

PAA Extended Abstract

Measuring Housing Quality in the Absence of a Monetized Real Estate Market: The Case of Rural Northeast Thailand

Introduction

Houses, or dwelling units, are found universally throughout every society. The quality of accommodations can vary considerably from household to household, and in some contexts, creating a measure of housing quality can be quite difficult. Dwelling units that are secure, sufficiently large to minimize the feeling of crowding, and appointed with amenities thought to be necessary for a comfortable life are a goal of many households across diverse social and geographic settings. Dwelling units constitute both an important asset and a critical aspect of consumption. Valuable houses can serve to buffer economic uncertainty, and for many, a dwelling unit that is recognized to be of high value is a preferred way to demonstrate social status.

Due to the importance of dwelling units in the household economy, much can be learned from including measures of housing quality in social-demographic surveys. For instance, measures of housing quality can be used to examine the consumption patterns of remitting migrant household members. Indeed, past research has found that migrant remittances make up a significant portion of rural household's cash flow, and are commonly spent on consumption needs. Research in rural Mexico and Thailand, for instance, has found that remittances are used in making housing upgrades or acquiring new housing (Durand et al. 1996; Massey et al. 1987, Richter et al. 1997).

In many settings, putting a price on a dwelling unit is fairly straightforward. In the presence of an active real estate market, one would look at the selling price of a comparable housing units recorded at a publicly available municipal office.

Alternatively, one could compute the cost of building a dwelling unit by adding up the cost of material and labor. Use information from tax records might be another alternative. Where property taxes are based on housing value, tax notices frequently have an assessed value printed on them reminding the owner of its value.

However, in settings where an active real estate market does not exist, where household members supply the labor themselves to construct their house, and where houses are frequently constructed or improved incrementally over time, it is extremely difficult to monetize the value of dwelling units. This is the situation for rural areas in much of the developing world. Instead of establishing the value of a dwelling unit, most studies in developing countries measure elements of its structure, such as the material used in constructing the dwelling's walls or floor, or whether the dwelling has access to piped water, electricity, or a sewage system.

The problem with this building elements approach is that various building materials can be substituted for one another and the availability of amenities such as electricity, piped water, and sewage may exhibit substantial regional variation. Metal, tile, wood, and even thatch can be substitutable for one another in many settings without having any appreciable effect on the value, quality, or comfort of a dwelling unit. Building materials are affected by the availability of materials. For example, as forests are depleted, it is common to use concrete products instead of wood. As a result, building elements might not provide a good proxy for housing quality, and this is evident to anyone who has spent any time in rural villages in developing countries.

In this paper we develop a new approach to the measurement of housing quality as part of a larger on-going longitudinal data collection in Nang Rong, Thailand. Nang

Rong is a rural, agrarian district located in Thailand's Northeast, the poorest region in the country. Using data from Nang Rong, we develop a method of measuring the relative quality rating of several dwelling units that takes advantage of general knowledge within an area as to what constitutes high-quality versus low quality housing.

The development of our housing quality measure followed several steps. Initially, we traveled throughout the study area in order to obtain a visual sense of the range of housing styles and to obtain an intuitive sense of the relative value of various dwelling units. Although we have been involved in data collection in Nang Rong for more than two decades, and we had a sense of housing quality there, recent development that had occurred in the district made it important to have an initial overview of the current housing situation.

We took pictures of a wide range of dwelling units, with the aim of capturing the extremes as well as the variation in the middle of the distribution of dwelling unit quality. We selected ten pictures that we felt represented the range of housing quality. We then asked a group of Nang Rong residents and officials to rank order the pictures from highest to lowest. We found that local residents had no problem ranking the pictures. They understood the task and could complete it quite quickly. We subsequently asked the rankers to tell us about factors that influenced their rankings. Some factors that emerged included: a) the size of the house (although it was sometimes hard to judge from a picture); b) the number of stories; c) the visible state of repair; d) the material used in the roof, whereby tile roof proved to be better than tin or zinc; e) whether or not the siding was painted; f) whether or not concrete block used in construction was finished with a stucco covering; g) whether the dwelling had glass windows.

Using these factors as a baseline for evaluation of housing quality, we then trained a team of investigators to rank dwelling units on a scale of one to five, with five indicating the highest quality house. Data were collected in 2000 in 51 villages. This was done in conjunction with a third panel of data collection that gathered data on household characteristics, household assets, and characteristics of a household's primary dwelling unit.

We began analyzing the housing quality data by using pair-wise correlation coefficients to find the strength and direction of the linear relationship between it and data on household assets and dwelling unit characteristics measured contemporaneously in the year 2000. Results indicated the housing quality behaved as expected, with measures of assets and building materials being generally positively related to the quality rating.

We then empirically examined the performance of our measure by developing a statistical model of the determinants of housing quality. Considering that there is an absence of an active housing market in Nang Rong, we argue that over time investment in housing improvement follows a pattern. Initially, household spending is aimed at fulfilling basic needs. At this point a dwelling unit is primarily built or maintained to provide shelter. As households begin to acquire working assets (land, tractor, and vehicles) and begin to develop a cash flow (from occupations, farming, migrant remittances) spending on housing quality begins to move gradually from necessity to consumption, and later to investment.

