

Rice Price, Job Misery, Hunger Incidence: An Econometric Analysis

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Sequence of the Presentation

- ❑ Background and Motivation of the Research
- ❑ Stylized Facts on Hunger Incidence, Price of Rice, Job Misery Index and other indicators
- ❑ Econometric Models: Vector AutoRegressive (VAR) and Time Varying Parameters (TVP)
- ❑ Empirical Results
- ❑ Conclusions

Background Information: National Perspective

- ❑ Statistics on hunger produced by both government and private institutions show a **very slow reduction** in hunger incidence over the last five years.
- ❑ Official data from Philippines Statistics Authority (PSA) show the percentage of **subsistence poor** (or extremely poor) in the population decreased only slightly from 10.9 percent of the population in 2009 to 10.4 percent in 2012 and increasing marginally to 10.5 percent during the 1st semester of 2013 (1st semester 2014 figure is 10.5 percent).
- ❑ Happening under a respectable growth of the economy: average RGDP Growth for the period 2010-2014 (Aquino administration) is 6.3 percent.

Background Information: National Perspective

- ❑ The results of the 8th National Nutrition Survey (NNS) of 2013 conducted by the Food Nutrition and Research Institute (FNRI) show the same small reduction in the proportion of children aged 0-5 years who are underweight (**indirect measure of hunger**) from 20.7 percent in 2008 to 19.8 percent in 2013.
- ❑ Moreover, the same report shows that the proportion of children who are under-height for age (stunted) also decreased marginally from 32.3 percent in 2008 from 30.3 percent in 2013.

Background Information: National Perspective

- ❑ The self-rated hunger incidence data from the SWS also reveal a similar bleak picture, where hunger incidence in households averaging at 19.5 percent in 2013 from 19.1 percent in 2009, slowing down slightly to an average of 18.3 percent in 2014.
- ❑ The last reported hunger incidence during the 3rd quarter of 2015 is 15.7 percent

Objectives of the Research

- ❑ This paper looks at the factors that influence the dynamic nature of hunger incidence in the Philippines using the self-rated data from the SWS quarterly surveys on hunger.
- ❑ Variables identified as potential determinants of hunger incidence are, among others, changes in the price of rice and job misery index (sum of the employment and unemployment rates).
- ❑ In this paper, the authors used Vector Auto Regressive (VAR) and Time-Varying Parameter (TVP) models.

Hunger Incidence and the Long Run Trend (Hodrick-Prescott Filter) 1st Quarter 2000 to 3rd Quarter 2015 (SWS Data)

