Economic Inequality and Happiness: A quantitative study among the elderly in Rural Vietnam

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Abstract

By combining data from the 2011 Vietnam National Aging Survey and the 2011 Rural, Agricultural and Fishery Census, we examined whether expenditure inequality has any effect on happiness or life satisfaction among the elderly in rural Vietnam. We find that individuals who live in the communes with high inequality tend to self-report as being less happy, even after controlling for various individual and household attributes. The results are robust to the choice of inequality measures and the specification of econometric models. We also find that older rural people who are farmers or poor are more sensitive to inequality. Given that these people tend to be less happy than others, the result shows the risk that inequality further lowers their subjective well-being. The result supports the view that rural Vietnam is a less mobile society.

1. Introduction

As a result of remarkable achievements in reducing fertility and mortality and increasing life expectancy at birth, Vietnam's elderly population has rapidly increased in both absolute and relative numbers (United Nations Population Fund[UNFPA], 2011). The mid-term census in 2011 by the General Statistical Office of Vietnam [GSO] reported that the country's pace of aging was faster than expected since the older population already accounted for more than 10% of the total population (Vietnam Women's Union [VWU], 2011)[1]. Trends and rates of aging have created both opportunities and challenges for Vietnam caring for a growing older population (VWU, 2011). In Vietnam, the quality of life of older people has emerged as the main concern in contemporary academic research (Long & Pfau, 2009; Pfau & Long, 2010; Truong, Bui, Goodkind, & Knodel, 1997) as well as in the public policy agenda (Vietnam National Commitee on Aging [VNCA], 2012).

There have been a large number of studies analyzing the characteristics and quality of life of as well as social policies for Vietnamese older people (e.g., Evans et al., 2007; Long & Pfau, 2009; Pfau & Long, 2010; Truong et al., 1997; UNFPA, 2011; VWU, 2011). Among these studies, few have examined determinants of objective wellbeing (e.g., poverty or income) of the Vietnamese elderly (Long & Pfau, 2009; Pfau & Long, 2010). However, to the best of our knowledge, little econometric evidence exists for factors affecting subjective welfare (i.e. happiness or life satisfaction) of the Vietnamese older population. Because using subjective satisfaction better indicates the comprehensive quality of life (Veenhoven, 2002)[2] and is more relevant to policy (Gilbert, Colley, & Roberts, 2016), a better understanding of factors affecting life satisfaction of the elderly is of much importance, especially when designing policy interventions to improve their welfare. The gap in the extant literature motivates us to investigate what factors are associated with happiness among older people in rural Vietnam?

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[1] According to United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP), population starts aging when the share of older-age persons to the total population accounts for more than 10 percent (UNFPA, 2011).
[2] As noted by Veenhoven (2002, p. 8): "Social policy makers need both objective and subjective indicators. Though subjective indicators have their limitations, objective indicators also labor under serious shortcomings. For some purposes objective indicators are best suited, for other uses subjective indicators are preferable".

In the current study, however, our main research objective was to examine whether inequality has any impact on happiness among older persons in rural Vietnam. The inequality-happiness relationship has been well established in the literature (Ferrer-i-Carbonell & Ramos, 2014; Schneider, 2015). Although a huge body of studies have found that economic status is an important determinant of life satisfaction among the elderly in both the West and Asia (George, 1992; Li, 1995; Von dem, Lüschen, Cockerham, & Siegrist, 2003), few have analyzed the association between income inequality and happiness in developing countries (Wang, Pan, & Luo, 2015). Therefore, our study investigated the relationship between individual happiness and expenditure inequality in the communes where the older individual lives, controlling for several individual and household characteristics.

We provided the first evidence that expenditure inequality, as measured by any indicator, has a significantly negative effect on happiness. This suggests that inequality results in negative consequences on the quality of life of the older population in rural Vietnam[3]. In addition, we find that sensitivity to inequality varies considerably according to certain individual characteristics. Among others, a useful implication for social policy is that older rural people who are farmers or poor are more sensitive to inequality. Given that these people tend to be less happy than others, the result shows the risk that inequality further lowers their subjective welfare. Our research result supports the view that rural Vietnam is a society that has less mobility.

The structure of the paper is as follows: Section 2 provides a brief review of the literature on the link between happiness and income inequality, Section 3 describes the data sources and methods. Results and discussion are given in Section 4. Conclusions and policy implications are reported in Section 5.

2. Literature review

2.1. The mechanism through which inequality affects happiness

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[3] This is because happiness is a crucial component of quality of life (Sumngern, Azeredo, Subgranon, Sungvorawongphana, & Matos, 2010)

Income inequality and its consequences on human welfare are of common concern (Neckerman & Torche, 2007; Wilkinson & Pickett, 2009). The inequality-wellbeing link has been well discussed in the literature (see Ferrer-i-Carbonell & Ramos, 2014; Schneider, 2015 for excellent reviews of the topic). According to Nguyen, Fleming, and Su (2015), there are at least two distinct channels through which income inequality might affect life satisfaction: (i) via possible changes in an individual's income compared to the mean income of a reference group (even though the individual's absolute income remains unchanged); and (ii) via an individual's preferences for the income distribution in the community or society where the individual lives. In the first channel, studies have included *relative income* (measured, for instance, as the ratio of individual income to the median income of the whole population or the median income of a relevant comparison group) find that life satisfaction is strongly and consistently positively affected by relativities (Dolan, Peasgood, & White, 2008; Nguyen et al., 2015).

