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Income, consumption, and poverty measurement in the Philippines[1]

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Abstract

The official poverty methodology of the Philippines uses pretax income as a measure of household welfare. A household is deemed poor if its pretax income falls below a minimum income sufficient to buy the household's basic needs. However, several studies suggest that a more appropriate welfare measure for poverty estimation is one that includes only resources available for a household's own consumption of goods and services. This means taxes, social security expenditures, and gifts or expenses for other households must be excluded from the welfare aggregate. Additionally, arguments towards using consumption as a better measure of welfare in poverty estimation also persist. In this study, we explore two welfare aggregates, disposable income, and basic consumption, and assess how well these alternative measures identify the disadvantaged households compared to when pretax income is used. Using the 2018 Family Income and Expenditure Survey, our results show that while disposable income is no better than pretax income in identifying deprived households, a consumption-based measure is preferable to an income-based measure in identifying the disadvantaged. Results are robust even when the welfare measures are adjusted to account for economies of scale in the household.

JEL Classification: I32

Keywords: consumption-based poverty, income-based poverty, welfare measurement

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1. Introduction

There are two pieces of information needed in poverty estimation: a welfare aggregate and a poverty threshold. The welfare aggregate quantifies individual or household well-being through the measurement of resources available for consumption, while the poverty threshold measures the minimum requirement to say that an individual or household is not deprived. The poverty threshold, also called as the poverty line, separates the poor from the non-poor. In the Philippines, the official poverty methodology uses pretax income as the measure of households' welfare. Additionally, the cheapest and nutritionally adequate food bundle, developed by the Food and Nutrition Research Institute, together with total basic expenditure is used in computing the poverty threshold. From its adoption in 1987, the official poverty methodology has undergone several revisions throughout the years. In 1992, acknowledging the fact that only basic expenditures should be included in estimating non-food essentials, alcohol, tobacco, recreation, durable furniture and equipment, and miscellaneous expenditures were excluded in the list of basic non-food requirements in measuring the poverty threshold. In 2002, provincial poverty thresholds were estimated to supplement the current regional poverty thresholds. This enabled disaggregation of poverty estimates to provincial-level values. In 2011, to ensure consistency and comparability of estimates across space and over time, poverty thresholds were calculated using a constant food expenditure over total basic expenditure (FE/TBE) value of 0.6983. This means that in computing for current poverty estimates it is assumed that subsistence poor households allocate around 70 percent of their expenses to basic food needs.[3] These three significant revisions in the official poverty methodology have been focused on refining the poverty threshold. No modifications have been made in the choice of welfare aggregate in estimating poverty statistics in the country. Pretax income continues to be used as a measure of household welfare in estimating poverty in the country. (PSA [2020])

This study explores alternative welfare aggregates in the poverty estimation in the Philippines. Using the 2018 FIES, we compare three welfare measures--pretax income, disposable income, and consumption, and investigate which three accurately identify the poor households. We look at the demographic characteristics and material circumstances of the poor households as identified by the three various measures.

In comparing gross-income poverty to an alternative measure, households can be categorized into four groups: households who are poor in both measures, households identified as poor when using gross income but non-poor when the alternative measure is used, households who are non-poor

[3] The FE/TBE was computed using data from previous FIES conducted from 2000 to 2009.

under the gross income measure but poor under the alternative and households who are non-poor in either measure. By comparing the characteristics of poor households in only one measure, we can investigate which welfare aggregate better captures the disadvantaged households.

Our results show that while disposable income is no better than pretax income in identifying deprived households, a consumption-based welfare measure is preferable to an income-based measure in determining the disadvantaged.

2. Gross income versus disposable income

In their study of new approaches to poverty measurement, the National Academy of Sciences [1995] stated that 'a defensible measure of poverty requires that resources and needs—the thresholds—be defined consistently'. Therefore, if a poverty threshold is estimated from a household's budget for basic expenses, an appropriate welfare aggregate would be one that includes resources available for household consumption and that excludes non-discretionary expenses and other expenditures not available for consumption. This means out-of-pocket health expenditures, taxes and transfers to other households, among others should be subtracted from income. The U.S. took note of this and in 2011, started publishing their Supplemental Poverty Measure (SPM) alongside the Official Poverty Measure (OPM). While OPM's welfare aggregate is gross pretax cash income, the SPM welfare measure is the sum of cash income, plus in-kind benefits, minus taxes, work expenses, and out-of-pocket medical expenses [Short2011].

There are on-going debates on whether health expenditures should be included when estimating poverty. An argument for excluding health expenditures in estimating poverty is that health expenditures do not necessarily increase household welfare since these reflect regrettable necessity [Deaton and Zaidi 2002]. Including expenditures because someone has fallen ill reflects an increase in welfare when the opposite has occurred. Furthermore, high out-of-pocket (OOP) health expenditures reflect a need for insurance and do not increase welfare (Meyer and Sullivan, 2009).

3. Income versus consumption

Another issue on poverty measurement is the question of whether income should be replaced with consumption as a measure of household welfare. In theory, as discussed by the life cycle models of Modigliani and Brumberg [1954] and the permanent income hypothesis model of Friedman [1957],

households tend to smooth their consumption over time due to uncertainty and the instability of income. This makes consumption a more accurate measure of well-being. Empirical studies have also shown that consumption has a more significant positive effect on well-being and life satisfaction than income [Brown and Gathergood 2019].