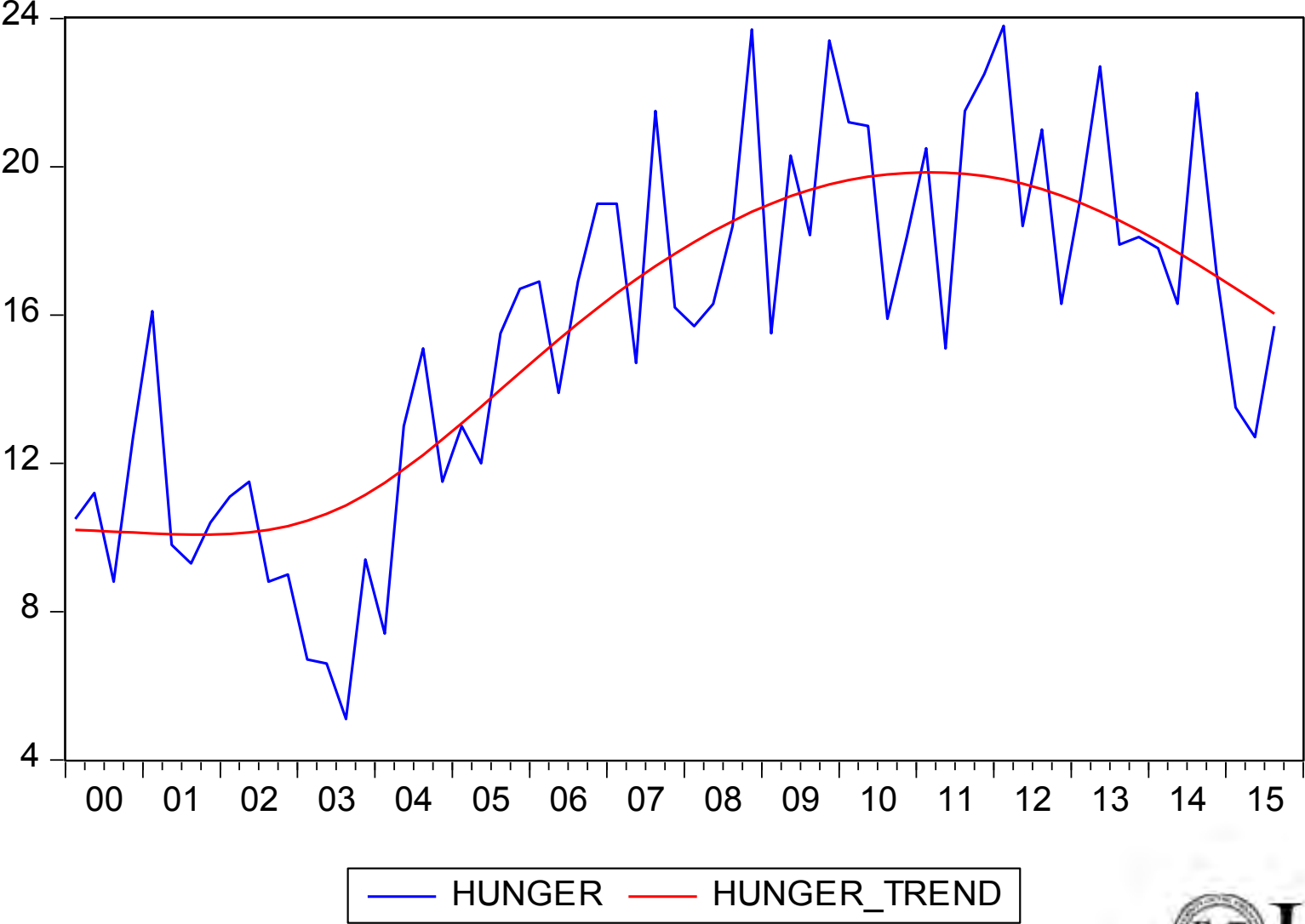
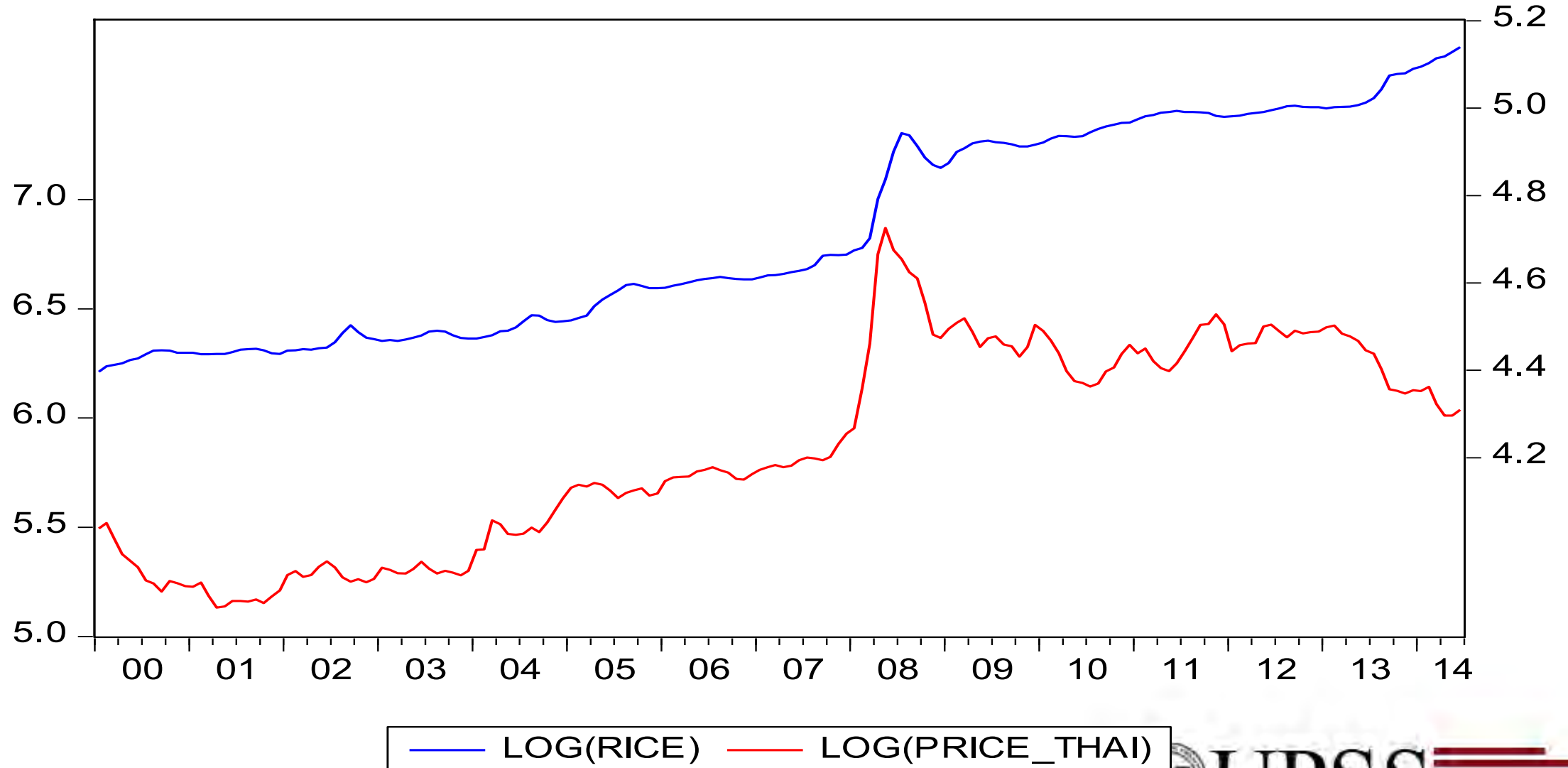