However, the second channel; namely *preferences for community equality* is our concern in the current study. There are at least three factors that potentially make individuals to have inequality aversion. First, individuals might have a genuine dislike for inequality (Dawes, Fowler, Johnson, McElreath, & Smirnov, 2007). Second, individuals might also have a taste for equality or inequality aversion because they think that social negative externalities are likely to be correlated with high inequality (Schneider, 2015). Income inequality might cause additional social problems such as social conflicts and tensions, crimes and violence (Ferrer-i-Carbonell & Ramos, 2014; Haller & Hadler, 2006). Third, individuals that have inequality aversion might denote a desire for reduced risk of substantial variations in their own income (Hochman & Rodgers, 1969; Ravallion & Lokshin, 2000).

It should be noted that in some case, people might tolerate or even like inequality if they perceive there is a positive chance that they can benefit from it (Ferrer-i-Carbonell & Ramos, 2014). The *tunnel effect* described by Hirschman and Rothschild (1973) argues that people might accept or like inequality if it signals social mobility. People expect that they would enhance their own living conditions in the future when they watch others that around themselves move upwards in the social ladder. Instead of feeling left behind – as

assumed by the relative income hypothesis - they are happier with inequality because it improves their own future (Wang et al., 2015). However, if expectations do not come true, their preference for inequality will turn into disappointment and dislike. Therefore, the *tunnel effect* only occurs in the short-term and leads to social conflicts if expectations are not realized in the long-term (Schneider, 2015).

2.2. Empirical evidence

The empirical evidence for inequality-subjective welfare relationship remains inconclusive (Schneider, 2015). A number of studies have found a negative association between happiness and inequality. Morawetz et al. (1977) are among the first researchers who examined the link between self-rated life satisfaction and inequality of two small Israeli communities that were similar in almost all characteristics but had different levels of income distribution. Their research finding reveals that individuals residing in the village with higher equality were happier than those residing in the village with less equality. Using the aggregated data of eight countries over 25 years, Hagerty (2000) find a reduction in income inequality (max, min, skew, the 80 the /20 the percentile ratio) for a country increased with its average national happiness. Alesina, Di Tella, and MacCulloch (2004) discover a negative relationship between income inequality (Gini) and life satisfaction in both the United States and Europe. Similar results were also reported for 18 Latin American Countries (Graham & Felton, 2006), Germany (Schwarze & Härpfer, 2007) and Urban China (Smyth & Qian, 2008). Using the data from the World Value Survey (WVS) over the period 1981-2004, Verme (2011) find that inequality (Gini) had a negative effect on happiness and this effect also hold for both the poor and non-poor as well as for all geographic regions.

In contrast, some studies have shown a positive effect of inequality on happiness. Using the data from 11 waves of British Household Panel Survey data, Clark (2003) finds that inequality, as measured by either Gini or the 90 the/ 10 the income percentile ratio, had a positive effect on happiness for the employed population. Similar evidence was reported in Japan by Ohtake and Tomioka (2004) who find that both the Gini coefficient

and perceived income inequality had a weak but positive association with happiness. Utilizing a very large sample of the world citizens from WVS in 1995/1996, Haller and Hadler (2006) also indicated that inequality (Gini) had a positive effect on happiness. A further study of each subgroup (by region) revealed that southern American countries showed high inequality but were very happy, while post-communist countries had equality but were very unhappy.

Nevertheless, other researchers have indicated no evidence for the inequality-happiness link. Diener, Diener, and Diener (1995) found no relationship between inequality and happiness for the student sample using the data from WVS. Using the data from WVS, Helliwell (2003) reported no association between inequality (Gini) and life satisfaction over the period 1980-1997. Income inequality (Gini) was also found not to be related to individual happiness in Russia (Senik, 2009) and 28 European countries (Zagorski, Evans, Kelley, & Piotrowska, 2014).

Empirical evidence of the sign and significance of the happiness-inequality link remains controversial and heterogeneous. Different findings can be supported by different theories that can explain the sign of either a positive or negative association. However, there are several factors that might lead to conflicting results of this relationship. First, this is the choice of inequality measures (Verme, 2011). Second, different population groups might have different tastes for inequality (Ferrer-i-Carbonell & Ramos, 2014; Verme, 2011). Third, empirical heterogeneity is likely to be related to econometric factors such as the choice of key regressors and the use of country and year fixed effects in cross and longitudinal studies (Ferrer-i-Carbonell & Ramos, 2014; Verme, 2011).

3. Data and methods

3.1. Data

The study utilized the data from the Vietnam National Aging Survey 2011 (2011 VNAS). The main objective of VNAS was to collect data on older people (those aged 50 and over). 12 provinces were randomly selected from six ecological zones. In each selected province, 200 communes were randomly selected and then two villages were randomly selected from each selected commune. Finally, 15 people aged 50 years old and above

were randomly selected. The total number of interviewed people is 4,007, of those, 1,218 were near-elderly (50-59) and 2,789 were 60 and older. 3,515 people were Kinh, and 492people were ethnic minorities. 2,887 people live in rural areas, and 1,120 people live in urban areas.