Income-based poverty indicators are widely used because they are cost-effective measurements [Haughton and Khandker 2009]. It is easier and more convenient to measure because asking a worker how much they earn is straightforward to answer [Meyer and Sullivan 2009]. However, it is only easier if the respondents have a fixed or salaried income [Albert, Abrigo, Quimba, and Vizmanos 2020] and). Income can show the households' capacity to spend or the command of households' over their resources UNECE [2018]; Haughton and Khandker [2009] (and). Income can also be disaggregated by its source components through time and space [UNECE 2018][UNECE 2018]).

However, income-based indicators can be misleading. While it measures current income, it fails to consider wealth or savings and monetary or in-kind transfers. It also does not consider receipts of consumer durables or housing and intrahousehold inequalities, which are pertinent in measuring household well-being [Hurd and Rohwedder 2006]. Income is also subject to fluctuations and transitory shocks, especially in agriculture, wherein the ability to earn is seasonal. It is difficult for income-based indicators to encapsulate self-employed workers and those who work irregular jobs (Deaton and Zaidi [2002]; Hurd and Rohwedder [2006]; Serafino and Tonkin [2017]; Albert et al., [2020]). Therefore, income-based indicators have shown a weak correlation with measuring material well-being, especially in lower-income households (Bavier [2008]; Haughton and Khandker [2009]; UNECE [2017]).

While income is easier to remember than consumption, income underreporting often occurs for low-income households making this form of measurement unrepresentative of their social status (Hurd and Rohwedder [2006]; Haughton and Khandker [2009]; UNECE [2017]; Serafino and Tonkin [2017]). Respondent biases also occur, such as concealing data for tax purposes or because of illegal transactions. These biases are extensive on the tail end of higher-income households [Albert et al., 2020].

While consumption may be seasonal, especially during holidays and festivals, these seasonalities are better mitigated with consumption data than income [Deaton and Zaidi 2002](and). Irregularities and short-term fluctuations can be smoothed out by consumption, which better reflects long term average

well-being (Haughton and Khandker [2009]; UNECE [2017]). Consumption is much more stable than income and is unchanging [Albert et al. 2020]. It also reflects wealth, saving, and dissaving, which better represent retired households [Deaton and Zaidi 2002]. With consumption data, there are more accurate reports of lower-income households as the data includes private and government transfers, housing benefits, and durable goods (Bavier [2008]; Meyer and Sullivan [2009]; UNECE [2017]; Serafino and Tonkin [2017]). Hence, consumption has a stronger correlation with basic standards of living. Individuals are more accommodating to recall what they consume rather than what they earn, especially for lower-income households [Haughton and Khandker [2009].

However, consumption-based indicators can also be misleading as households have different tastes and preferences with their purchases. Under reporting may occur for high value irregular items for higher income households (UNECE [2017]; Serafino and Tonkin[2017]). Higher income households may choose to consume less but their consumption may not reflect their actual social status. Conversely, lower income households may purchase luxury items to exhibit higher social status, this is called conspicuous consumption [Haughton and Khandker [2009]. It is commonly seen with families with Overseas Filipino Workers who send in remittances [Ang 2007]. While households are more willing to remember what they consume rather than earn, respondent bias takes effect as they can be easily fatigued with the 4-hour interviews for the Family and Income Expenditure Surveys [Serafino and Tonkin [2017]; Albert et al. [2020]). Underreporting may also occur for illicit items and particular vices, such as alcohol and tobacco. There can also be some difficulty with measuring consumption such as choosing consistent thresholds, imputing household prices and durable goods, and adjusting prices for inflation (Johnson [2004]; Haughton and Khandker [2009]).

Income-based and consumption-based poverty measures both have their advantages and disadvantages. Consumption-based measures better represent low- or middle- income countries [Albert et al. 2020]. Both methods have their difficulties and disadvantages with underreporting for high-income households. In the study of Brewer and O'Dea [2012], the authors discuss those with low income do not necessarily have the lowest consumption levels. The Philippines is a middle-low income country with a sizeable informal sector. Since households gain a better quality of life through consumption of goods and services [Serafino and Tonkin 2017], to accurately depict poverty levels, consumption-based poverty measures should be taken into consideration.

4. Welfare measures

In this study, we use three welfare measures and identify which among them are better predictors of deprived households. These are gross income, disposable income, and consumption.

4.1 Gross income

Since its adoption in 1987, the Philippines' official poverty measure has used pretax income as the welfare aggregate. This pretax income is based on the Family Income and Expenditure Survey (FIES) definition of total income. Included in this definition are (i) salaries and wages from employment in cash and in-kind received by family members both from agricultural and non-agricultural activities, (ii) income from any entrepreneurial activity whether in agricultural or in non-agricultural business by any household member as an operator or self-employed (net of the business' operating expenses), (iii) income from other sources such net share of fruits and vegetables produced, or fishing, livestock, or poultry raised by other households, cash receipts, gifts, support and relief from abroad and domestic sources, rentals received from lands, buildings, and spaces, interest, pension and retirement, employee compensation, social security benefits, dividends from investment, and family sustenance activities, (iv) imputed value of house and lot, and (v) the total value of goods received as gifts.

This official income aggregate, which we will call gross income, will serve as our baseline welfare measure. Furthermore, the official poverty methodology divides gross household income by the family size to obtain per capita welfare estimates. We will also do the same and apply this to the two other welfare measures we are investigating.

In 2018, the average per capita (PC) gross income for households in the Philippines was Php84,463, with the poorest deciles reporting a PC gross income of Php18,679 while the richest decile has, on average, Php300,559. The average PC gross income of the poorest is only 6.2 percent to that of the richest. Averages for all deciles are presented in Table 1.

