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AN EXAMINATION OF METHODS TO ESTIMATE POVERTY LINES IN INDONESIA

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Abstract

The first objective of this paper is to set out a new approach for estimating regional poverty lines in Indonesia. The approach is referred as a utility-consistent poverty line (UCPL) approach. It is based on a theory of price index or cost of living index (COLI). The second objective is to examine the development of methods for estimating poverty lines in general and methods used to estimate regional poverty lines in Indonesia. The survey focuses on comparing these methods with UCPL approach. The paper finds out that the existing methods used to estimate poverty line in Indonesia are not able to generate utility-consistent poverty lines.

Keywords: Poverty line, spatial cost of living, food energy intake, ravallion method
JEL classification numbers: I32, I38

Abstrak

Tujuan pertama dari makalah ini adalah membangun sebuah pendekatan baru untuk menaksir garis kemiskinan daerah di Indonesia. Pendekatan ini disebut sebagai pendekatan *Utility Consistent Poverty Line* (UCPL). Pendekatan ini mengambil dasar teori indeks harga atau *cost of living index* (COLI). Tujuan kedua adalah menguji pengembangan dari metode tersebut untuk memperkirakan garis kemiskinan secara umum dan juga untuk memperkirakan garis kemiskinan daerah di Indonesia. Penelitian ini berpusat pada pembandingan metode tersebut dengan pendekatan UCPL. Makalah ini menemukan bahwa metode yang selama ini digunakan untuk memperkirakan garis kemiskinan di Indonesia tidak mampu menghasilkan garis kemiskinan yang konsisten dengan utilitas.

Keywords: Garis kemiskinan, biaya hidup spasial, asupan makanan untuk energi , metode ravallion
JEL classification numbers: I32, I38

INTRODUCTION

The oldest method for estimating poverty line is the one used by Rowntree back in 1901 when he studied poverty in York (Rowntree, 1902). This is called the basic needs approach. This approach defines poverty as the lack of command over the consumption goods needed to maintain 'physical efficiency', namely the ability to undertake manual labour. A variation of this basic needs approach was applied in the US by Orshansky (1963; 1965; 1969).

Another populer method is the Food Energy Intake (FEI) method. The idea of this method is to set the poverty line equal to the average total expenditure (food and non-food) of people who consume the minimum calories requirement – say 2100 calories/day. The poverty line is the total expenditure level at which 2,100 calories/day is achieved. A higher expenditure level is associated with a higher energy intake level, but at lower increasing rates. This change reflects both Engel's law and also the difference in the source of calories across different level of expenditure. Rich-

er households spend more on food than poor ones, but the share of food in total spending is lower for the rich than the poor. In addition, richer households get the calories intake from more expensive foods. With some variations this method has been applied in many countries - such as in Indonesia by Indonesia Central Bureau of Statistics (BPS) (2003b; 1999), Mozambique (Tarp et al., 2002), Kenya (Greer and Thorbecke, 1986), the Indian state of Punjab (Paul, 1989), and so forth.

A method for estimating poverty line that has been becoming popular in poverty study in Indonesia is the Ravallion method. This method was applied by many researchers such as Ravallion and Bidani (1994), Pradhan et al. (2001; 2000). The Ravallion method is a refinement of previous methods, i.e. food energy intake and basic needs method. In addition to the Ravllion method, another method has also been applied for poverty measurement in Indonesia, i.e., the official method. The latter method basically is a food energy intake method. These methods will be explored further in the following section.

The objective of this paper is to set out a new approach to estimate poverty lines in Indonesia. The approach is referred as a utility-consistent poverty line (UCPL) approach. This approach is based on a theory of price index or cost of living index (COLI) and derived from an expenditure function. Based on this approach, this paper analyzes the methods of estimating poverty lines that have been used for Indonesia from 1987 to 2002: the official methods and the Ravallion lower poverty line method. The latter method has been widely applied for Indonesia. The analysis focuses on whether these methods generate utility consistent poverty lines.

METHODS

This study applies comparative approach to analyse the existing methods of estimating poverty lines in Indonesia, i.e., BPS methods and the Ravallion Lower Poverty Line method. The benchmark method is the UCPL approach and the development of estimating poverty line methods. Sources of data (documents) will be indicated through out the explanation.

Derivation of the Utility-consistent Poverty Line (UCPL) Method

This section sets out the UCPL approach through definition of a true cost of living index (COLI), followed by the discussion of the development of estimating poverty line methods. A poverty line is one point in an expenditure function evaluated at a certain utility level and at existing market prices. Let the poverty line for base region be:

$$PL_0 \equiv z_0 = e(p_0, \bar{u}) \tag{1}$$

By definition, the ratio of a poverty line in region 1 to a poverty line in some base region is a true COLI, which is defined as the ratio of two values of an expenditure function evaluated at two different price sets: p^1 and p^0 (see for example, Kakwani and Hill, 2002) :

$$\frac{z^1}{z^0} = \frac{e(p^1, \bar{u})}{e(p^0, \bar{u})} \equiv P(p^1, p^0; \bar{u}) \tag{2}$$

where p is a price set, $\bar{u}$ is a fixed utility level, so that $e(.)$ is an expenditure function.

