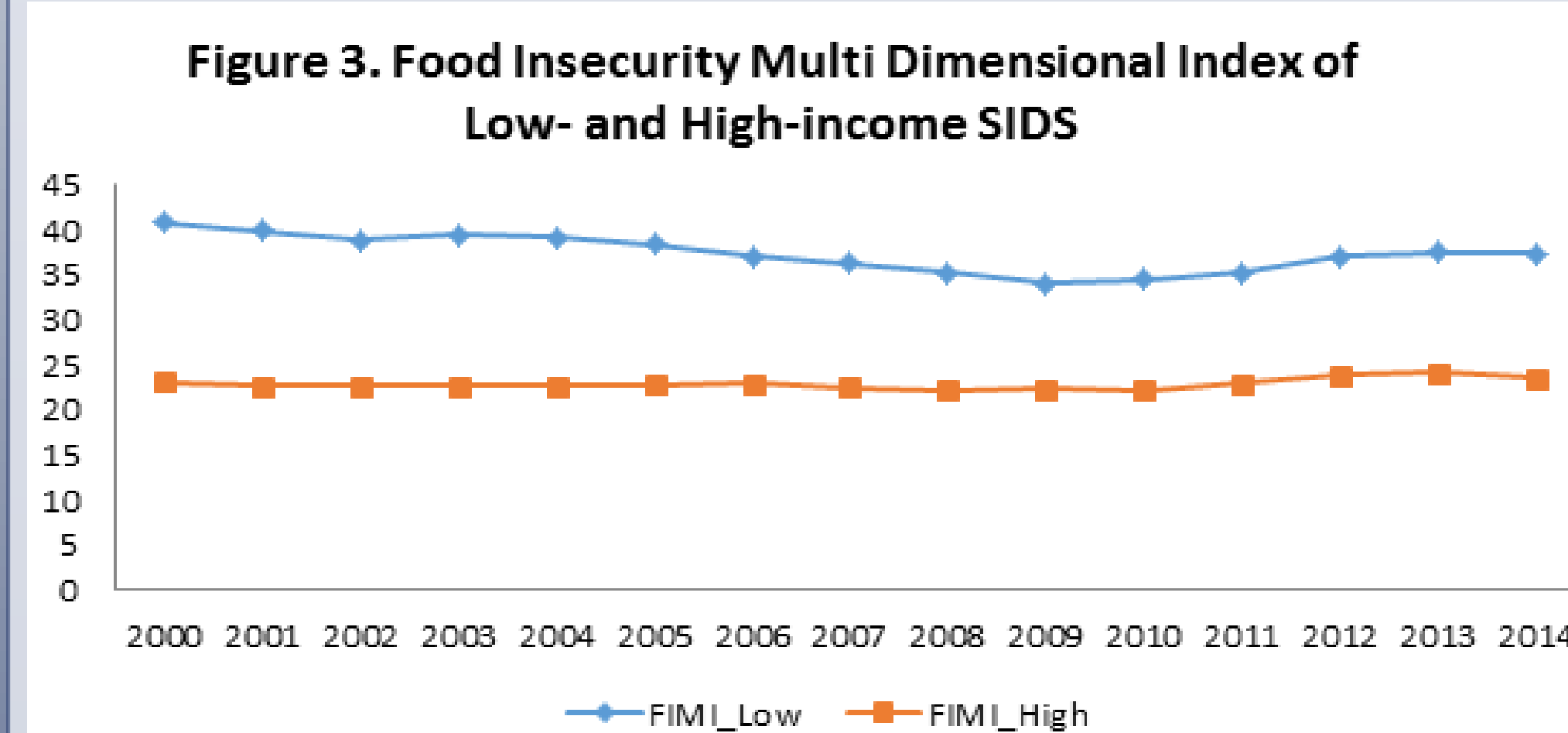Access to improved water sources

Figure 2: Four Dimensions and Sixteen Indicators included the FIMI

- This study applies fixed effect model.
- FIMI= $\alpha_i' + r_{it} DFI_{it} + \beta_{it}' X_{it} + e_{it}'$
- FIMI= $\alpha_i'' + \lambda_{it} DFVI_{it} + \beta_{it}'' X_{it} + e_{it}''$
- FIMI= $\alpha_i''' + r_{it}' DFI_{it} + \lambda_{it}' DFVI_{it} + \varphi_{it} DFI_{it} * DFVI_{it} + \beta_{it}''' X_{it} + e_{it}'''$

- DFI indicates domestic food price index, and DFVI indicates domestic food price volatility index.

- Where vector X includes all the other explanatory variables, such as food production index (FPI), food import over total merchandise export (Food import), per capita food production variability, and per capita food supply variability.

Figure 3. Food Insecurity Multi Dimensional Index of Low- and High-income SIDS

FIMI_Low — FIMI_High

Figure 4. Domestic Food Price Index and Domestic Food Pirce Volatility Index of Low- and High-income SIDS

DFI_low — DFVI_low — DFI_high — DFVI_high

RESULTS

Table 2 : Results of models

	Model 1	Model 2	Model 3
DFI	0.19***		0.24***
DFVI		0.002	0.03**
DFI*DFVI			-0.003**
FPI	0.07***	0.07***	0.07***
CPI	0.02***	0.02***	0.02***
Food_import	0.05****	0.04***	0.06***
Food_pro_variability	0.08***	0.07***	0.08***
Food_supply_variability	0.07***	0.07***	0.07***
Population	0.002***	0.001**	0.001***
Unemployment rate	0.06**	0.06*	0.07*
Rural Pop Percent	0.19***	0.21***	0.17***
GDP Per Capita	-0.0002	0.001	0.001
Constant_	4.42*	5.21*	5.3**

DISCUSSION & CONCLUSION

- Contrary to some previous papers, we find that domestic food price index and domestic food volatility index have different effects on the small island developing states' food insecurity level.

- High food price and food price volatility cannot be used interchangeably as is often the case.

- Simple regression models show that the domestic food price index has a positive and significant effect on the food insecurity level of small island developing states, while the domestic food price volatility does not have significant effect on the food security level.

- The margins also show that at the average of dfvi (15), higher domestic food price increases food insecurity. However at the average dfi (10), increasing domestic food price volatility does not change the food security level.

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