TABLE 1. Mean household per capita (PC) welfare by deciles, Family Income and Expenditure Survey, 2018

	PC gross income (Php)		PC disposable income (Php)		PC consumption (Php)	
	Mean	**Std. Dev.**	**Mean**	**Std. Dev.**	**Mean**	**Std. Dev.**
Deciles of welfare						
1	18,679	3,658	18,132	7,612	15,067	2,611
2	27,316	2,055	26,741	1,996	21,116	1,410
3	34,444	2,111	33,646	2,037	25,911	1,389
4	42,078	2,330	41,030	2,248	30,945	1,527
5	50,855	2,784	49,470	2,666	36,661	1,764
6	61,807	3,549	59,948	3,385	43,472	2,182
7	76,307	5,010	73,662	4,736	52,026	2,777
8	97,712	7,804	93,799	7,208	63,869	4,161
9	134,920	15,026	128,373	13,966	83,599	7,946
10	300,559	285,223	281,308	270,354	158,535	90,239
Mean for all households	**84,463**	**120,292**	**80,608**	**113,222**	**53,119**	**49,474**

4.2. Disposable income

Several issues arise in the use of gross income as the welfare aggregate for poverty measurement. In defining the income aggregates for poverty estimation, the National Research Council [NRC 1995] stresses that definitions between welfare measures and poverty thresholds be consistent. Poverty thresholds are measured based on the 'need' of households. The welfare measure to be used should be resources available for consumption of goods and services in the poverty budget. This means income aggregates should exclude taxes and other social security expenditures as well as work expenses and gifts/expenses for other households.

This issue of using disposable income instead of gross income in poverty estimation has been overlooked in the official poverty methodology in the Philippines. To investigate how this impacts the poverty estimates in the country, we subtract the following expenditures from the official gross income: taxes, transfers and gifts to other households, social contributions, and medical expenses. While the FIES does not present a clear and precise disaggregation between out-of-pocket expenditures and other subsidized health expenses, it could be surmised that only out-of-pocket health expenses are removed since all types of subsidies, medical or otherwise, have been included in the computation of gross income.

From Table 1, the average PC disposable income of households in 2018 was Php80,608. As expected, the average PC disposable income is smaller than PC gross income across decile groups. However, a slightly narrower distribution is observed with the poorest decile reporting on average an income that is 6.4 percent of the richest decile.

4.3. Consumption

Our consumption measure is based on the total basic expenditure TBE definition of the country's official poverty methodology. TBE is the sum of the household's expenditure on food, clothing and footwear, fuel, light and water, housing maintenance and other minor repairs, rental of occupied dwelling units, medical care, education, transportation, communication, non-durable furnishing, household operations, and personal care and effects [PSA 2020]. However, as with the estimation of disposable income, we exclude health expenditures.

Because of data constraints, we cannot identify out-of-pocket medical expenses from subsidized health expenditures, so we exclude all medical expenses. User cost of durable goods is also not part of our consumption-based welfare. While we acknowledge the importance of adding the user cost or value of durable goods owned by the household at present time, data limitations hinder us to do so. While the information on durable furniture and equipment purchased during the period and the number of durable goods currently owned are available in the FIES, the dataset does not include the date of purchase of the good. Model and make of the cars are also not available. This information is needed to compute the present value of the goods.

From Table 1, the average PC consumption of households in 2018 was Php53,119. As expected, the average PC consumption is smaller than PC gross income across decile groups with the wealthier groups being able to allot more for savings than the poorer deciles. A narrower distribution is observed with the poorest decile reporting on average a consumption that is 9.5 percent of the richest decile.

5. Characteristics of the deprived households by welfare measure

To investigate how well the 3 welfare measures identify deprived households we look at the different characteristics of the poor households for each measure. A better welfare aggregate would be able to capture more deprived households based on various household well-being indicators. We use 20 indicators of household well-being for this study: household head employment, household head

education, household's experience of hunger during the last quarter of the year, house ownership, house ownership of a single-family household, overcrowding measured by the number of persons sharing 1 bedroom, different housing characteristics (roof and wall material, sanitation facility, water source, electricity), and asset ownership (television, refrigerator, washing machine, air-conditioning unit, vehicle, landline phone, cellular phone, computer, and stove).

To eliminate the possible bias of results due to different poverty cutoffs, we set the same poverty rates for all 3welfare aggregates. We use the Philippines' official 2018 poverty rate at 12.42 percent, equivalent to around 3 million households in poverty. We focus on these poorest 3 million households separately identified using the various welfare measures and look at their characteristics. The means of the 20 indicators of well-being for each group is presented in Table 2.

TABLE 2. Mean characteristics of the poor households for each per capita (PC) welfare measure, Family Income and Expenditure Survey 2018

	PC gross income poor	PC disposable income poor	PC consumption poor
PC gross income (Php)	19,832	20,113	22,759
PC disposable income (Php)	19,503	19,296	22,355
PC consumption (Php)	17,499	17,708	15,879
Household characteristics			
Household head with job or business	88.69%	88.31%	88.27%
Household head with college degree	0.97%	1.06%	0.90%
Experienced hunger	6.06%	6.07%	5.88%
Own house	59.46%	59.61%	60.41%
Single family with own house	41.46%	41.30%	39.83%
Number of persons per bedroom	4.49	4.47	4.55
Strong roof	79.61%	79.69%	79.02%
Strong wall	66.54%	66.85%	65.30%
Improved sanitation facility	76.78%	76.94%	76.69%
Improved water source	83.60%	83.74%	83.05%
With electricity	80.40%	80.52%	79.20%
Owns a television	53.99%	54.11%	51.92%
Owns a refrigerator	8.36%	8.61%	8.63%
Owns a washing machine	8.42%	8.62%	7.32%
Owns an airconditioning unit	0.41%	0.51%	0.41%
Owns a car, van, or jeep	0.22%	0.30%	0.24%
Owns a landline phone	0.62%	0.60%	0.59%
Owns a cellular phone	75.53%	75.42%	75.21%
Owns a computer	1.68%	1.80%	1.90%
Owns a stove	2.57%	2.69%	2.33%