The true COLI can be illustrated in Figure 1. Suppose there are two goods: *X*, depicted at the horizontal line, and *Y*, depicted at the vertical line. The price of *Y* is normalized to 1. This normalization gives an advantage, namely the point where the budget line crossing at the vertical line represents the level of income in terms of good *Y*. The relative price in the base region is p^0 and the optimum bundle is q^0 generating utility level u^0. The minimum expenditure level corresponding to this price and utility level is given by $e(p^0, u^0)$.

Let the price in region 1 be higher than in the base region, so that the relative price in region 1 is p^1. The minimum expenditure level to achieve the initial level of utility increases to $e(p^1,u^0)$. With this relative price, and after rearranging the goods purchased, consumers in region 1 choose the optimal bundle at point *B*. So, the true COLI is given by the ratio of these two values of expenditure function: $e(p^1,u^0)$ to $e(p^0,u^0)$.

Equation 2 is the ideal way to measure the COLI and is done via estimating a system of demand equations. This is ideal since it can capture the substitution effect generated by price changes, i.e., from point q^o to *B*.

However, this is not a practical way to construct COLI since it requires estimated parameters of the minimum expenditure function (which in turn depend on the functional form of the utility) and a system of demand equations. A different functional form will generate different parameters. The number of parameters that must be estimated in a full demand system rises with the square of (one less than) the number of commodities and quickly becomes impossible to implement at any detailed level of disaggregation (Boskin et al. 1998, p.7). In addition, it requires a great deal of data if generality is to be preserved and even if these are available, the results do not always match the theoretical preconception.

Another way to construct COLI, but with less data, is required (see for example, Aizcorbe and Jackman, 1993; Boskin et al., 1998; Moulton, 1996). In doing this, the ratio of two poverty lines as in equation 2 is best approximated by a Laspeyres price index,[1] which requires a price and the corresponding quantity sets in the base region and the price sets for another region, i.e., p^0, q^0 and p^1, q^0. The index does not require specification of functional forms of the utility and system of demand equations.

$$\frac{z^1}{z^0} \cong \frac{p^1 q^0}{p^0 q^0} \equiv P(p^1, p^0; q^0) \qquad (3)$$

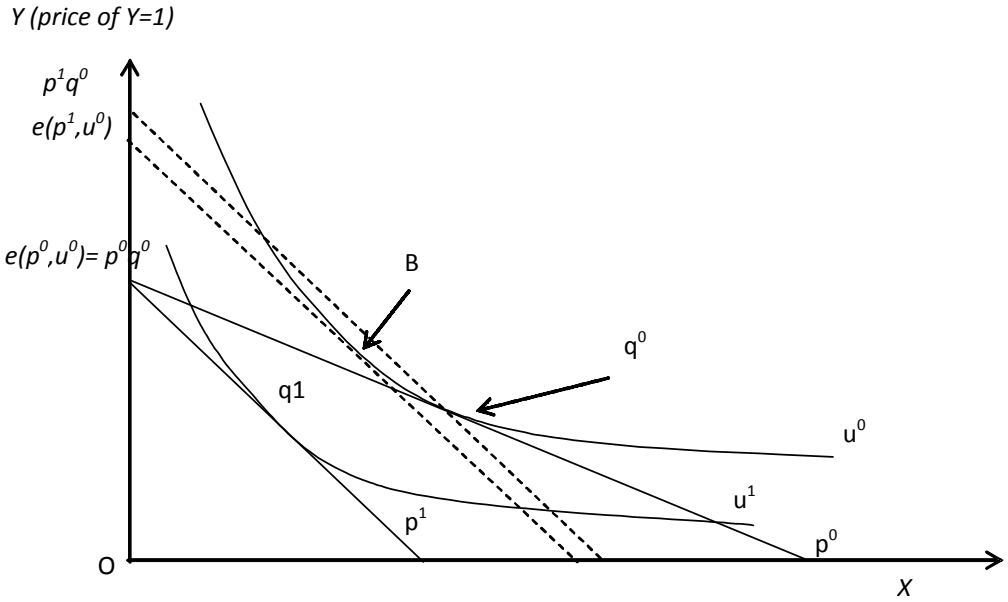

Figure 1: Two Approaches for Estimating COLI

[1] An index proposed by Laspeyres in 1871. Price indices were in use long before that, with the first price index proposed by Dutot in 1738.