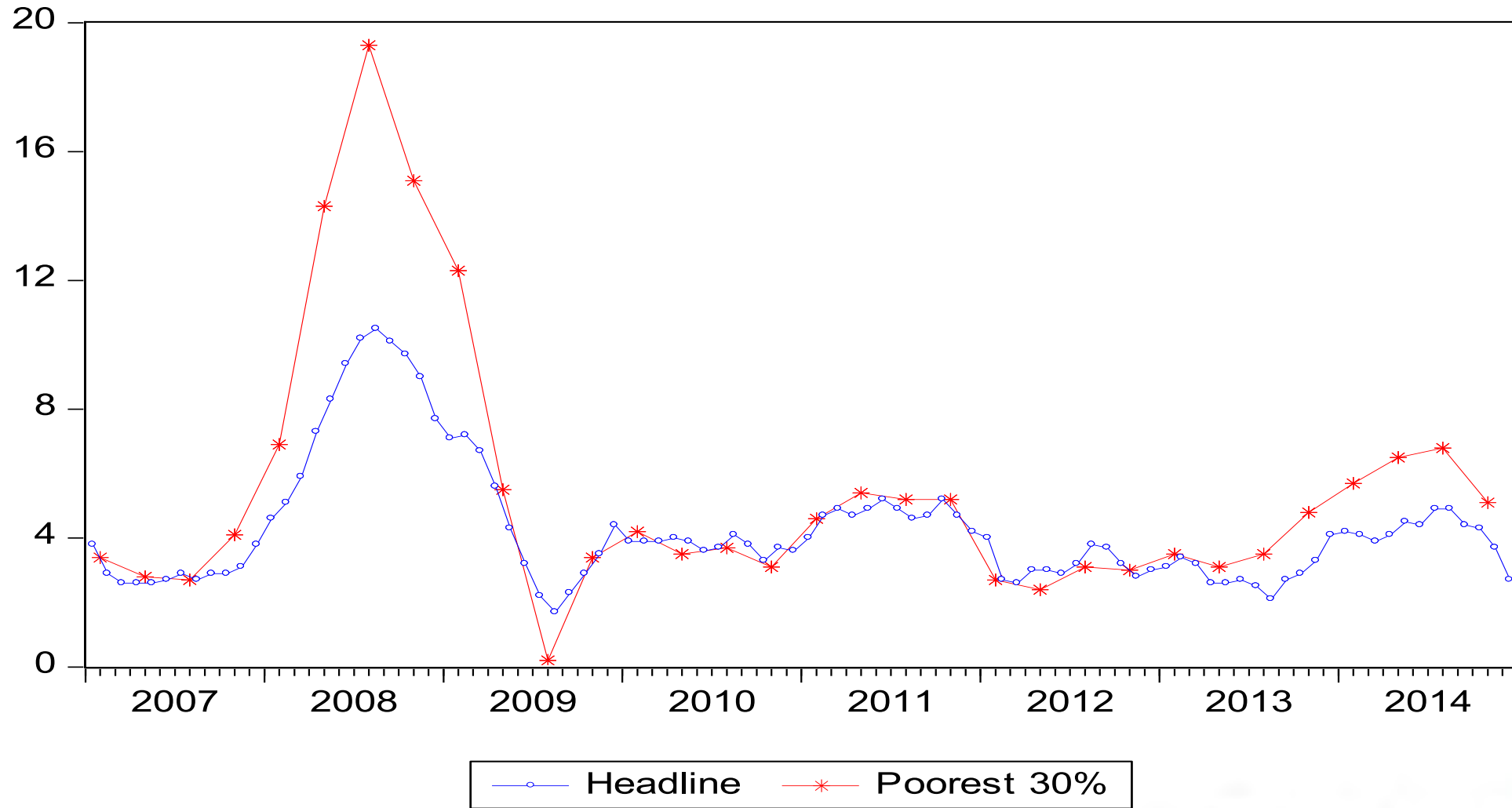
Figure 2. Monthly Averages Rice Price Index (PHIL) and Thailand 100%, 2nd Grade Rice (in US\$/Ton) January 2000 to June 2014 (in natural logarithm)