The changes in values of PC gross income, PC disposable income and PC consumption in the 3 columns provide initial evidence that classification of households as poor or non-poor depends on which welfare aggregate is used. Looking at the different household characteristics, households who are categorized as poor by PC consumption are more disadvantaged in 15 out of the 20 indicators. PC gross income poor households are more deprived in 4 indicators while PC disposable income poor households in only 1 indicator. The magnitudes of these differences, however, seem negligible.

6. Comparing characteristics of those added to or removed from poverty across measures

A limitation in comparing only the mean characteristics of the poor for each welfare aggregate is that these results in Table 2 does not isolate the value of using a welfare over the other because some households would be poor in both or all measures. To investigate the efficiency of using one measure over another measure, Meyer and Sullivan [2012] suggest comparing households who are poor only in one welfare measure and not the other.

In comparing 2 welfare measures, the households are grouped into 4 categories: those who are poor in both welfare measures, those who are poor in first welfare measure only, those who are poor in second welfare measure only, and those who are not poor in either measure. Mean characteristics for each group are then compared. Like the analysis in the previous subsection, we use the 20 indicators of household well-being to investigate which among the 2 welfare measures identify deprived household better. In this section, we compare PC gross income poor with PC disposable income poor and PC consumption poor separately.

The comparison of characteristics between PC gross income poor and PC disposable income poor households is presented in Table 3. Shifting between these welfare aggregates changes only the status of a small percentage of households from poor to non-poor and vice versa (0.72 percent, equivalent to around 89,000 households becoming poor and another 89,000 households becoming non-poor). To compare the two welfare measures, we focus on the second and third columns of the Table. The second column presents households' characteristics classified as poor under PC gross income but non-poor when PC disposable income is used. The third column shows households' characteristics classified as poor under PC disposable income but non-poor when PC gross income is used.

TABLE 3. Mean characteristics of households by poverty status (PC gross income poor and PC disposable income poor), Family Income and Expenditure Survey, 2018

	Both PC gross income and PC disposable income poor	PC gross income poor only	PC Disposable income poor only	Neither PC gross income nor PC disposable income poor	+ favors gross income
PC gross income (Php)	19,668	25,286	34,883	93,873	
PC disposable income (Php)	19,333	25,149	18,061	89,570	
PC consumption (Php)	17,399	20,808	27,987	58,296	
Household characteristics					
Household head with job or business	88.7%	86.9%	73.9%	78.7%	-
Household head with college degree	1.0%	0.5%	3.7%	13.0%	+
Experienced hunger	6.0%	7.2%	7.5%	2.1%	-
Own house	59.5%	58.9%	64.2%	70.9%	+
Single family with own house	41.3%	45.3%	39.7%	49.1%	-
Number of persons per bedroom	4.5	4.0	3.4	2.6	+
Strong roof	79.5%	84.6%	87.3%	95.2%	+
Strong wall	66.4%	70.9%	81.2%	90.7%	+
Improved sanitation facility	76.6%	82.2%	87.6%	94.7%	+
Improved water source	83.5%	87.9%	92.7%	95.6%	+
With electricity	80.3%	83.2%	87.4%	94.9%	+
Owns a television	53.7%	63.6%	67.6%	85.7%	+
Owns a refrigerator	8.2%	13.3%	22.1%	51.0%	+
Owns a washing machine	8.3%	12.3%	19.1%	49.4%	+
Owns an airconditioning unit	0.4%	0.3%	3.4%	15.9%	+
Owns a car, van, or jeep	0.2%	0.1%	2.9%	9.6%	+
Owns a landline phone	0.6%	1.6%	1.0%	8.2%	-
Owns a cellular phone	75.4%	80.3%	76.6%	89.9%	-
Owns a computer	1.7%	2.7%	6.7%	23.4%	+
Owns a stove	2.5%	3.7%	7.9%	17.8%	+
Unweighted number of households	21,782	602	625	124,708	
Weighted number of households	2,983,635	89,827	89,764	21,583,948	
Share of weighted households	12.06%	0.36%	0.36%	87.22%	

TABLE 4. Mean characteristics of households by poverty status (PC gross income poor and PC consumption poor), Family Income and Expenditure Survey, 2018