The survey collected data on personal information (such as age, gender, marital status, religion, social activities, life style, education, employment, own income, assets, etc.) and household information (houssing conditions, family relationship, living arrangements and household income). Especially, the survey collected information about the quality of life such as health status and life satisfaction.

The data on expenditure inequality and expenditure per capita at the commune level were calculated from the 2011 Rural, Agricultural and Fishery Census (2011 RAFC). A detailed description of how to estimate different measures of inequality are reported in Sub-section 3.1.2 and Appendix 1.

3.1.1. Happiness indicator

The measure of subjective satisfaction is the most commonly used in the happiness literature (Dolan et al., 2008; Ferrer-i-Carbonell & Ramos, 2014; Schneider, 2015). The outcome variable in our study is the life satisfaction or happiness scores of respondents, obtained from a multiple-choice question: "Taken all together, how are you satisfied with your life at present?" The five possible responses to the question are "very dissatisfied", "dissatisfied", "neither satisfied nor dissatisfied", "satisfied", and "very satisfied". For our analysis, happiness is constructed with a value ranging from 1 to 5, corresponding to "very dissatisfied", "dissatisfied", "neither satisfied nor dissatisfied", "satisfied", and "very satisfied", respectively.

Table 1. Distribution of individual happiness by gender, employment, religion and poverty

Happiness	Total	Male	Female	Farmer	Non farmer	Religion	No religion	poor	Non-poor
Very dissatisfied (%)	1.77	1.07	2.25	1.91	1.65	1.83	1.51	2.98	1.45
Dissatisfied (%)	9.57	8.66	10.21	8.07	10.76	8.87	12.45	15.94	7.88
Neither satisfied nor dissatisfied (%)	23.37	20.36	25.49	24.38	22.57	23.69	22.08	29.77	21.63
Satisfied (%)	53.74	56.96	51.47	54.33	53.27	53.54	54.53	45.18	56.04

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| Very Satisfied (%) | 11.56 | 12.95 | 10.58 | 11.31 | 11.75 | 12.07 | 9.43 | 6.13 | 13.01 |
| Observations | 2,717 | 1,120 | 1,597 | 1,202 | 1,515 | 2,187 | 530 | 571 | 2,145 |

Table 1 reports the sample summary statistics about happiness. About two thirds of all respondents reported being happy or very happy while around 23 % said that they were neither satisfied nor dissatisfied and about 12 % being dissatisfied or very dissatisfied. A close look at the data by gender shows that men seemed to be happier than women. The happiness status of farmers and non-farmers is quite similar. The happiness status is slightly different between those with and without religion. However, the poor/non-poor disparity in happiness tended to be much larger with 69 % of the non-poor self-reporting to be happy or very happy, compared with about 51% of the poor.

Table 2. Sample summary statistics

Variable	Definitions	Mean	SD	Min	Max
Happiness	1="very dissatisfied"; 2="dissatisfied"; 3="neither satisfied nor dissatisfied"; 4= "satisfied", and 5= " very satisfied"	3.64	0.87	1	5
Expenditure inequality and expenditure per capita at the commune level					
Gini	Gini coefficient	0.25	0.03	0.17	0.37
P10/P90	The ratio of the 10th percentile to the 90th percentile	3.07	0.49	2.13	5.75
GE (0)	Theil's L index of inequality	0.11	0.03	0.05	0.23
GE (1)	Theil's T index of inequality	0.11	0.03	0.05	0.23
Expenditure level	Log of per capita expenditure at the commune level	9.45	0.25	8.41	10.53
Individual characteristics					
Age	Age of respondent in years	66.34	11.39	50	108
Gender	1= male; 0=female	0.41	0.49	0	1
Ethnicity	1=majorities (Kinh & Hoa); 0=minorities	0.86	0.35	0	1
Farmer	1= farmers; 0 otherwise	0.42	0.49	0	1
Education					
Primary	1=completed primary school; 0 otherwise	0.21	0.41	0	1
Lower secondary/higher	1=completed lower secondary school or higher level; 0 otherwise	0.19	0.40	0	1
Family status					
Being widowed	1=widowed; 0=not	0.30	0.46	0	1
Living arrangements	1= living with children/grandchildren; 0=not	0.33	0.47	0	1
Social activities					
Membership	1=membership of any group/association; 0=not	0.43	0.49	0	1
Religion/Religiosity					
Religious people	1=not; 0= yes	0.19	0.40	0	1
Frequency of worship					
Once a month	1= monthly; 0 otherwise	0.46	0.50	0	1
Weekly or daily	1= weekly or daily; 0 otherwise	0.30	0.46	0	1
Health status					

