Vulnerability to Poverty of Rural Households in Pattani Province: A Feasible Generalized Least Squares (FGLS) Approach

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Abstract

Against the background of growing poverty in the rural areas of Thailand, this paper examines the level of vulnerability to poverty among rural households with particular focus on Pattani province in Thailand. Through multi stage sampling procedure, and by dividing the population proportionately into five regions of Pattani province, namely northern, southern, eastern, western and central, a sample size of 600 households were drawn for the study. A structured questionnaire was administered to collect primary data for the study. Data collected were analysed through descriptive statistics and Feasible Generalized Least Squares (FGLS) approach. The analysis of the results reveals that the southern region has the highest vulnerable population when compared to other regions in Pattani province. Also among the general populace, approximately 84 percent of rural households in Pattani province are found to be vulnerable to poverty. Further analysis shows the influence of educational attainment of household head, the size of the household and the level of savings all have positive effect on the household consumption even though house condition has a negative effect on the household consumption.

Keywords

Vulnerability to Poverty, Rural households, FGLS, Pattani province

Introduction

In many developing countries such as the East Asia and Southeast Asia region, a rapid reduction in poverty rate goes along with the economic growth (Balisacan & Fuwa, 2007). Nonetheless, the effect of poverty increase has been blunted by the income inequality. In spite of the high economic growth rate in these emerging economies, the gap between the rich and the poor is still pronounced. This is particularly common among the rural areas households who encounter high risk of being victim of poverty and hence, exposed to instability and insecurity in their living conditions (United Nations Development Programme (UNDP, 2008); Asian Development Bank (ADB, 2008). Giving the foregoing, literatures on poverty have been re-conceptualizing poverty focusing more on the aspects of insecurity or vulnerability. This re-conceptualization has brought out the question on how poverty ought to be addressed in these countries.

It is argued that any serious discussion or analysis of poverty issue must include   those who are already defined as poor, and those who are yet to be considered as poor but with high vulnerability to become poor owing to constant exposure to poverty shocks. For the purpose of capturing how exposure to shocks adversely affects the welfare of household, a new concept of analysis has been conceptualized and refer to as "vulnerability to poverty". As a concept, "vulnerability to poverty" used social indicator to measure the household's well-being (Hardeweg, Wagener, & Waibel, 2009). A household that is encountering several risky situations have the high tendency of losing welfare in the future which will likely influence the households' livelihood (Sarris & Karfakis, 2010).

Gaiha, Imai and Kang (2007) point out the dynamic characteristics of the concept of vulnerability. According to them vulnerability alters the welfare or poverty status of the exposed persons thereby bringing about fluctuation in the levels of their living conditions. Vulnerability has the potential to reduce the level of resilience of members of households when confronted with the twin of co-variant and idiosyncratic shocks. Perhaps, it is in response to and recognition of the value of the concept of vulnerability that there is upsurge of interest among development economists to measure vulnerability in developing countries. This growing interest has led many scholars to argue that there is need for incorporation of the issue of vulnerability in the design of poverty eradication policies.(see for example Chaudhuri, Jalan, & Suryahadi, 2002; Hoddinott & Quisumbing, 2003; Gaiha & Imai, 2004; Dercon, 2005; Ligon, 2005; Gaiha & Imai, 2006 or Ligon & Schechter, 2003).

Furthermore, vulnerability to poverty would need another set of policies or measures different from the usual approach to tackling the issue of poverty. A new approach suggested by experts is to have extensive social security programme. Applying this approach, it is argued that it potentials to mitigate poverty is enhanced, if the country in question has a proper social security system on which the population can rely on in case of a problem or a crisis. In the specific case of Thailand, government, as far back as 1971, has established a contributory social security system which has been gradually expanded to cover all establishments with at least one worker. This system works on the contributory approach paid by employees, employers, and government with each making contributions based on a percentage of the employee's income. The scheme's benefits cover sickness; disability, maternity, death benefits, allowances for two children, a pension and unemployment benefit (Social Security Office (SSO), 2009). However, the current social security system has reduced risks for those in the formal sector; there is need for it to be

extended to the informal sector as they remain largely unprotected. The population in the informal economy remains unprotected from other risks as well. It must be pointed out that the larger size of rural households in Thailand is employed in the agricultural sector and they are not different from other rural communities in term of their vulnerability to poverty.