— LOG(RICE) — LOG(PRICE_THAI)

Price Increases Affect the Poor Households the Most!

Figure 3. Headline Inflation Rate and Inflation Rate of the Poorest 30 Percent of Households (1st Quarter 2007 to 4th Quarter 2014)



Inflation Rate of the Poorest 30 Percent of Households

Quarter	Year								
	2007	2008	2009	2010	2011	2012	2013	2014	
1st	3.4	6.9	12.3	4.2	4.6	2.7	3.5	5.7	
2nd	2.8	14.3	5.5	3.5	5.4	2.4	3.1	6.5	
3rd	2.7	19.3	0.2	3.7	5.2	3.1	3.5	6.8	
4th	4.1	15.1	3.4	3.1	5.2	3.0	4.8	5.1	

Weight of Food in the Basket:

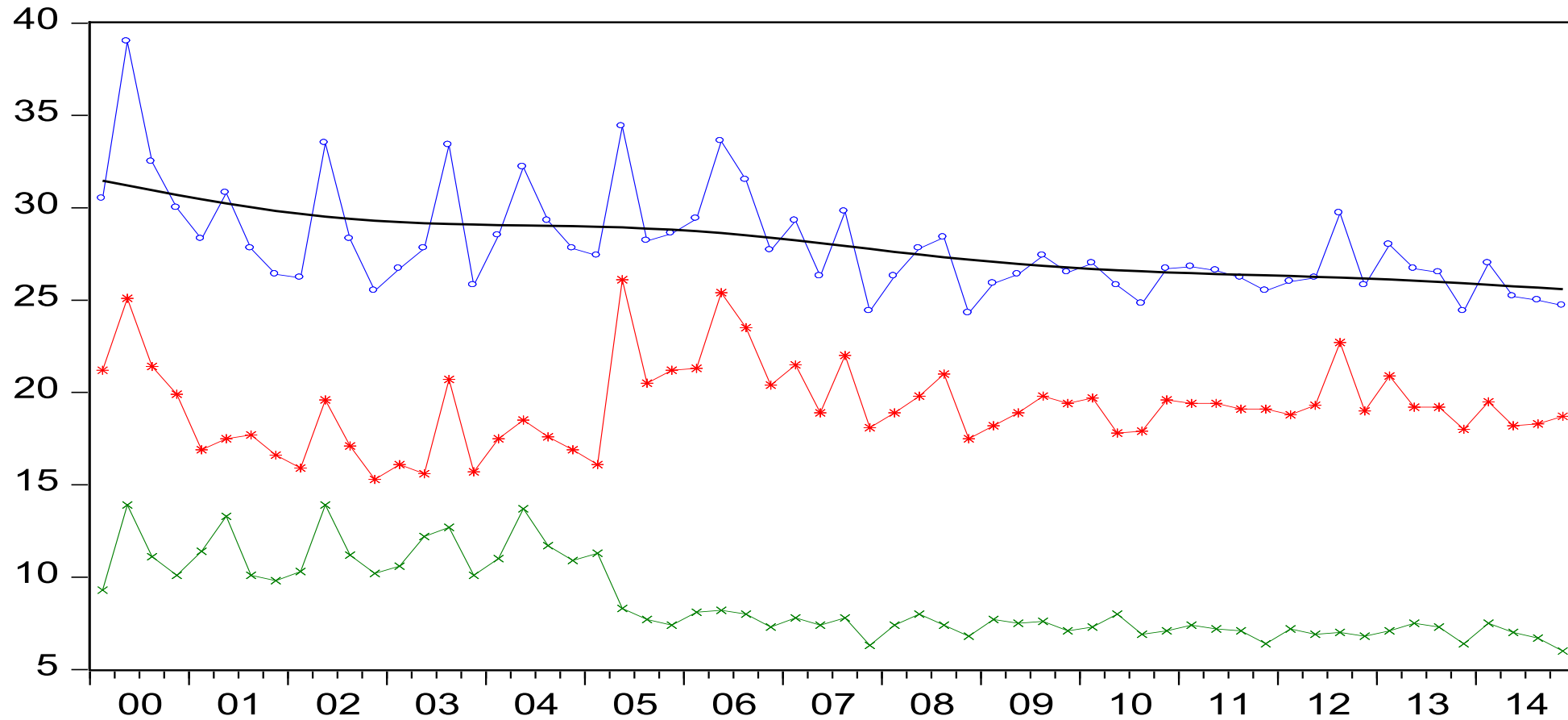
70 percent (vs. 39 percent for all households);