So-so	1=so-so health; 0 otherwise	0.27	0.45	0	1
Healthy	1=good or very good health; 0 otherwise	0.05	0.21	0	1
Annual household income(Y): million Vietnam dong (MD)					
Low income	1 if Y <10 MD; 0 otherwise	0.24	0.43	0	1
Middle income	1 if Y=10 MD &Y<50 MD; 0 otherwise	0.53	0.50	0	1
High income	1 if Y≥50 MD; 0 otherwise	0.23	0.42	0	1
Relative income to neighbours					
Same	1 if similar to neighbours; 0 otherwise	0.38	0.48	0	1
Higher	1 if higher than neighbours; 0 otherwise	0.12	0.33	0	1
Region					
North	1 if living in the North; 0 otherwise	0.47	0.50	0	1
South	1 if living in the South; 0 otherwise	0.25	0.43	0	1

3.1.2 Measures of economic inequality

In this study, we used household consumption expenditure to calculate various measures of economic inequality instead of using household income. This is because expenditure inequality indicates more about the longer-run, or lifetime, differences in living standards between people while measures of income inequality provide us with a snapshot of income disparities across the population (Goodman & Oldfield, 2004). In addition, consumption expenditure is associated with less measurement error than income data and commonly regarded as a better proxy for household wellbeing (Deaton, 1997). In developing countries, income data tend to be less reliable due to income fluctuations in harvest cycles in rural areas or irregular income flows from the large informal sector in urban areas and difficulty in calculating income for self-employment activities (Coudouel, Hentschel, & Wodon, 2002).

In our study, a challenge is to how to estimate the inequality at the commune level. To calculate the expenditure inequality of a commune, one needs data on expenditure of households within the commune. However, expenditure data are only collected in sampled surveys which have small sample size and cannot be used to estimate the expenditure inequality of communes. To address this challenge, we used a small area estimation method proposed by Elbers, Lanjouw, & Lanjouw (2002, 2003) which first estimates a model of expenditure using a household survey, and then applies this estimated model to a census to predict expenditure inequality of communes.[4]

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[4] In Vietnam, different poverty and inequality maps are constructed using the small area estimation method (e.g., recent studies are Cuong (2011) and Lanjouw, Marra, and Cuong (2013)).

The method requires data from a census and a household survey which contain expenditure data. In this study, we used census data are from the Rural Agriculture and Fishery Census (RAFC) in 2011. The RAFC was carried out by GSO in July 2011. The census covered all households in rural areas. The census contains data on individuals and households including basic demography, employment and housing, and agricultural activities. There are 16,194,218 households covered in the census. The household survey is from Vietnam Household Living Standard Survey (VHLSS) in 2010. This was also conducted by GSO. It samples 9,399 households and contains detailed data on characteristics of households and individuals. More important, it contains data on household expenditure, which were collected using very detailed questionnaires on different expenditures of households.

The method can be described in the following steps. First, we define common explanatory variables in both the census and the household survey. These variables are comparable in terms of definition and mean statistics. The common variables can include household-level variables and commune-level variables. Secondly, we regress the log of per capita consumption on the selected variables using the household survey as follows:

$$\ln(y_{ic}) = X_{ic}\beta + Z_c\gamma + \varepsilon_{ic}, \qquad (1)$$

where $\ln(y_{iv})$ is log of per capita expenditure of household i in commune c, X_{ic} the vector of the common household-level variables, Z_c is the commune-level variables, β and γ are the vector of regression coefficients, ε_{iv} the error term. In the Elbers et al. (2002, 2003) framework, the error is allowed to be correlated within communes. Model (1) is estimated using data from the 2010 VHLSS.

In the next step, the estimated parameters of model (1) are used in the 2011 RAFC to predict expenditure of all the households:

$$y_{ic}^{Census} = \exp\left(X_{ic}^{Census}\hat{\beta} + V_{ic}^{Census}\hat{\gamma} + \hat{\varepsilon}_{ic}\right), \qquad (2)$$

The predicted expenditure will be used to calculate inequality indexes of communes. The standard errors of the inequality indexes are estimated using Monte-Carlo simulations. More specifically, we first estimate the distributions of $\hat{\beta}$, $\hat{\gamma}$ and $\hat{\varepsilon}_{iv}$, then in

each simulation, values of these parameters are drawn randomly from their estimated distributions, and used to estimate of the inequality indexes of small areas. After a number of simulations, we can get the sampling distribution of the inequality indexes and calculate the standard deviations of the inequality indexes.

To measure inequality, we use most common measures of inequality: the Gini coefficient, Theil's L index of inequality, and Theil's T index of inequality and the ratio of the 90th percentile to the 10th percentile. See Appendix 1 for a detailed description of different measures of inequality in the current study.

3.1.3. Other explanatory variables

Life satisfaction or happiness is determined by a large number of different factors. Following the literature (e.g., Brown & Tierney, 2009; Cheah & Tang, 2013; Dolan et al., 2008; Gray, Rukumnuaykit, Kittisuksathit, & Thongthai, 2008; Morawetz et al., 1977; Nguyen et al., 2015; Schneider, 2015; Smyth & Qian, 2008; Sumngern et al., 2010), a set of control variables, including individual and household characteristics, were included in the econometric models. The definition and measurements of the variables are given in Table 2. The literature indicates that both absolute and relative incomes often have a positive relationship with happiness (Ball & Chernova, 2008; Dolan et al., 2008; Oshio, Nozaki, & Kobayashi, 2011). Hence, we included both absolute and relative income in the models, which were expected to be positively associated with individual happiness.