In view of the foregoing arguments, the objective of this study is to determine the level of vulnerability to poverty among rural households in Pattani province, Thailand. To achieve this objective, the paper is structured in the following sequence. A discussion of the concept of vulnerability and approaches to measure vulnerability. The next section discusses the empirical literatures review on vulnerability. Thereafter, an explanation of the data and method used in this study is provided while the following section contains the data analysis including a discussion of the findings and the last section presents the concluding remarks.

Vulnerability to Poverty

The Concept of Vulnerability

According to Holzmann, (2003), the concept of vulnerability is futuristic; its features are oriented as forward-looking schemes and refer specifically to "*the possibility of becoming or remaining materially poor in the future*". The concept of vulnerability is forward-looking and one of its features is a probability of experiencing some kind of future loss relative to some welfare benchmark. Uncertain events cause vulnerability, and a household affected can be considered to be vulnerable to the loss of welfare in the future (Alwang, Siegel, & Jorgensen, 2001). Furthermore, the vulnerability is related to poverty, so that the concept of poverty is refers to economic scarcity as due to lack of income. Poor households that have no probable to escape poverty are also defined as vulnerable (Conway & Turk, 2001).

Measuring Vulnerability

Attempting to measure vulnerability, according to the World Bank (2000),is not easy. This difficulty arises because it is almost impossible to measure the probability of falling into poverty tomorrow. What is, however, visible is to attempt to analyse the dynamics of income and consumption dynamics and to use their variability as proxies for measuring vulnerability. Some other approaches also exist that are used to measure vulnerability. An example is the one proposed by Hoddinott and Quisumbing (2003) which involves the use of several indexes. The authors outlined three main indexes that are related to vulnerability. First, is the index of expected poverty (VEP) which measures the probability for a household that fall below the poverty line of income. Second is the index of expected utility (VEU). The approach of this index is to measure the distance between two types of utility that can be achieved. The first utility refers to what can be achieved by a household based on the ability to maintain a certain level of consumption with certainty while the second type refers to the usefulness that is expected in relation to an unknown future occurrence. Finally, VER is also an index of measuring the consumption level so as to calculate the cost of being exposed to risks. When using the index for this calculation, the focus is on the proportion of observable change in consumption that can be attributed to being exposed to shocks in the past.

Empirical Literature Review on Vulnerability

There is growing interest among researchers on the issue of households' vulnerability to poverty. These empirical studies have focused on the rural areas. For example, Gaiha *et al*. (2007) carried out a study to measure the vulnerability to poverty of several Vietnamese households. Their objective was to assess the extent to which the vulnerability of several Vietnamese households is related to their level of poverty over time. Based on panel data obtained from the Vietnam Household Living Standards Survey (VHLSS) which was the data collected for the whole of Vietnam for the period of 2002 and 2004, so the measurement employed for the study is the "Vulnerability as Expected Poverty" (VEP) and the analysis of the data show that higher vulnerability generally would translate into poverty over time. The findings also indicated that the household who are vulnerable in 2002 will become poor in 2004 just as it will exacerbate the level of poverty. Similar study like that of Hardeweg *et al*. (2009) set their study with two objectives in minds: to compare and rank provincial vulnerabilities and to show that distributional comparisons can be used to make useful comparison of several index-based vulnerability measures. A panel data of 4400 rural households participated in the survey. The data for the study was the from the 2007 and 2008 survey conducted in six provinces of Thailand and Vietnam namely Buriram, Nakhon Phanom, and Ubon Ratchathani in Thailand, and Dak Lak, Ha Tinh, and Thua Thien Hue in Vietnam. By applying the approach of Kolmogorov-Smirnov-type due to Barrett and Donald (2003) the findings indicate that the same vulnerability measure can give rise to different vulnerability depending on the underlying poverty lines. Also, regardless of the measures of vulnerability used such as increasing utility functions or on decreasing poverty functions, the outcome of the study reveals that the Vietnamese provinces is worse off than their Thai counterparts.