	Both PC gross income and PC consumption poor	PC gross income poor only	PC consumption poor only	Neither PC gross income nor PC consumption poor	+ favors gross income
PC gross income (Php)	18,814	22,519	33,169	96,080	
PC disposable income (Php)	18,511	22,121	32,496	91,576	
PC consumption (Php)	15,329	23,225	17,330	59,827	
Household characteristics					
Household head with job or business	89.1%	87.6%	86.0%	78.4%	-
Household head with college degree	0.7%	1.6%	1.3%	13.5%	-
Experienced hunger	6.4%	5.2%	4.5%	2.0%	+
Own house	58.9%	60.9%	64.3%	71.2%	+
Single family with own house	40.3%	44.5%	38.6%	49.4%	-
Number of persons per bedroom	4.75	3.81	4.04	2.55	-
Strong roof	77.1%	86.1%	84.0%	95.6%	-
Strong wall	63.1%	75.7%	71.1%	91.5%	-
Improved sanitation facility	74.6%	82.6%	82.2%	95.2%	-
Improved water source	81.8%	88.3%	86.3%	96.0%	-
With electricity	77.6%	87.8%	83.4%	95.4%	-
Owns a television	49.2%	66.5%	59.0%	86.7%	-
Owns a refrigerator	6.7%	12.6%	13.6%	52.4%	+
Owns a washing machine	6.0%	14.7%	10.7%	50.9%	-
Owns an airconditioning unit	0.3%	0.7%	0.7%	16.4%	-
Owns a car, van, or jeep	0.2%	0.4%	0.5%	9.9%	+
Owns a landline phone	0.5%	0.9%	0.8%	8.5%	-
Owns a cellular phone	73.2%	81.7%	80.5%	90.3%	-
Owns a computer	1.2%	2.9%	3.7%	24.1%	+
Owns a stove	1.9%	4.5%	3.6%	18.3%	-
Unweighted number of households	16,563	5821	6426	118,907	
Weighted number of households	2,228,802	844,660	844,671	20,829,041	
Share of weighted households	9.00%	3.41%	3.41%	84.17%	

Results suggest that a PC disposable income-based welfare aggregate is no better than PC gross income in identifying deprived households. On average, households classified as poor under PC disposable income only have higher PC consumption (Php27,987) than households who are PC gross income poor only (Php20,808). Furthermore, the last column in Table 3 shows that out of the 20 indicators of well-being, households who are poor only under PC disposable income are, on average,

more deprived in only 5 (lesser household heads employed, more households who experienced hunger, less single family-owned houses, less households with landline and cellular phones).

We do the same comparisons for PC gross income and PC consumption in Table 4 and, in this case, 3.4 percent or around 845,000 households are considered poor in only 1 welfare measure. A PC consumption-based welfare measure is able to identify deprived households more than a PC gross income-based measure does. Poor households under PC consumption alone are on average, more deprived than poor households under PC gross income alone in 15 out of the 20 well-being indicators. A PC gross income-based welfare measure is able to identify more poor households in terms of hunger, house ownership, and ownership of refrigerator, vehicle, and computer.

7. Accounting for economies of scale in households

In our above analyses we have been using per capita welfare measures. The official poverty methodology of the Philippines uses per capita gross income and compare this to per capita poverty thresholds in estimating poverty. However, using per capita estimates to measure welfare does not take into consideration the fact that some goods and services bought by the household have public good characteristics. Some goods such as rent and durable goods when shared amongst several people in the household is much more affordable than for just one person [Rahman 2020]. Therefore, adjusting for equivalence scales is important to make comparable welfare aggregates with varying household demographics and not doing so may lead to misidentification of the poor, particularly in low-income areas with high fertility rates [Reiger et al. 2018].

While several methodologies have been proposed to account for economics of scale in households, we use Betson's [1996] 3-parameter scale in this study. The 3-parameter scale is based on three facts that Betson has observed: (i) that two-adult and one-adult families display a high degree of economies of scale, (ii) that the first child increase family needs less than the second and third child, and (iii) that the needs of single-parent families are greater than two-parent families. Every household is thus assigned a scale using the formula,

$$Scale = \begin{cases} 1, \text{ if single-individual household} \\ 1.41, \text{ if two-adult household with no child} \\ \left(A + 0.8 + 0.5 * (C-1)\right)^{0.7}, \text{ if single-parent household} \\ \left(A + 0.8 + 0.5 * (C)\right)^{0.7}, \text{ all other household} \end{cases} \quad (1)$$

where A is the number of adults and C is the number of children in the household.

Table 5 presents the per capita and 3-parameter scale values assigned to a sample of households with different compositions. For a household with 4 members, for example, the use of a per capita scale would simply assign the value of 4 ignoring the household composition and economies of scale. On the other hand, using the 3-parameter scale would take into consideration economies of scale as well as give a lower weight for children. Thus a 4-adult household will have a weight of 2.64 while a 2-adult household with 2 children will give a lower weight of 2.16.

TABLE 5. Example of per capita and the 3-parameter scale equivalent for different types of households

	Per capita	3-parameter scale
1 adult	1	1
2 adults	2	1.41
2 adults 1 child	3	1.90
2 adults 2 children	4	2.16
4 adults	4	2.64

TABLE 6. Mean household equivalence-adjusted (EA) welfare by decile, Family Income and Expenditure Survey, 2018

	EA gross income (Php)		EA disposable income (Php)		EA consumption (Php)	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Deciles of welfare						
1	36,600	6,484	35,497	11,877	29,409	4,607
2	51,160	3,308	50,001	3,241	39,446	2,270
3	62,442	3,245	60,964	3,134	46,979	2,116
4	74,363	3,610	72,483	3,536	54,602	2,360
5	87,854	4,237	85,525	4,047	63,349	2,741
6	104,208	5,257	101,112	5,015	73,713	3,271
7	125,577	7,215	121,374	6,873	86,404	4,105
8	156,667	11,289	150,514	10,432	103,533	5,895
9	210,724	22,013	200,757	20,433	130,755	10,931
10	441,937	437,507	416,294	424,707	230,184	108,512
Mean for all households	135,151	179,306	129,450	171,702	85,835	66,059

We apply the 3-parameter scale to check the robustness of our results from the previous section and investigate if a consumption-based welfare would still identify deprived households better than an income-based measure when the welfare measures are adjusted for economies of scale. Applying the 3-parameter scale to the 3 welfare measures, we compute for the equivalence-adjusted (EA) gross income, equivalence-adjusted (EA) disposable income and equivalence-adjusted (EA) consumption.