The other socio-economic control variables include age, gender, ethnicity, family status, religion, social activities, education, employment, and health. Among other factors, health status is predicted to be most positively associated with happiness. Empirical evidence often shows that both religious participation and frequency of worship are positively linked with life satisfaction (Dolan et al., 2008; Krause, 2003; Myers, 2000). Therefore, religious individuals were expected to be more likely to be happier than those without religion. The level of happiness is also expected to have a positive relationship with frequency of worship.

Table 2 shows that the average age for respondents in the sample is 66.4 and men account for about 41 % of the sample. 86 % of the sample are the ethnic majorities (Kinh

and Hoa) while 14 % are ethnic minorities. Regarding employment status, 42 % of individuals reported that they are farmers and 58 % are not farmers. Only 19 % and 21 % of respondents completed the primary school and secondary school (or higher level), respectively. 30 % of respondents are widowed and 33 % lived with their children or grandchildren. 43 % of the sample participated in at least one social activity and 19 % did not engage in any religion activity. The data show that 68 % of respondents self-rated their health as bad or very bad, while 57 % possessed normal health and only 5 % had good or very good health.

Looking at economic status, about 53% of respondents estimated that their total household income ranging from 10 million dong (VND) to less than 50 million VND. 24 % earned total household income less than 10 million VND while 23 % with total household income equal or higher than 50 million VND. Regarding relative income, the data reveal that half of respondents self-rated that their household income lowers than neighbours. 38 % of surveyed individuals responded that their household income is about as same as neighbours while 12 % reported that their household income higher than neighbours.

3.2. Econometric models

The following equation was used to estimate the impact of inequality on individual happiness:

$$Happiness_{ij} = \alpha + \beta_1 Lnex_j + \beta_2 Ineq_j + \beta_3 X_{ij} + e_{ijt} \tag{3}$$

where i and j are subscripts for individual and commune, respectively. X_{ij} is the vector of other individual, household and location variables. $Happiness_{ij}$ represents the respondent's self-reported happiness. $Ineq_j$ stands for the commune-level expenditure inequality as measured by various indicators, while $Lnex_j$ denotes the log-transformed commune per capita expenditure. Controlling for the average area - level income or expenditure helps mitigate the negative relationship between inequality and subjective welfare (Oshio & Kobayashi, 2011).

Happiness can be used as cardinal or ordinal, depending on researchers' assumption (Ferrer-i-Carbonell & Ramos, 2014) and the results of econometric analysis

are robust to both means of a liner or an ordered categorical estimator (Ferrer-i- Carbonell & Frijters, 2004). Since Ordinary Least Squares (OLS) coefficients directly denote the marginal effects (Wooldridge, 2013) and thus are more intuitive and interpretable by a wide range of readers (Jiang, Lu, & Sato, 2012), we chose OLS models to examine the effect of inequality on individual happiness. However, ordered logit models were also estimated to check for the robustness to the model specifications.

We also examined some type of heterogeneity on inequality aversion. Specifically we empirically investigated whether inequality aversion is different across groups such as gender, poverty, religion, and employment. In this case, a common approach is to use an interaction term between the inequality measures with the variable describing the dimension creating heterogeneity (Ferrer-i-Carbonell & Ramos, 2014). In addition, we ran different models with the inclusion of the squared terms of inequality, expenditure level, and age of respondents, to capture potential non-linear effects. However, we found no non-linear effects and therefore we do not report the results from regression models using the squared terms.

4. Results and discussion
4.1. Impact of inequality on happiness

Table 3 presents the result from the model in which expenditure inequality is measured by the Gini coefficient. While age has a positive effect on happiness among older people in rural Vietnam, other variables such as gender, ethnicity and employment are not associated with happiness. The result indicates that individuals with secondary or higher schooling tend to be happier than those without primary school. However, the same relationship does not hold for those with primary school. Same results are also reported for China (Brown & Tierney, 2009), where age and education are positively linked with life satisfaction among the elderly. We also find that widowed people are less happy than married people. The result is partially consistent with Chyi and Mao (2012) who find that being widowed is negatively correlated with life satisfaction among older men in China. Our research result confirms no difference in happiness between those living with and without children/grandchildren. Similar evidence is also found among the elderly in rural Thailand (Gray et al., 2008). This finding suggests that living with one's own child might have a net

zero impact on an elderly's happiness. As discussed by Chyi and Mao (2012), on the one hand, living with their children/grandchildren helps older people with easy access to receive emotional and daily life support, which can increase their life satisfaction. On the other hand, coresiding with their children/grandchildren is likely to cause tensions and conflicts, which in turn can make the elderly less happy[5].