Preliminary results of an ordered logit model in which dwelling unit housing quality (in 2000) is specified as a function of covariates measured in a previous wave of

data collection (in 1994) shows that our measure of housing quality is associated with household debt, household demographics, household assets, household economy, and remittance flows in ways that one would expect given our theory.

Thus, not only is our measure related to other household assets and housing characteristics, but empirical results confirm that it performs as expected in statistical models. We would argue that our measure of housing quality is innovative, is an improvement over commonly used existing measures, and it can be extended to other settings. Such a measure could be useful for development researchers who are interested in obtaining a more complete list of a household's assets.

Works Cited

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Table 1. Frequency Distribution of 2000 Dwelling Unit Quality Rating

Description	Category	Frequency	Percent
Lowest Quality	1	743	11.24
Mid-low Quality	2	2965	44.84
Middle Quality	3	2252	34.05
Mid-high Quality	4	543	8.21
Highest Quality	5	110	1.66
Total		6613	100.00

Table 2. Descriptive Statistics for Dwelling Unit Housing Quality and Independent Variables for 1994 Nang Rong Households

Variable	Minimum	Maximum	Mean	Std Dev	N
<i>Debt</i>					
Household debt is 5,000 to 9,999 baht	0.000	1.000	0.082	0.275	6613
Household debt is 10,000 to 19,999 baht	0.000	1.000	0.141	0.348	6613
Household debt is 20,000 + baht (Household debt is less than 5000 baht)	0.000	1.000	0.204	0.403	6613
<i>Household Demographic</i>					
Number of working age people living in the household	0.000	9.000	2.519	1.285	6613
Number of non-working age people living in the household	0.000	10.000	1.799	1.231	6613
<i>Non-Agricultural Assets</i>					
Household cooks with wood, charcoal, or other type of fuel (Household cooks with electricity or gas)	0.000	1.000	0.964	0.187	6613
Number of black and white televisions	0.000	2.000	0.413	0.497	6613
Number of color televisions	0.000	3.000	0.303	0.467	6613
Number of refrigerators	0.000	3.000	0.155	0.373	6613
Number of Cars/Trucks/Pick ups/Itans	0.000	4.000	0.066	0.277	6613
Number of motorcycles	0.000	4.000	0.339	0.542	6613
Number of sewing machines	0.000	6.000	0.101	0.338	6613
Windows have glass panes or netting (Windows do not have glass panes or netting)	0.000	1.000	0.086	0.280	6613
Household has electricity (Household does not have electricity)	0.000	1.000	0.935	0.247	6613
<i>Agricultural Assets</i>					
Household owns cattle (Household does not own cattle)	0.000	1.000	0.173	0.379	6613
Total number of water buffalo	0.000	50.000	1.914	2.518	6613
Household owns pigs (Household does not own pigs)	0.000	1.000	0.141	0.348	6613
Household owns small tractor (Household does not own small tractor)	0.000	1.000	0.176	0.381	6613
Household owns water pump (Household does not own water pump)	0.000	1.000	0.080	0.272	6613
Household planted cassava (Household did not plant cassava)	0.000	1.000	0.135	0.341	6613
<i>Household Economy</i>					
Household engages in silk weaving (Household does not engage in silk weaving)	0.000	1.000	0.074	0.262	6613
Household raises silkworms (household does not raise silkworms)	0.000	1.000	0.049	0.217	6613
Household engages in cloth weaving (household does not engage in cloth weaving)	0.000	1.000	0.141	0.348	6613
Household makes charcoal (Household does not make charcoal)	0.000	1.000	0.591	0.492	6613
Someone in the household works as a laborer (No one in the household works as a laborer)	0.000	1.000	0.395	0.489	6613
Number of household members working as in commerce	0.000	5.000	0.113	0.465	6613
Number of household members working in government	0.000	4.000	0.045	0.257	6613
<i>Hiring and Renting Land and Equipment</i>					
Amount of land that the household rents out	0.000	115.600	0.812	4.061	6613
<i>Remittance</i>					
Net Amount of Migrant-to-Household Remittance	0.000	110.000	5.374	9.799	4757
Net Amount of Household-to-Migrant Remittance	0.000	3.500	0.104	0.305	4757

Table 3. Ordered Logit Estimates of Dwelling Unit Housing Quality Against Independent Variables for 1994 Nang Rong Households