The average values of each welfare measure for all households and by decile are presented in Table 6. Average EA gross income, EA disposable income and EA consumption are Php135,151, Php129,450 and Php85,835, respectively. Compared when per capita is used, equivalence-adjusted measures display a narrower distribution. The poorest decile has, on average, an EA gross income that is 8.3 percent of the richest decile. The gradient is narrower for EA disposable income and EA consumption with the poorest decile having welfare values that are 8.5 percent and 12.8 percent of the richest decile, respectively.

Using the same procedure as the previous section, we identify the lowest 12.42 percent of households for each equivalence-adjusted welfare measure and compare their characteristics. Based on Table 7, we only see small differences in mean characteristics of the households across the three welfare measures with EA consumption having a slight advantage in identifying deprived households in 12 out of 20 deprivation indicators. EA disposable income identifies deprived households the least (2 out of 20).

TABLE 7. Mean characteristics of the poor households for each equivalence-adjusted (EA) welfare measure, Family Income and Expenditure Survey 2018

	EA gross income	EA disposable income	EA consumption
EA gross income (Php)	39,223	39,789	45,913
EA disposable income (Php)	38,489	38,126	44,979
EA consumption (Php)	34,822	35,145	31,216
Household characteristics			
Household head with job or business	83.61%	83.06%	83.65%
Household head with college degree	0.86%	0.96%	0.76%
Experienced hunger	6.29%	6.30%	6.07%
Own house	60.75%	60.93%	61.62%
Single family with own house	45.05%	44.96%	44.23%
Number of persons per bedroom	3.78	3.74	3.74
Strong roof	78.56%	78.73%	78.05%
Strong wall	64.37%	64.77%	62.55%
Improved sanitation facility	76.04%	76.26%	75.69%
Improved water source	83.09%	83.36%	82.43%
With electricity	77.97%	78.16%	76.52%
Owns a television	48.36%	48.64%	45.50%
Owns a refrigerator	7.07%	7.56%	7.08%
Owns a washing machine	6.23%	6.61%	4.73%
Owns an airconditioning unit	0.29%	0.38%	0.25%
Owns a car, van, or jeep	0.19%	0.27%	0.20%
Owns a landline phone	0.55%	0.58%	0.59%
Owns a cellular phone	68.28%	68.23%	67.46%
Owns a computer	1.27%	1.43%	1.31%
Owns a stove	2.00%	2.13%	1.59%

TABLE 8. Mean characteristics of households by poverty status (EA gross income poor and EA disposable income poor), Family Income and Expenditure Survey, 2018

	Both EA gross income and EA disposable income poor	EA gross income poor only	EA disposable income poor only	Neither EA gross income nor EA disposable income poor	+ favors gross income
EA gross income (Php)	38,874	48,792	64,811	150,271	
EA disposable income (Php)	38,123	48,528	38,210	143,920	
EA consumption (Php)	34,629	40,104	49,242	93,872	
Household characteristics					
Household head with job or business	83.5%	85.9%	70.2%	79.5%	-
Household head with college degree	0.9%	1.1%	3.8%	13.1%	+
Experienced hunger	6.3%	5.3%	5.7%	2.1%	+
Own house	60.7%	62.2%	67.3%	70.7%	+
Single family with own house	44.9%	48.0%	45.3%	48.5%	-
Number of persons per bedroom	3.8	3.7	2.7	2.7	+
Strong roof	78.3%	84.7%	89.5%	95.3%	+
Strong wall	64.1%	70.9%	82.3%	91.1%	+
Improved sanitation facility	75.8%	83.6%	89.8%	94.8%	+
Improved water source	83.0%	84.9%	92.7%	95.7%	+
With electricity	77.7%	84.6%	90.1%	95.3%	+
Owns a television	47.9%	60.4%	68.4%	86.5%	+
Owns a refrigerator	7.0%	8.8%	22.9%	51.3%	+
Owns a washing machine	6.1%	8.8%	19.6%	49.8%	+
Owns an airconditioning unit	0.3%	0.2%	2.8%	15.9%	+
Owns a car, van, or jeep	0.2%	0.0%	2.3%	9.6%	+
Owns a landline phone	0.6%	0.6%	1.3%	8.2%	+
Owns a cellular phone	67.9%	77.9%	76.3%	91.0%	-
Owns a computer	1.3%	1.2%	5.7%	23.5%	+
Owns a stove	2.0%	2.7%	6.6%	17.9%	+
Unweighted number of households	21,887	729	746	124,355	
Weighted number of households	2,965,225	108,160	108,372	21,565,417	
Share of weighted households	11.98%	0.44%	0.44%	87.14%	

TABLE 9. Mean characteristics of households by poverty status (EA gross income poor and EA consumption poor), Family Income and Expenditure Survey, 2018