Table 3. Factors associated with happiness

	Ordinary Least Squares	
Individual characteristics	Coefficient	SE
Age	0.0075***	(0.002)
Gender	-0.0218	(0.035)
Ethnicity	-0.0048	(0.060)
Farmer	-0.0022	(0.033)
Education		
Primary school	0.0334	(0.043)
Lower secondary school or higher	0.1096**	(0.050)
Family status		
Widowed	-0.1802***	(0.039)
Living with children/grandchildren	-0.0078	(0.032)
Social activities		
Membership of any group/association	0.0933***	(0.031)
Religion/religiosity		
Religious people	0.0267	(0.044)
Monthly worship	0.0426	(0.043)
Weekly or daily worship	0.1229***	(0.042)
Health status		
So-so	0.2036***	(0.024)
Healthy	0.3019***	(0.072)
Household income		
Middle income	0.1281***	(0.043)
High income	0.2840***	(0.050)
Relative income		
About as same as neighbours	0.3908***	(0.042)
Higher than neighbours	0.3434***	(0.067)
Location of residence		
North	0.1174***	(0.039)
South	0.0596	(0.061)
Commune characteristics		
Expenditure (log)	0.1366**	(0.066)
Expenditure inequality (**Gini**)	**-1.4445***	(0.471)
Constant	1.6862**	(0.640)
Observations	2,597	
R-squared	0.135	

Note: robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The omitted categories in the dummy variable analyses are: female sex; ethnic minorities; non-farmers; no primary school; married; living without children/grandchildren; no participation in any social activity; no religion; having worship at special events; not healthy; low household

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[5] Another possible explanation, is similar to that used by Gray, Rukumnuaykit, Kittisuksathit, and Thongthai (2008), is that while many Vietnamese old people in rural areas do not live with their children or grandchildren, their home close to their children/grandchildren's home. Furthermore, although the elderly do not co-reside with their children/grandchildren, their children/grandchildren still contribute positively to their material well-being and still maintain contact and visits.

income; lower than neighbours; the central.

Involvement in social activities also has a positive association with happiness among the Vietnamese elderly. This is in accordance with previous findings that there is a positive link between having membership in groups/organizations and life satisfaction (Dolan et al., 2008; Matsushima & Matsunaga, 2015). Our research result shows that there is no difference in happiness between religious people and their godless counterparts. However, happiness is found to be positively linked with a higher frequency of worship. Specifically, individuals that had weekly or daily worship were happier than those that only had worship at special events. However, this is not the case for those conducting worship monthly. Consistent to the literature (Dolan et al., 2008; Kingdon & Knight, 2007; Wang et al., 2015), we find that health has a substantial and positive relationship with happiness. As expected, it is found that both absolute and relative incomes have strongly positive effects on happiness. Holding all other variables constant, individuals that belong to high income and middle income households would have life satisfaction scores that were 0.28 points and 0.13 points higher than those of individuals in low income households, respectively.

Regarding the impact of inequality on happiness, the coefficient of inequality variable in Table 4 is negative and highly statistically significant ($p<0.01$). This confirms that individuals who lived in the commune with higher inequality tend to feel less happy than those living in the commune with higher equality. Holding all other variables constant, a 10 percentage point increase in the Gini coefficient associated with a 0.144 point decline in life satisfaction scores. This suggests that inequality results in negative consequences on the quality of life of the older population in rural Vietnam. This finding is in line with previous findings for Australia (Nguyen et al., 2015), Japan (Oshio & Kobayashi, 2011), the United State (Ahn et al., 2015) and the Europe (Alesina et al., 2004) but contrasts with reported results for China (Wang et al., 2015), Russia and Latin America (Eggers, Gaddy, & Graham, 2006; Senik, 2004).

We also find that the living standards within the commune (measured by the average expenditure per capita at the commune level) are positively linked with individual happiness. The result is similar to that by Kingdon and Knight (2007) who found that the income per capita of the small local residential community has a positive effect on

individual happiness in South Africa. With respect to regional variables, the result indicates that individuals with equal individual, household and other characteristics will on average have life satisfaction scores that are higher in the North than in the Central. Nevertheless, no difference in individual happiness is found between the South and the Central.

4.2. Heterogeneity on inequality aversion

Economic inequality might affect life satisfaction via individual characteristics because inequality aversion might differ across groups (Ferrer-i-Carbonell & Ramos, 2014). We also examine whether heterogeneity on inequality aversion exists by interacting a number of key individual characteristics with inequality in regression models. In Table 4, Column (2 and 3), the coefficient of the interaction term between inequality and farmer is negative and statistically significant at the 0.05 level. This demonstrates that farmers dislike inequality more than non-farmers. The result also indicates the poor dislike inequality more than the non-poor. Looking at the interaction terms for expenditure inequality with gender, ethnicity and religion in Columns (1), (5) and (6), respectively, neither of the interactions shows statistical significance at the 0.1 level. This indicates that no difference exists in the perception of inequality between men and women, between ethnic minorities and majorities, and between those with and without religion.

Table 4. Comparing the inequality sensitivities by key individual characteristics

Interacted variables	Model 1	Model 2	Model 3	Model 3	Model 4	Model 5
Gini	-0.8911	-0.1971	-0.8123	-0.8123	-1.4042	-1.4961**
	(0.562)	(0.578)	(0.453)	(0.453)	(0.996)	(0.671)
Gini*Gender	-0.7169					
	(1.085)					
Gini*Farmer		**-2.2883****				
		(1.057)				
Gini*Low income			**-1.9065****			
			(0.8940)			
Gini*High income				-1.0623		
				(1.0609)		
Gini*Ethnicity					0.2842	
					(1.212)	
Gini*Religion						0.8991
						(1.352)
Control variables	(Yes)	(Yes)	(Yes)		(Yes)	(Yes)
Constant	1.5946**	1.3559**	1.8493***		1.7063***	1.7759***
	(0.606)	(0.607)	(0.634)		(0.591)	(0.577)
Observations	2,712	2,712	2,711		2,712	2,712
R-squared	0.136	0.138	0.139		0.136	0.136

Note: robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The omitted categories in the dummy variable analyses are: female; non-farmers; the non-poor (those in middle income households); ethnic minorities; no religion.