From Africa, Novignon (2010) studied population in Ghana to examine their vulnerability to poverty of households. By using the data from the Ghana Living Standards Survey (GLSS) collected through a cross sectional survey, the study drew a sample of 8,687 households of all regions in Ghana. In order to estimate vulnerability to poverty and also to determine the factors influencing households' vulnerability to poverty, a three step Feasible Generalized Least Squares (FGLS) was used. The results reveal that about 56 percent of households in Ghana are vulnerable to poverty. This is significantly higher than observed poverty level of about 28 percent. On comparative basis, the Eastern region was found to have the highest average vulnerability of approximately 73 percent; when compare to the Upper West region with the least vulnerability of about 21 percent average vulnerability to poverty. In the urban households, their Vulnerability to poverty was estimated to be 61 percent as against 25 percent among rural households. As predictor variables, household size, household health status and education attainments significantly influence vulnerability to poverty.

Still in Africa, Sarris and Karfakis (2010) examine the Tanzania programme designed to quantitatively evaluate the nature and extent to which rural, particularly, poor rural households are vulnerable to idiosyncratic and covariate uncertain risks. Using a Feasible Generalized Least Squares (FGLS) procedures and Ordinary Least Squares (OLS) regression, their finding indicates the following. The degree of vulnerability is relatively high in the areas under study; the vulnerability is considerably higher in the poorer region of Ruvuma. A further analysis reveals

that the proportion of the consumption variability due to covariate shocks is found to be much smaller in the Kilimanjaro region, relative to the Ruvuma region.

Nagarajan, and Pradhan (2012) designed to examine households' vulnerability, their coping strategy and how this strategy has influenced the consumption of household. Using Vulnerability Expected Utility (VEU) analysis, households' vulnerability was estimated while households' strategy to cope with risk is estimated using multivariate probit analysis. The outcome of the study suggests that households' vulnerability to risk depends mostly on its idiosyncratic components and poverty level. Still, the study found that these households rely greatly on informal instruments such as their asset/saving, depleting their capital or transfers to cope with shocks.

Another interesting research is that of Iqbal (2013) who estimated vulnerability using Vulnerability as Expected Poverty (VEP), as ex-ante measure of the well-being for Afghanistan. Based on a single cross-section data of household consumption expenditure during 2007/2008, his study reveals that 42 percent of the people are poor at the national level, while 66 percent are vulnerable to poverty in the near future. The other findings from the survey are that there is a positive effect on consumption based on male headship of a household and educational background of the head of the household. Furthermore, there is a positive effect on ownership of irrigated agriculture land and housing condition. However, when examining the migrant households that are living in the rural areas and the relative size of family members that are under 15 and over 50 years old, the result shows a negative effect on household consumption.

However, the studies investigated from above literature review presented that there are different measures used to examine vulnerability to poverty issues. These studies also point out the households' characteristics that influence vulnerability to poverty especially for the households live in the rural area as well as the relationship between shock, vulnerability and poverty.

Methodology

The method adopted for this study is the quantitative approach with primary data collected using structured questionnaire. The population where the data was collected is the rural area of Pattani province, Thailand. To collect a sample size of 600 households, a multi-stage sampling procedure was used to divide the population proportionately into five regions in Pattani province namely northern (147 households), southern (133 households), eastern (103 households), western (88 households), and central (129 households). The descriptive statistics and Feasible Generalized Least Squares (FGLS) approach are employed for the analysis of the data. Although it may be noted that one of the methods mostly used by previous studies to measure vulnerability to poverty is VEP but this study uses the FGLS in order to measure VEP empirically (Sarris & Karfakis, 2010; Sricharoen, 2011; Gaiha & Deolalikar, 1993; Chaudhuri *et al.*, 2002; Chaudhuri, 2003; Christiaensen & Subbarao, 2005; Gaiha *et al.*, 2007). This method is an ex-ante or a forward looking measure of the well-being of the household. It has capability to identify households "at risk" who are not poor and it also can be used to estimates single cross-sectional data. Following the adoption of FGLS, and its relevance to the objectives of the study, this study also measures vulnerability to poverty using FGLS.