	Both EA gross income and EA consumption poor	EA gross income poor only	EA consumption poor only	Neither EA gross income nor EA consumption poor	+ favors gross income
EA gross income (Php)	37,273	43,375	64,304	154,202	
EA disposable income (Php)	36,588	42,536	62,841	147,485	
EA consumption (Php)	30,247	44,562	33,278	96,731	
Household characteristics					
Household head with job or business	82.8%	85.3%	85.4%	79.2%	+
Household head with college degree	0.6%	1.5%	1.1%	13.6%	-
Experienced hunger	6.9%	5.1%	4.4%	2.0%	+
Own house	60.2%	61.8%	64.5%	71.0%	+
Single family with own house	44.3%	46.6%	44.1%	48.7%	-
Number of persons per bedroom	3.9	3.6	3.5	2.7	+
Strong roof	75.6%	84.9%	83.3%	95.9%	-
Strong wall	60.0%	73.7%	68.0%	92.1%	-
Improved sanitation facility	73.1%	82.2%	81.1%	95.5%	-
Improved water source	81.0%	87.5%	85.4%	96.1%	-
With electricity	73.9%	86.6%	82.1%	95.9%	-
Owns a television	41.3%	63.4%	54.4%	87.9%	-
Owns a refrigerator	5.1%	11.3%	11.4%	53.0%	+
Owns a washing machine	3.8%	11.4%	6.7%	51.7%	-
Owns an airconditioning unit	0.2%	0.5%	0.4%	16.6%	-
Owns a car, van, or jeep	0.1%	0.4%	0.4%	10.0%	+
Owns a landline phone	0.5%	0.7%	0.8%	8.5%	-
Owns a cellular phone	63.4%	78.6%	76.0%	91.6%	-
Owns a computer	0.9%	2.1%	2.2%	24.4%	+
Owns a stove	1.2%	3.7%	2.4%	18.6%	-
Unweighted number of households	15,547	7,069	7,545	117,556	
Weighted number of households	2,091,120	982,264	982,377	20,691,412	
Share of weighted households	8.45%	3.97%	3.97%	83.61%	

Table 8 presents the comparison between EA gross income and EA disposable income while Table 9 compares EA gross income and EA consumption. Results when the welfare measures are adjusted for economies of scale are similar to when per capita welfare measures are used albeit with stronger consequences. Compared to an EA gross income measure, EA disposable income is not able to capture more deprived households (3 out of 20 indicators) while EA consumption still provides a better

measure to capture the deprived households (13 out of 20 indicators). Whether welfare is adjusted per capita or using the 3-parameter scale, a consumption-based measure is able to identify more deprived households compared to when an income-based measure is used.

8. Comparing PC gross income poor and EA consumption poor.

We extend our analysis and compare the characteristics of the poor under the PC gross income measure and the poor households under EA consumption. To do this, we first follow the same method used in the previous section and compare households who are poor under only 1 welfare measure. Secondly, we decompose the mean differences across welfare measures to isolate 2 effects: the economies of scale effect or the impact of changing from PC gross income to EA gross income and the change in welfare aggregate effect or the impact of changing from EA gross income to EA consumption.

When EA consumption is used as an alternative welfare aggregate to PC gross consumption, around 1.3 million households (5.11 percent) from being poor would become non-poor while another 1.3 million households would be categorized as poor from non-poor. This is a rather large number and thus making the decision to shift from PC gross income to EA consumption an important consideration. In terms of identifying deprived households, EA consumption provides a better measure in capturing the deprived households in 17 out of the 20 indicators presented in Table 10. However, it is important to note that the 3 indicators where PC gross income seem to overtake EA consumption are house ownership, single family-owned house, and number of persons of bedroom may not be robust indicators of the poor, particularly in the Philippines. For example, the Philippines is known to have household consisting of extended families regardless of income status particularly for families who takes care of their elderly parents. Thus, more investigation should be done to make guarantee that a PC gross income measure is more suitable in identifying deprived households under these indicators.

TABLE 10. Mean characteristics of households by poverty status (PC gross income poor and EA consumption poor), Family Income and Expenditure Survey, 2018

	Both PC gross income and EA consumption poor	PC gross income poor only	EA Consumption poor only	Neither PC gross income nor EA consumption poor	+ favors gross income
EA gross income (Php)	37,503	47,599	57,940	154,990	
EA disposable income (Php)	36,890	46,825	56,546	148,214	
EA consumption (Php)	30,211	45,808	32,652	97,147	
Household characteristics					
Household head with job or business	87.3%	90.7%	78.4%	78.7%	-
Household head with college degree	0.6%	1.5%	1.0%	13.7%	-
Experienced hunger	6.9%	4.8%	4.9%	2.0%	-
Own house	59.3%	59.6%	64.9%	71.3%	+
Single family with own house	41.3%	41.7%	48.4%	49.1%	+
Number of persons per bedroom	4.4	4.6	2.8	2.6	+
Strong roof	75.7%	85.2%	81.4%	96.0%	-
Strong wall	60.2%	75.6%	65.8%	92.2%	-
Improved sanitation facility	72.8%	82.5%	79.8%	95.6%	-
Improved water source	80.8%	87.7%	84.8%	96.2%	-
With electricity	74.9%	88.3%	78.8%	95.9%	-
Owns a television	44.3%	67.9%	47.2%	88.0%	-
Owns a refrigerator	5.4%	12.6%	9.5%	53.5%	-
Owns a washing machine	4.3%	14.3%	5.4%	52.0%	-
Owns an airconditioning unit	0.3%	0.6%	0.2%	16.8%	-
Owns a car, van, or jeep	0.1%	0.3%	0.3%	10.1%	-
Owns a landline phone	0.5%	0.7%	0.7%	8.7%	-
Owns a cellular phone	69.1%	84.7%	65.1%	91.4%	-
Owns a computer	1.1%	2.6%	1.7%	24.7%	-
Owns a stove	1.4%	4.3%	1.9%	18.7%	-
Unweighted number of households	13,540	8,844	9,552	115,781	
Weighted number of households	1,808,744	1,264,718	1,264,754	20,408,958	
Share of weighted households	7.31%	5.11%	5.11%	82.47%	

TABLE 11. Decomposition of differences in welfare measures as captured by their effects on mean household characteristics of the poor, Family Income and Expenditure Survey, 2018