The result of our study indicates that farmers and the poor are more sensitive to inequality possibly because they tend to face more uncertainty about their income and economic activities than others. Another possible explanation is that farmers and the poor might believe that social mobility is low and that they are likely to remain in their current disadvantageous status, which makes them to be more negatively affected by inequality. This finding supports the view that rural Vietnam is not a mobile society. The finding is consistent with reported result for Japan (Oshio & Kobayashi, 2011) and Europe but inconsistent with that for America (Alesina et al., 2004). Alesina et al. (2004) found that income inequality has a stronger effect on individual happiness among low-income Europeans, but not among low-income Americans. The authors argue that these findings were in line with the perception that Europeans live in less mobile societies while Americans live in a mobile society.

4.3. Robustness Checks

In the empirical literature, inequality is always measured by the Gini coefficient in the region or country where the individual lives and few studies examined the robustness

of the results to the different ways of measuring inequality (Ferrer-i-Carbonell & Ramos, 2014). In this study, we checked for the robustness of the results via investigating the association between individual happiness and inequality as measured by different methods. As noted by Ferrer-i-Carbonell and Ramos (2014), a robustness test would help identify what type of inequality individuals are more sensitive to. Table 5 shows that inequality, as measured by any indicator, has a significantly and negative effect on happiness. This confirms that the result is robust to different measures of inequality.

In addition, for the robustness test for the model specifications, we also ran several ordered logit models with the same variables. The ordered logit and OLS results are very similar: there is no difference at all in the sign and the significance levels are almost the same for each of coefficients (see Appendix 2). This result is similar to that in a methodological paper by Ferrer-i- Carbonell and Frijters (2004), who checked for the robustness of findings on the determinants of happiness using the German national household panel survey and concluded that the results are not sensitive to the choice between a linear and an ordered categorical estimator.

Table 5. The association between happiness and inequality as measured by different indicators

Independent variable	Model 6	Model 7	Model 8	Model 9
Expenditure (log)	0.1366**	0.1356**	0.1320*	0.1261*
	(0.066)	(0.065)	(0.067)	(0.066)
Gini	**-1.4445***			
	(0.471)			
g1090		**-0.0980***		
		(0.028)		
GE(0)			**-1.5024***	
			(0.483)	
GE(1)				**-1.2302***
				(0.430)
Control variables	Yes	Yes	Yes	Yes
Constant	1.6862**	1.6352**	1.5269**	1.5598**
	(0.640)	(0.642)	(0.648)	(0.649)
Observations	2,597	2,597	2,597	2,597
R-squared	0.135	0.135	0.134	0.134

Note: robust standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

5. Conclusion and policy Implications

The main purpose of this study was to explore how expenditure inequality contributes to the elderly's happiness in rural Vietnam, based on a combination of the data from the 2011 VNAS and 2011 RAFC. Our regression analysis confirms that individuals who live in the commune of high inequality tend to report themselves as being less happy, even after controlling for several individual and household attributes. The results are robust to different measures of inequality as well as the specification of econometric models. This finding indicates that inequality results in negative consequences on the quality of life among older people. This result is consistent to previous findings in many countries.

We further examined some type of heterogeneity on inequality aversion. We find that older rural people who are farmers or poor are more sensitive to inequality. Given that these people tend to be less happy than others, the result shows the risk that inequality further lowers their welfare. A policy implication here is that social policies for the elderly should focus on farmers and the poor since they are more vulnerable to inequality. As mentioned by Oshio and Urakawa (2014), individuals with low income status tend to feel more disappointed with economic inequality, when living in a less mobile society; this is because inequality implies that they have limited chances to move up the social ladder. Thus, the finding of our study supports the view that rural Vietnam is not a mobile society, which is another interesting topic, should be addressed in future research.

The current study also answered the question: To what extend do absolute income and relative income affect individual happiness? It was found that both the income of the household and the income of other households have a significant effect on subjective well-being. Some of our estimates suggest that the latter relative to the former is even more important than the former on its own. In addition, the result of the current study confirms that the living standards within the commune (as measured by the average expenditure per capita at the commune level) have a positive effect on individual happiness. We also find that health status is an important determinant of happiness among the elderly. Combined together, the findings of our study suggest that while both wealth and health are much of importance to the subjective welfare of older people in rural Vietnam, improving social mobility is also vital for increasing their well-being.