According to Chaudhuri (2003), first, it is assumed that the stochastic process that generates the consumption of a household *h* is given by:

$$\ln c_h = X_h \beta + \varepsilon_h \tag{1}$$

Where

C_h = per capita consumption expenditure,

X_h = a vector of observable household characteristics (e.g: location, household size, educational of the household head)

β = a vector of parameters,

ε_h = a mean-zero disturbance term that captures idiosyncratic factors (shocks) that contribute to different per capita consumption levels for households that are otherwise observationally equivalent.

In addition, the variance of ε_h is also decided based on the observable characteristics of the household. One way to calculate this is to apply a simple parametric formula for the purpose of modeling the variance. This formula is stated as:

$$\sigma_{\varepsilon,h}^2 = X_h \theta \tag{2}$$

The application of the formula follows a three-step Feasible Generalized Least Squares approach. Accordingly, by estimating the β and θ values are estimated through a three-step Feasible Generalized Least Squares (FGLS) method. Also the estimation uses the standard regression analysis based on Ordinary Least Squares (OLS) to obtain consistent asymptotically efficient estimates of β and θ.

Using the estimates $\hat{\beta}$ and $\hat{\theta}$ obtained by FGLS, we would be able to directly estimate expected log consumption as follows:

$$\hat{E}[\ln c_h \mid X_h] = X_h \hat{\beta}_{FGLS} \tag{3}$$

Meanwhile, the variance of log consumption for each household *h* will be estimated as follows:

$$\hat{V}[\ln c_h \mid X_h] = \sigma_{\varepsilon,h}^2 = X_h \hat{\theta}_{FGLS} \tag{4}$$

By assuming that consumption is log-normally distributed which means that ln C_h is normally distributed, we can use these estimates to form an estimate of the probability that a household with the characteristics, X_h, will be poor. In other words, we will be able to estimate the household's vulnerability level. To put it differently, estimates of β and θ are used to calculate the probability that a household will be poor in the future.

Since consumption is assumed to be log normal, the estimated conditional probability is given by:

$$\hat{V}_h = \hat{\Pr}(\ln c_h < \ln z \mid X_h) = \Phi\left(\frac{\ln z - X_h \hat{\beta}}{\sqrt{X_h \hat{\theta}}} \right) \tag{5}$$

Letting Φ denotes the cumulative density of the standard normal distribution.

Where

V_h= Household's vulnerability level
c_h = Consumption level of household h (Dependent variable)
X_h= Vector of independent variables (Independent variables which comprise of χ_1=gender of household head, χ_2 = age of household head, χ_3= primary education of household head, χ_4= secondary education of household head, χ_5= tertiary education of household head, $\chi_{6=}$ size of the household, $\chi_{7=}$ house condition, $\chi_{8=}$ access to credit, and $\chi_{9=}$ savings)
β = Vector of respective parameters
$\sigma^2_{\varepsilon,h}$ = Variance of idiosyncratic and covariate variable
ε_h = Error term
z = Consumption poverty line
$X_h\hat{\beta}$ = Expected log of consumption
$X_h\hat{\theta}$ = Expected variance of log consumption

In this study, FGLS estimates the level of vulnerability to poverty. The independent variables included in the model were adopted/adapted from the previous study (Oni & Yusuf, 2008; Novignon, 2010; Adepoju & Yusuf, 2012; Iqbal, 2013). Also, all of the independent variables (gender of household head, primary education of household head, secondary education of household head, tertiary education of household head, house condition, access to credit, and savings) except age of household head and size of the household were incorporate in the regression model by using in the form of dummy variables in order to have a good estimation and it is also useful to predict an outcome variable that is categorical form.