Weight of Rice: 23 percent (vs. 9 percent for all households)

Headline Inflation vs Inflation of the Poorest 30%

- ❑ Headline inflation in 2008 was 8.3 percent, coming from a low of 2.9 percent in 2007.
- ❑ The inflation rate of the poorest 30 percent of the Filipino households reached 19.3 percent during the same quarter (almost double that of the headline inflation rate) and full year inflation rate reaching a high of 13.9 percent, 67 percent higher than the popularly reported headline inflation rate.
- ❑ For 2014, while the headline inflation rate is reported at an average of 4.1 percent, the inflation rate for the poorest 30 percent of households is higher at 6 percent.

Figure 4. Unemployment Rate, Underemployment Rate, Job Misery Index and its Long Run Trend
1st Quarter 2000 to 4th Quarter 2014



Vector AutoRegressive (VAR) Model

We can generalize the mathematical representation of a VAR model as:

$$\underline{y}_t = \underline{A}_1 \underline{y}_{t-1} + \underline{A}_2 \underline{y}_{t-2} + \dots + \underline{A}_p \underline{y}_{t-p} + \underline{e}_t$$

where \underline{y}_t is a $(k \times 1)$ vector of endogenous variables, $\underline{A}_1, \underline{A}_2, \dots, \underline{A}_p$ are matrices of coefficients to be estimated, and \underline{e}_t is a $(k \times 1)$ vector of innovations that may be contemporaneously correlated but are uncorrelated with their own lagged values and uncorrelated with all of the right-hand side variables. \underline{e}_t is assumed to be normally distributed with mean $\underline{0}$ and covariance matrix $\underline{\Sigma}$.