We acknowledge that our study has some limitations. First, like many other happiness studies, our study considers happiness only as a single term and is based on the survey results of a subjective assessment. Since happiness is multi-dimensional, the validity of perceived happiness as reported from the survey should be further addressed. Second, we are unable to examine the link between inequality and happiness over time due to lack of longitudinal data. As noted by Ferrer-i-Carbonell and Ramos (2014), the use of panel data in estimating a happiness equation reduces the bias because it controls for time invariant unobservable individual characteristics. This suggests that further research is needed to address this issue. Third, our sample focuses only on the elderly in rural areas. It should be noted that different groups might have different tastes for inequality (Verme, 2011). Future research should examine the happiness-inequality relationship with the sample should cover all other groups and regions.

Appendices

Appendix 1:

The Gini index can be calculated from the individual expenditure in the population (Deaton, 1997):

$$G = \frac{n+1}{n-1} - \frac{2}{n(n-1)\bar{Y}} \sum_{i=1}^{n} \rho_i y_i \ , \tag{1}$$

where ρ_i is the rank of person i in the Y-distribution, counting from the richest so that the richest has the rank of 1. The value of the Gini coefficient varies from 0 when everyone has the same expenditure to 1 when one person has everything. The closer a Gini coefficient is to one, the more unequal is the expenditure distribution.

The Theil L index of inequality, which is also known as Generalized entropy index $GE(0)$, is calculated as follows:

$$Theil\_L = \frac{1}{n} \sum_{i=1}^{n} \ln\left(\frac{\bar{Y}}{Y_i}\right), \tag{2}$$

The Theil L index ranges from 0 to infinity. A higher value of Theil L indicates more inequality.

The Theil T index of inequality, which is also known as Generalized entropy index $GE(1)$, is calculated as:

$$Theil\_T = \frac{1}{n}\sum_{i=1}^{n}\frac{Y_i}{\overline{Y}}\ln\left(\frac{Y_i}{\overline{Y}}\right) \hspace{3cm} (3)$$

The Theil T index ranges from 0 (lowest inequality) to ln(N) (highest inequality).

Appendix 2: Factors associated with happiness (Ordered Logit Models)

	Model 6	Model 7	Model 8	Model 9
Age	0.0182***	0.0182***	0.0182***	0.0182***
	(0.004)	(0.004)	(0.004)	(0.004)
Gender	-0.0688	-0.0703	-0.0694	-0.0694
	(0.086)	(0.086)	(0.086)	(0.086)
Ethnicity	0.0249	0.0234	0.0327	0.0419
	(0.137)	(0.132)	(0.135)	(0.135)
Farmer	-0.0069	-0.0094	-0.0076	-0.0057
	(0.077)	(0.076)	(0.077)	(0.077)
Primary school	0.0463	0.0466	0.0447	0.0432
	(0.101)	(0.102)	(0.101)	(0.101)
Secondary school or higher	0.3027**	0.3028**	0.3018**	0.3013**
	(0.122)	(0.122)	(0.122)	(0.122)
Widowed	-0.4576***	-0.4602***	-0.4582***	-0.4569***
	(0.090)	(0.090)	(0.090)	(0.089)
Living with children/grandchildren	-0.0458	-0.0436	-0.0452	-0.0450
	(0.071)	(0.071)	(0.071)	(0.071)
Social activity	0.2233***	0.2222***	0.2234***	0.2246***
	(0.070)	(0.070)	(0.070)	(0.070)
Religious people	0.0658	0.0626	0.0628	0.0629
	(0.099)	(0.098)	(0.099)	(0.099)
Monthly worship	0.0695	0.0729	0.0688	0.0666

	(0.099)	(0.098)	(0.099)	(0.099)
Weakly or daily worship	0.2431***	0.2446***	0.2408***	0.2387***
	(0.091)	(0.090)	(0.091)	(0.091)
So-so health	0.4888***	0.4917***	0.4884***	0.4868***
	(0.063)	(0.062)	(0.063)	(0.063)
Good/very good health	0.7751***	0.7754***	0.7734***	0.7720***
	(0.164)	(0.164)	(0.164)	(0.164)
Middle income	0.3099***	0.3101***	0.3103***	0.3102***
	(0.101)	(0.100)	(0.101)	(0.101)
High income	0.7199***	0.7203***	0.7193***	0.7175***
	(0.126)	(0.127)	(0.127)	(0.126)
About as same as neighbours	0.8650***	0.8645***	0.8649***	0.8654***
	(0.101)	(0.100)	(0.101)	(0.101)
Higher than neighbours	0.8282***	0.8289***	0.8288***	0.8293***
	(0.165)	(0.165)	(0.165)	(0.166)
North	0.2584***	0.2603***	0.2542***	0.2499***
	(0.094)	(0.094)	(0.094)	(0.094)
South	0.1672	0.1610	0.1588	0.1488
	(0.144)	(0.145)	(0.144)	(0.142)
Expenditure level (log)	0.3564**	0.3540**	0.3443**	0.3313**
	(0.155)	(0.153)	(0.156)	(0.156)
Gini	-3.1349***			
	(1.004)			
P10/P90		-0.2127***		
		(0.061)		
GE (0)			-3.1841***	
			(1.014)	
GE (1)				-2.5805***
				(0.911)
Prob > chi2	0.0000	0.0000	0.0000	0.0000
Observations	2,597	2,597	2,597	2,597

Robust standard errors in parentheses*** p<0.01, ** p<0.05, * p<0.

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