Findings and Discussion

A descriptive analysis as contained in Table 1 shows the frequency distribution and percentage of the household's characteristics used to measure vulnerability to poverty. As shown in the table, 70 percent of the households are headed by a male as against 30 percent which has a female head. The age distribution of the households heads shows approximately 32 percent of them were in the age group between 41-50 years old while 10 percent of them are above 60 years old. Most of the households head have relatively low level of education with more than 30 percent has primary school level of education. About 26.6 percent of the households head have a bachelor's degree or above. A breakdown of the size of the household sampled in this study shows that most of the household members are between 4-6 persons per household representing 50.3 percent while 6.2 percent of them have more than 10 members in the household. In term of the general conditions of households' house, about 85.3 percent are found to be good while 14.7 percent of houses are categorized as poor. Analysis of the saving pattern of the respondents indicate that, majority of the respondents (69.8 percent) do have some level of savings. Also the analysis of loan that had been taken by the respondents reveals that more than 30 percent of them have contracted one form of loan or the order. However, pattern of total consumption of the households is as follows: 1.7 percent spent less than 3,000 Baht per month while 40.8 percent of respondents have a monthly expenditure of more than 12,000 Baht.

Table 1:

Summary descriptive statistics of households' characteristics use to measure vulnerability to poverty

Variables	Frequency	Variables	Frequency
Gender		**House condition**	
Male	416(69.3)	Poor house condition	88(14.7)
Female	184(30.7)	Good house condition	512(85.3)
Age (Years old)		**Access to credit/loans**	
<30	77(12.8)	Access to credit	223(37.2)
31-40	151(25.2)	No access to credit	377(62.8)
41-50	190(31.7)	**Savings**	
51-60	122(20.3)	Savings	419(69.8)
>60	60(10.0)	No savings	181(30.2)
Education level		**Total consumption, (Baht/month)**	
Primary	202(33.7)	0-2999	10(1.7)
Secondary	187(31.2)	3000-5999	79(13.2)
Tertiary	160(26.6)	6000-8999	119(19.8)
Household size		9000-11999	147(24.5)
< 3	124(20.7)	>12000	245(40.8)
4-6	302(50.3)		
7-9	137(22.8)		
>10	37(6.2)		

Source: Author's calculation from survey data, 2013, figures in parentheses are percentage.

In order to estimate vulnerability to poverty, this study employed the FGLS methods as shown in equation 1 to equation 5. Using this technique, it was able to estimate; on the basis of households characteristics, the probability of household becoming poor in the near future. The result from this analysis shows that the estimated vulnerability to poverty by applying the FGLS procedure is contained in Table 2 which also explains the factors responsible for the expectation of consumption and variance of consumption regression.

Apart from gender of household head (χ_1), age of households head(χ_2), and access to credit (χ_8), all other variables in the analysis are found to be significant on household welfare status (log of consumption). In particular, primary education of household head (χ_3), secondary education of household head (χ_4), tertiary education of household head (χ_5), size of the household (χ_6) and level of savings (χ_9) are positively statistically significant at 1 percent probability level effect on the household consumption, whereas house condition (χ_7) is negatively statistically significant at 1 percent probability level effect on the household consumption.

Further analysis indicates that the educational background of household heads such as primary, secondary and tertiary educations of household head have positive relationship to consumption. In other words, it is observed that if there is increase in the years of schooling, it will trigger expectation of consumption which in turn lowers the probabilities of vulnerability to poverty. This result may be interpreted in the fact that higher educated individuals are usually more distributing in term of their income to the family. However, this is point to the importance of

education in preventing households becoming poor in the future. The implication of this positive relationship that is observed between the log of consumption and the nature of household is an indication of the larger the size of the household, the higher the likelihood of the expectation of increase in level of consumption. This is to assert that those household that keep large family size are less vulnerable to being poor in the future. This result may be interpreted as an indication that households which are bigger size may have more member that contribute economically to the well-being of the household thus preventing it from falling into the poverty trap. Conversely, it can be asserted that a household with culture of saving has probabilities of protection from being vulnerable to poverty and higher chance of being able to meet expectation of consumption. On the other hand, for the households those are living in poor housing condition as they will be more vulnerable to poverty which explains the negative relationship with expected consumption.