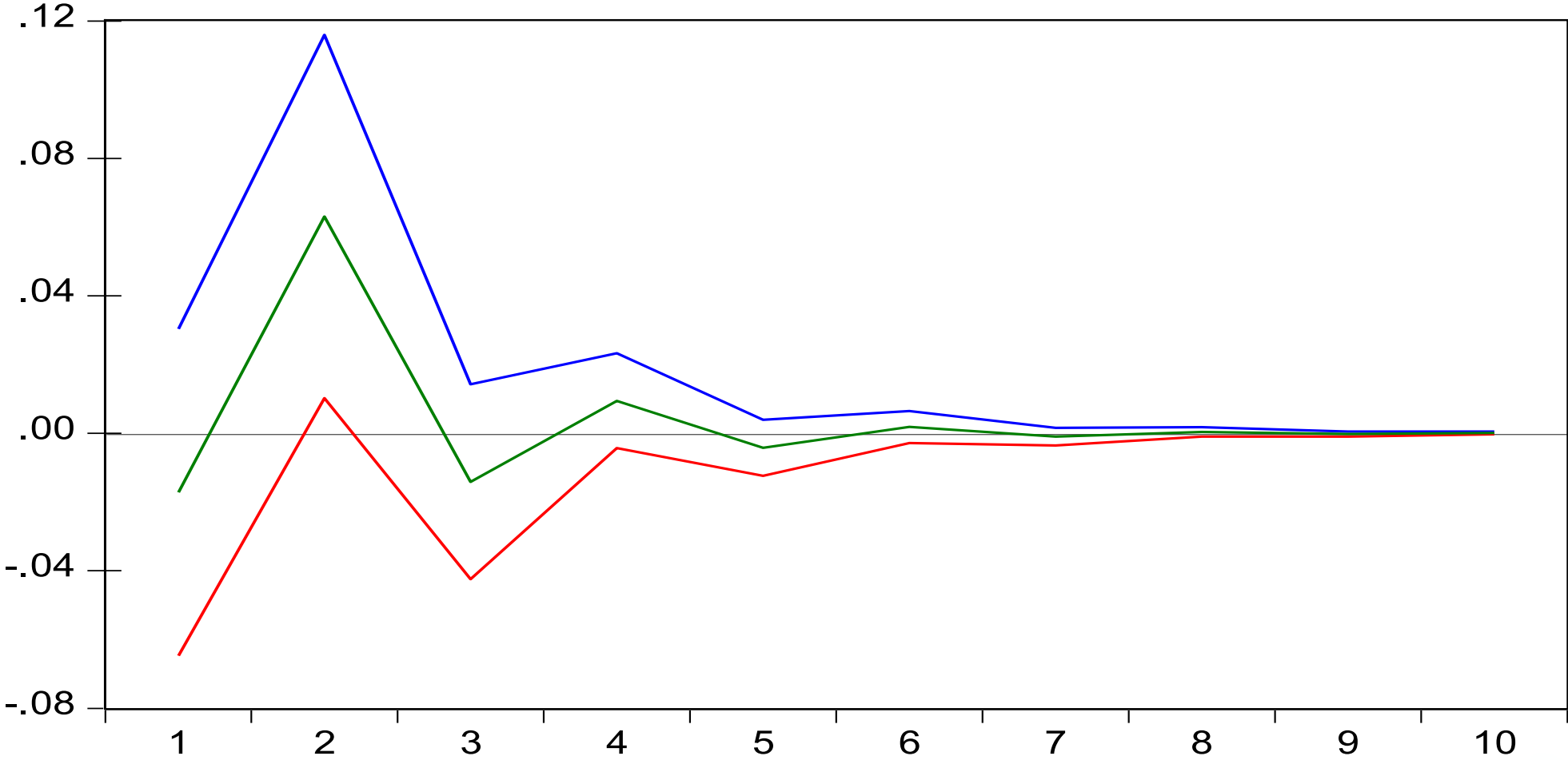
Summary Statistics

	Full Data (2000 to 2013)				After 2008			
	Hunger	Job Misery	Rice	HWGEF	Hunger	Job Misery	Rice	HWGEF
Statistics	Incidence	Index	Price Inf	Price Inf	Incidence	Index	Price Inf	Price Inf
Mean	15.70	27.87	4.91	4.53	19.49	26.58	7.26	4.04
Median	16.15	27.40	3.22	4.76	19.75	26.45	3.78	4.76
Maximum	23.80	34.40	33.18	7.99	23.80	29.70	33.18	5.86
Minimum	5.10	24.30	-1.15	0.80	15.10	24.30	-1.15	0.80
Std. Dev.	4.99	2.42	6.81	1.88	2.87	1.18	9.53	1.50
No. of Quarters	50	50	50	50	22	22	22	22

Results of the VAR Model

	DLOG(HUNGER)	DLOG(RICE)	DLOG(HWEGF)	LOG(MISERY_SA)
DLOG(HUNGER(-1))	-0.432***	-0.003	-0.003	0.010
	(0.123)	(0.016)	(0.005)	(0.041)
	[-3.505]	[-0.202]	[-0.565]	[0.239]
DLOG(RICE(-1))	2.043**	0.180	-0.020	0.018
	(1.065)	(0.139)	(0.0430)	(0.358)
	[1.919]	[1.301]	[-0.463]	[0.051]
DLOG(HWEGF(-1))	-5.661*	0.711	0.297*	0.637
	(3.507)	(0.456)	(0.142)	(1.179)
	[-1.614]	[1.558]	[2.096]	[0.541]
LOG(MISERY_SA(-1))	0.685*	-0.068	0.009	0.381*
	(0.375)	(0.049)	(0.015)	(0.126)
	[1.825]	[-1.401]	[0.602]	[3.017]
C	-2.228*	0.230	-0.023	2.054
	(1.247)	(0.162)	(0.050)	(0.419)
	[-1.786]	[1.415]	[-0.448]	[4.898]
R-squared	0.3068	0.1172	0.1024	0.1831
Adj. R-squared	0.2478	0.0421	0.0260	0.1136
Std Errors are in () and t-statistics in []; *** significant at 1%; ** significant at 5%; * significant at 10%				

Response of Total Hunger Incidence to One Standard Deviation Increase in Rice at Quarter t