	PC gross income poor	EA consumption poor	PC gross income to EA consumption	Equivalence scale effect (PC gross income to EA gross income)	welfare measure effect (EA gross income to EA consumption)
EA consumption (Php)	36,308	31,216	-5,092	-1,486	-3,606
Household Characteristics					
Household head with job or business	88.69%	83.6%	-5.04%	-5.08%	0.04%
Household head with college degree	0.97%	0.8%	-0.21%	-0.10%	-0.11%
Experienced hunger	6.06%	6.1%	0.01%	0.23%	-0.22%
Own house	59.46%	61.6%	2.16%	1.30%	0.86%
Single family with own house	41.46%	44.2%	2.77%	3.59%	-0.82%
Number of persons per bedroom	4.49	3.7	-0.75	-0.71	-0.04
Strong roof	79.61%	78.0%	-1.57%	-1.05%	-0.51%
Strong wall	66.54%	62.5%	-4.00%	-2.17%	-1.82%
Improved sanitation facility	76.78%	75.7%	-1.09%	-0.75%	-0.35%
Improved water source	83.60%	82.4%	-1.18%	-0.52%	-0.66%
With electricity	80.40%	76.5%	-3.87%	-2.43%	-1.44%
Owns a television	53.99%	45.5%	-8.49%	-5.64%	-2.86%
Owns a refrigerator	8.36%	7.1%	-1.28%	-1.29%	0.01%
Owns a washing machine	8.42%	4.7%	-3.70%	-2.20%	-1.50%
Owns an airconditioning unit	0.41%	0.3%	-0.16%	-0.13%	-0.04%
Owns a car, van, or jeep	0.22%	0.2%	-0.02%	-0.03%	0.01%
Owns a landline phone	0.62%	0.6%	-0.03%	-0.07%	0.04%
Owns a cellular phone	75.53%	67.5%	-8.07%	-7.24%	-0.83%
Owns a computer	1.68%	1.3%	-0.37%	-0.41%	0.04%
Owns a stove	2.57%	1.6%	-0.98%	-0.57%	-0.40%

We decompose the impact of a shift from PC gross income to EA consumption to isolate the effect of changing equivalence scales and changing welfare measures. In Table 11, columns 1 and 2 present the averages of the poor's household characteristics under PC gross income and EA consumption, respectively. Column 3 provides the impact on the averages when changing from PC gross income to EA consumption. While columns 4 and 5 decompose this impact to show the effect of changing equivalence scales and welfare measures. The results show a large equivalence scale effect when moving from PC gross income to EA consumption. For example, capturing more unemployed household heads when using EA consumption compared to PC gross income is due to the equivalence scale effect alone. This finding is true for the 5 other well-being indicators. However, as seen in the last column, there is still value in changing from income to consumption as a welfare measure in poverty estimation as consumption is able to capture more deprived households than income.

Conclusion

There are 2 pieces of information needed for poverty estimation: the poverty threshold and the welfare measure. This study explored the latter. In particular, it investigated and compared the use of disposable income and consumption to the official gross income measure being used in the Philippines. Our results suggest that while disposable income is no better than gross income in identifying the deprived, there is sufficient evidence to conclude that using a consumption-based welfare measure is better than a gross income-based measure in classifying the poor. Out of the 20 household characteristics used, a consumption-based measure will identify more deprived households in 15 indicators. The study also provided evidence on the impact of accounting for household composition in poverty measurement. Results show that adjusting household income using a 3-parameter equivalence scale is better than using per capita measure in identifying the poor. But this adjustment does not diminish the impact of changing the welfare aggregate from income to consumption. An equivalence-adjusted consumption is still a better measure than equivalence-adjusted income in poverty estimation.

The Philippine Republic Act No. 11291, also known as an act providing for a magna carta of the poor states that the "poor shall refer to individuals or families whose income falls below the poverty threshold as defined by the National Economic and Development Authority (NEDA) and/or who cannot afford in a sustained manner to provide their minimum basic needs of food, health, education, housing, or other essential amenities of life". This means that by law, income should be taken into consideration when estimating poverty in the Philippines. While the law did not state how income should be measured, the Philippines uses gross income in the estimation of official poverty statistics. It is suggested, however, that taxes and compulsory social security contributions be deducted in the income aggregate in estimating poverty. This deduction results in disposable income which is a better measure of household's resource available for consumption. Furthermore, it is essential to take into consideration the diverse needs of household members through the use of equivalence scales. How imputed rent is estimated should also be explored if rent is accurately calculated.

Based on the results of this study, a supplemental poverty measure using a consumption aggregate is suggested. To do this, the FIES questionnaire should be modified to capture the current value of durable goods and provide more detailed information on a household's medical expenses.

Given the multidimensionality of poverty, identifying who is income poor is not enough to distinguish the deprived households and individuals. This is of critical importance, especially during the current pandemic. The last time an official poverty estimate was released was in 2018; the next release will be in 2021. Using income aggregates as a measure of household welfare in 2021 might not be enough since it will fail to capture the income shocks that happened in the households the previous year. On the other hand, consumption would be a better long-run measure of welfare since it could capture the changes in habits and expenditures of households brought by the recent pandemic.

The next round of FIES set in 2021 is a good period to explore the use of consumption aggregates to supplement the current poverty methodology. According to the law, the PSA can only adopt a new poverty methodology at the start of a new administration to ensure that poverty estimates is comparable for the whole term. A new term is expected in 2022 and this gives the PSA ample time to explore and improve on how the Philippines measure poverty.

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