Variable	Coeff	Std Err	Odds Ratio	Coeff	Std Err	Odds Ratio
Intercept 1	-6.031***	0.2	0.002	-6.428***	0.257	0.002
Intercept 2	-3.906***	0.178	0.02	-4.228***	0.23	0.015
Intercept 3	-1.462***	0.172	0.232	-1.74***	0.223	0.176
Intercept 4	1.215***	0.171	3.371	0.979***	0.221	2.663
<i>Debt</i>						
Household debt is 5,000 to 9,999 baht	-0.133	0.088	0.876	-0.152	0.103	0.859
Household debt is 10,000 to 19,999 baht	0.111	0.071	1.117	0.144	0.083	1.155
Household debt is 20,000 + baht (Household debt is less than 5000 baht)	0.269***	0.065	1.309	0.205**	0.075	1.228
<i>Household Demographic</i>						
Number of working age people living in the household	0.015	0.02	1.015	0.033	0.023	1.034
Number of non-working age people living in the household	-0.048*	0.02	0.953	-0.021	0.022	0.98
<i>Non-Agricultural Assets</i>						
Household cooks with wood, charcoal, or other type of fuel (Household cooks with electricity or gas)	-0.493***	0.133	0.611	-0.244	0.164	0.783
Number of black and white televisions	0.206***	0.058	1.229	0.18**	0.069	1.198
Number of color televisions	0.59***	0.067	1.803	0.506***	0.079	1.659
Number of refrigerators	0.584***	0.083	1.794	0.609***	0.096	1.839
Number of Cars/Trucks/Pick ups/Itans	0.14	0.098	1.151	0.107	0.112	1.112
Number of motorcycles	0.45***	0.051	1.569	0.416***	0.059	1.516
Number of sewing machines	0.334***	0.075	1.396	0.349***	0.082	1.418
Windows have glass panes or netting (Windows do not have glass panes or netting)	1.117***	0.091	3.054	1.037***	0.109	2.821
Household has electricity (Household does not have electricity)	0.9***	0.103	2.46	0.871***	0.149	2.39
<i>Agricultural Assets</i>						
Household owns cattle (Household does not own cattle)	0.246***	0.065	1.279	0.32***	0.075	1.377
Total number of water buffalo	0.023*	0.01	1.023	0.006	0.011	1.006
Household owns pigs (Household does not own pigs)	0.049	0.07	1.051	0.073	0.078	1.076
Household owns small tractor (Household does not own small tractor)	0.761***	0.074	2.14	0.759***	0.083	2.136
Household owns water pump (Household does not own water pump)	-0.059	0.096	0.943	-0.125	0.108	0.883
Household planted cassava (Household did not plant cassava)	0.335***	0.071	1.398	0.427***	0.085	1.533
<i>Household Economy</i>						
Household engages in silk weaving (Household does not engage in silk weaving)	0.202	0.145	1.223	0.256	0.162	1.292
Household raises silkworms (household does not raise silkworms)	-0.247	0.168	0.781	-0.356	0.185	0.7
Household engages in cloth weaving (household does not engage in cloth weaving)	0.063	0.076	1.065	0.035	0.084	1.036
Household makes charcoal (Household does not make charcoal)	-0.025	0.051	0.975	-0.023	0.06	0.978
Someone in the household works as a labor (No one in the household works as a laborer)	-0.265***	0.05	0.767	-0.231***	0.06	0.794
Number of household members working as in commerce	-0.037	0.056	0.964	-0.008	0.065	0.992
Number of household members working in government	0.507***	0.109	1.66	0.544***	0.142	1.722
<i>Hiring and Renting Land and Equipment</i>						
Amount of land that the household rents out	0.022***	0.006	1.022	0.02**	0.007	1.02
<i>Remittance</i>						
Net Amount of Migrant-to-Household Remittance				0.015***	0.003	1.015
Net Amount of Household-to-Migrant Remittance				0.038	0.092	1.038
N		6613			4757	
- 2LL		14620.043			10475.611	
* p < .05 ** p < .01 *** p < .001 (Two-Tailed Test)						

Matrix of Pairwise Pearsons Correlations for Household Assets and Dwelling Unit Quality Rating in Nang Rong in 2000

		qu_rater
Dwelling Unit Quality Rating	qu_rater	1.000
Whether House has only one story	sstory	-0.135
Whether House has no windows	nowindow	-0.510
Whether House has windows with bug screens	bug_w	0.137
Whether House has windows with glass panes	glass_w	0.458
Whether House has windows with wooden panes	panes_w	0.206
Whether House has windows with frames but no panes	frames_w	-0.133
Household cooks with electricity or gas	CKFUEL	0.249
Number of color TVs greater than 17"	CTV_GE17	0.224
Number of color TVs less than 17"	CTV_LT17	0.144
Number of VCRs	VCR	0.191
Number of Refrigerators	FRIDGE	0.395
Number of Itans	ITAN	0.068
Number of Bicycles	BIKE	0.050
Number of Motorcycles with 110 + cc engines	MCYCLE_B	0.175
Number of Motorcycles with smaller than 110 cc engines	MCYCLE_S	0.182
Number of Cars, Trucks, and Pickups	CAR_TRUK	0.246
Number of Sewing Machines	SEWING_M	0.168
Whether Household owns Small Tractor	STRCTOWN	0.113
Whether Household owns Cattle	CATTLE_C	0.080
Whether Household owns Water Buffalos	WBUFF_C	-0.051
Whether Household owns Pigs	PIGS_C	0.122
Whether Household owns Ducks	DUCKS_C	-0.003
Whether Household owns Chickens	CHICKN_C	0.029

N = 8365