— UPPER_LIMIT
— LOWER_LIMIT
— POINT_ESTIMATE

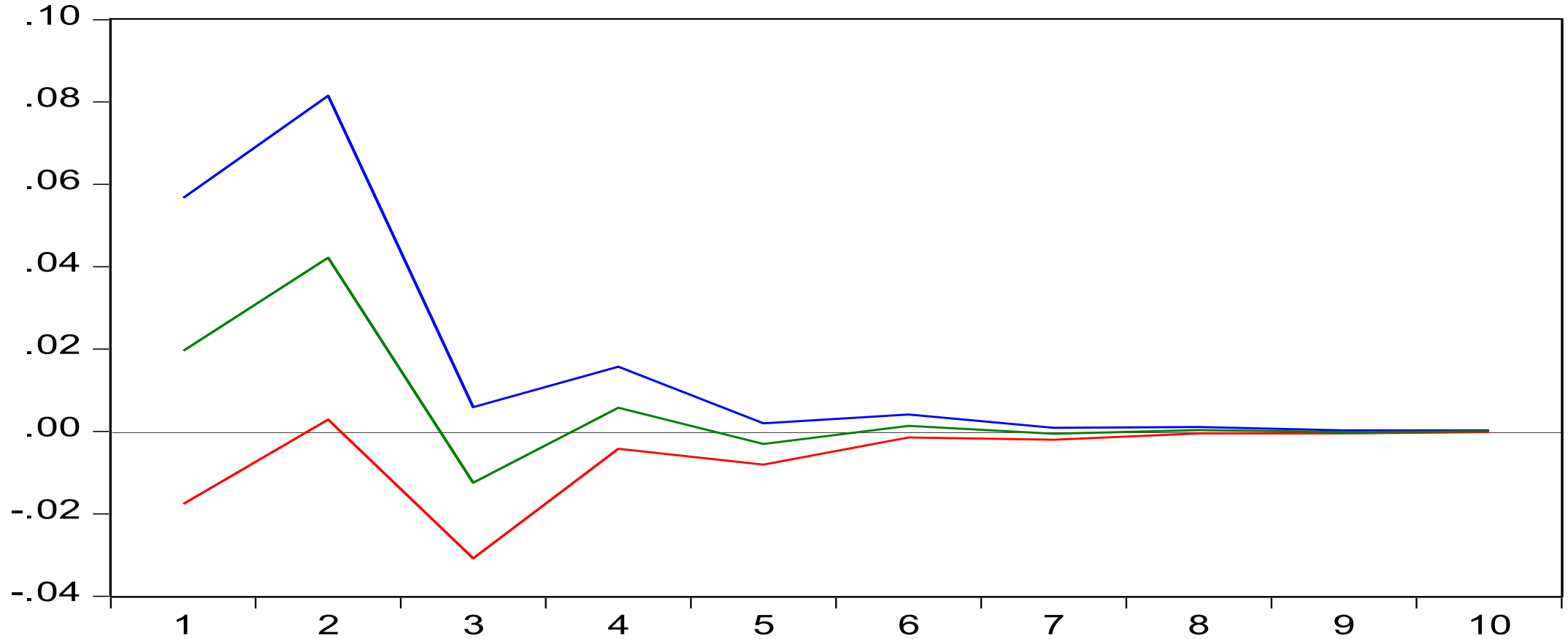


Impulse Response Function – Response of Change in Hunger Incidence to a One-Standard Deviation increase in Rice Price Inflation at Quarter 1

Quarter	Point Estimate	Standard Error.	Confidence Interval	
			Lower Limit	Upper Limit
1	-0.017	0.029	-0.065	0.030
2 *	0.063	0.032	0.010	0.116
3	-0.014	0.017	-0.042	0.014
4	0.009	0.008	-0.004	0.023
5	-0.004	0.005	-0.012	0.004
6	0.002	0.003	-0.003	0.006
7	-0.001	0.002	-0.003	0.002
8	0.000	0.001	-0.001	0.002

one standard deviation increase to rice price (about 2.8 percentage points using the sample data) at quarter t will increase total hunger by about 6 percentage points in the next quarter, all things being the same.

Response of Total Hunger Incidence to One Standard Deviation Increase in Job Misery at Quarter t



— UPPER_LIMIT
— LOWER_LIMIT
— POINT_ESTIMATE

Impulse Response Function – Response of Change in Hunger Incidence to a One-Standard Deviation increase in Rice Price Inflation at Quarter 1

Quarter	Point Estimate	Standard Error.	Confidence Interval	
			Lower Limit	Upper Limit
1	0.020	0.029	-0.018	0.057
2*	0.042	0.031	0.003	0.082
3	-0.012	0.014	-0.031	0.006
4	0.006	0.008	-0.004	0.016
5	-0.003	0.004	-0.008	0.002
6	0.001	0.002	-0.001	0.004
7	-0.001	0.001	-0.002	0.001
8	0.000	0.001	0.000	0.001

one standard deviation increase to the job misery index (about 8 percent using the sample data) at quarter 1 will increase total hunger by about 4.2 percentage points in the next quarter, all things being the same.