Table 2:

Estimating Vulnerability to Poverty by FGLS

Variables	Coefficient (LogC)	t-value	Coefficient (VarC)	t-value
Constant	8.1506***	54.60	1.0440***	4.53
Gender of HH head (χ_1)	0.0609	1.44	0.0430	0.22
Age of HH head (χ_2)	0.0021	1.02	0.0043	0.63
Primary education of HH head (χ_3)	0.3605***	4.47	-0.0999	-0.30
Secondary education of HH head (χ_4)	0.4808***	5.42	-0.1782	-0.47
Tertiary education of HH head (χ_5)	0.7351***	7.60	0.2181	0.51
Size of the HH (χ_6)	0.0652***	7.02	-0.0097	-0.22
House condition(χ_7)	-0.1694***	-3.02	-0.0005	-0.00
Access to credit(χ_8)	0.0640	1.52	-0.0510	-0.26
Savings(χ_9)	0.1592***	3.54	-0.0046	-0.02
Number of observation	600		600	
Prob> F	0.0000		0.9663	
R-squared	0.22		0.0050	
Adj. R-squared	0.21		-0.0102	

Source: Author's calculation from survey data, 2013.

Note: HH= Household

LogC = Log of consumption.

VarC = Variance of log consumption.

***, denotes coefficient is significance at 1 percent level, **, at 5 percent level, *, at 10 percent level.

The analysis applied the FGLS regression estimate (shown in Table 2) to generate the probability of household vulnerability as identified in equation 5. The standard vulnerability threshold that is adopted in this study is 0.5 in line with Chaudhuri *et al.* (2002); Oni and Yusuf (2006); Gaiha *et al.* (2007); Imai, Wang, & Kang (2009). Households were then classified into their vulnerability status. A household is considered as vulnerable if it has an estimated probability of falling into

poverty in the near future greater than 0.5 (or households with a 50 percent or more chance of falling into poverty in the future). On the other hand, a household is considered as being non-vulnerable if it has an estimated probability of falling into poverty in the near future less than 0.5 (Pritchett *et al.*, 2000; Chaudhuri *et al.*, 2002).

The results of the estimated vulnerability to poverty of the households as presented in Table 3 show that 84 percent of households in the sample are vulnerable to poverty while 16 percent of them are not vulnerable to poverty. However, Table 4 shows vulnerability estimates of five regions in Pattani province. It is interesting to note that although the southern region seems to have the highest vulnerable population (22.6 percent), the results for other region are equal close to the southern region. The central region has the second highest with 21.6 percent of vulnerable population followed by northern region with 21.2 percent of vulnerable population.

Table 3:

Vulnerability to Poverty

Vulnerability Level	Frequency	Percent
Vulnerable	504	84.0
Non-vulnerable	96	16.0
Total	**600**	**100.0**

Source: Author's calculation from survey data, 2013.

Table 4:

Vulnerability to Poverty by geographic regions of Pattani province

Region Name	Total Observation	Vulnerable	
	Frequency	Frequency	Percent
Northern	147	107	21.2
Southern	133	114	22.6
Eastern	103	98	19.5
Western	88	76	15.1
Central	129	109	21.6

Source: Author's calculation from survey data, 2013.

Conclusion

The objective set for this study was to examine the vulnerability to poverty using households drawn from rural areas of Pattani province in Thailand. The outcome of the study confirmed that majority of the households are vulnerable to poverty. This means that vulnerability as conceptualized in this study is an important issue in the study population. Specifically, the study reveals that the highest vulnerable population, when compared to the other regions in Pattani

province is the rural areas that are located in the southern region. This outcome informs the need for the government of Thailand to institute policy and programmes that can effectively tackle the vulnerability to poverty of rural households in the study area. The starting point will be for the Thai government to improve its social security net which can be relied upon by the rural households to prevent them from actually falling into the poverty trap. From this study also, it is discovered that educational attainment of household head, size of the household and level of savings are positively effect on the household consumption. It must be noted that house condition has negative effects on household consumption.

Despite this outcome of the study it is recognized that the limitation of this study is its focus on the rural area of Pattani province; which limits its generalisation to other region of the country. Therefore, researchers are invited to expand knowledge in this area by collecting sample from other areas (rural and urban) with different cultural and socio-economic set up in order to see to what extent the findings of this study can be generalized to the whole of Thailand.

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