Time-Varying Parameters (TVP) Model

A linear (Gaussian) state space representation of the dynamics of the $(n \times 1)$ vector \underline{y}_t is given by the system of equations:

$$\underline{y}_t = \underline{X}_t \underline{\beta}_t + \varepsilon_t, \quad \varepsilon_t \sim N(0, \Sigma_\varepsilon)$$

measurement equation (1)

$$\underline{\beta}_t = \underline{c}_t + \underline{F} \underline{\beta}_{t-1} + \underline{v}_t, \quad \underline{v}_t \sim N(0, \Sigma_v)$$

transition equation (2)

Summary of the Impact of the Rice Price Inflation (Lag 1) on Hunger Incidence

	Sample Periods	
Summary Statistics	2003 to 2008	2009 to 2013
Mean	1.02	1.88
Median	0.72	1.88
Std. Dev	1.40	0.04
Number of Quarters	26	18

Simulating the Impact of the Change in the Price of Rice from Php 27.00 to Php 32.00

	Definition	Results
1)	Rice Price Inflation, G_1	0.19
2)	Estimated Response of Hunger Incidence to Rice Price Inflation, $\Delta x = G_1 * \Delta p$	0.40
3)	Hunger Incidence Base, h_0 (given)	19.68
4)	New Hunger Incidence, $h_1 = h_0 * (1 + \Delta x)$	27.48
5)	Estimated Change in Hunger Incidence, $\Delta h = h_1 - h_0$	7.81
6)	Increase in Number of "hungry" families $\Delta h * pop$	1,673,680
	Actual Change in Hunger Incidence based on data	3.00
	Increase in Number of "hungry" families	643,101

Simulating the Impact of the Change in the Price of Rice from Php 32.00 to Php 19.00

	Definition	Results
1)	Rice Price Inflation, G_1	(0.41)
2)	Estimated Response of Hunger Incidence to Rice Price Inflation, $\Delta x = G_1 * \Delta p$	(0.87)
3)	Hunger Incidence Base, h_0 (given)	19.68
4)	New Hunger Incidence, $h_1 = h_0 * (1 + \Delta x)$	2.55
5)	Estimated Change in Hunger Incidence, $\Delta h = h_1 - h_0$	(17.13)
6)	Decrease in Number of "hungry" families $\Delta h * pop$	(3,671,635)

Summary of Results

- ❑ Results from the VAR model show that a shock (increase) in the price of rice at the current quarter tends to increase hunger incidence in the succeeding quarter.
- ❑ A shock (increase) in job misery index at the current quarter also increases the hunger incidence in the next quarter.
- ❑ Analysis using the time-varying parameter (TVP) model shows a higher effect of changes in the price of rice to hunger incidence after the global rice crisis in 2008. The impact of the change in the price of rice on hunger incidence almost doubled after the global rice price crisis than before it.
- ❑ This means that hunger incidence is becoming very sensitive to changes in the price of rice.

Conclusions

- ❑ The increases in the price in the local market is one of the major reasons for the spike in hunger incidence during the period.
- ❑ The rice self-sufficiency program of the government must be reviewed in the light of the studies pointing to the program as one of the culprits resulting in the continuing increases in the price of rice in the local market.
- ❑ Another key factor affecting hunger incidence is the availability (quantity) and the quality of jobs.
- ❑ The job misery index remains high which means that a large percentage of the country's labor resources is underutilized.

Conclusions

- ❑ It is also important that the public and the policy makers are provided with relevant information and indicators that affect the welfare of poor households.
- ❑ In the case of inflation rate, it is high time that the PSA gives **equal importance to the inflation rate for the poorest 30 percent of the households**, similar to the headline inflation rate (for all households), particularly during periods when there are substantial gaps/differences in the two inflation figures.
- ❑ The inflation rate for the poorest 30 percent of the households should also be reported monthly, rather than quarterly, together with the headline inflation rate.
- ❑ The PSA, together with the Department of Labor and Employment (DOLE), should also report the quarterly *labor underutilization rate* (or perhaps the job misery index) to provide the public and policy makers with a clearer picture of the labor situation in the country.

Thank you and good morning.

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