In small changes, the Laspeyres price indices give the same answer as the true COLI. In finite changes, it would be necessary to add up the sequence of changes implied by these indices. This procedure yields what is known as a Divisia index. Rebasing every period gives a good approximation.

In short, as can be seen from equation 3, the main feature of this approach is that once one poverty line has been calculated for the reference region, the poverty lines for the remaining regions (that consistent with the poverty line in the first region in terms of utility) must be estimated using spatial price indices (referred as SCOLI) for the corresponding regions. Another feature is that the types and quantities of commodities in the bundle to calculate the SCOLI are *fixed* across the regions being compared. By this approach, the utility function of all persons in the population is assumed to be identical otherwise any welfare comparisons cannot be made.

The Development of Estimating Poverty Line Methods

This section explores further the common methods used to estimate the absolute poverty line. It starts with a discussion of the oldest method, i.e., the basic needs methods and its variation. The next method discussed is the food energy intake method. The last two methods discussed are Ravallion's lower poverty line (LPL) and upper poverty line (UPL).

The Basic Needs Method

The main feature of this method is the list of quantities and types of food and non-food regarded as basic needs, applied for every individual. Basically, there two steps estimating a poverty line based on basic needs are. Fist, Estimating the cost of the food basket required to meet the minimum energy requirement. Rowntree assumed a person had to consume 3500 calories including 125 grams of fat. This energy requirement was translated into daily meals (breakfast, dinner, and supper) over a week. For example, breakfast on Sunday consisted of bread (8 oz.), margarine (0.5 oz.) and tea (1 pt.) (Rowntree, 1902). Rowntree utilized Atwater's standard nutrition to select the types and quantities of food items in order to provide the required physical efficiency. These requirements had to be fulfilled for individuals to be out of poverty. Nevertheless, the choices of food types and quantities were somewhat arbitrary.

Second, An allowance for non-food expenditure was added. Only two main items were included in the non-food expenditure: house rents and household sundries. Household sundries included all necessary expenditure other than for food and house rents, the main items being boots, clothes, and fuel. His choice of non-food was more arbitrary than the choice for basic food needs. He seemed not to include expenditure for health, education, and transportation and so forth in basic non-food needs.

Orshansky (1963; 1965; 1969) approached the determination of non-food basic needs differently. Instead of determining quantity and type of non-food, she applied a 'food-share' method to reveal the poverty line, i.e., the food poverty line (FPL) divided by the food-share, which was assumed to be 1/3. The food share estimate was based on average food expenditure across the whole population of the United States (Orshansky, 1963). This approach offers a more simple procedure for revealing the poverty line and is easier to implement in practice. In particular, it can be implemented even in the absence of data on non-food prices.

The food-share method could be a solution to the arbitrariness of estimating non-food needs. However, as pointed out by Ravallion and Bidani (1994), it can result in an inconsistent poverty line. If the food share in each region is estimated as

the share of, say, the poorest 20 per cent of people in that region then the resulting poverty line will be biased upwards in relatively rich regions. The reason is that the poorest 20 per cent of people in a rich region will have a smaller food share than the poorest 20 per cent in a poor region. Of course this criticism does not apply to Orshansky's study since she used one single food share – the national average – for all regions. However, her method is biased unless the relative prices of food and non-food are constant (Kakwani, 2003).

Food Energy Intake (FEI) Method

As mentioned in the previouse section, the poverty line in this method is defined as the total expenditure level, at which 2,100 calories/day is achieved. This implies that a higher expenditure level is associated with a higher energy intake level, but at lower increasing rates. This method could be a solution to the 'arbitrariness' of the choice of necessities for both food and non-food. It is a simpler method of estimating a poverty line and requires less data than the full basic needs method. The FEI method does not require a list of food or non-food items in order to get the total expenditure. Another attraction of this method is that it does not require price data, which is often a major problem in developing countries.

The defects of the FEI method were discussed in detail in Bidani and Ravallion (1993), Ravallion and Bidani(1994), and Kakwani (2001). At any given total expenditure level, the food energy intake for households in rural areas tends to be higher than for households in urban areas. The sources of calories intake of households in urban areas are from more expensive items than those in rural areas. For instance, households in urban areas may consume beef as a source of protein in a larger quantity per capita than in rural areas. Conversely, households in urban areas may consume cassava as a source of carbohydrate in a smaller quantity than in rural areas. Therefore, for a given energy intake of 2100 calories/day the expenditure of households in urban areas may substantially higher than households in rural areas. That is, the urban-rural gap of poverty line is much larger than price differentials.

Distribution margins of the commodities from rural to urban areas may explain the source of calories intake pattern between urban and rural areas. It makes the relative prices of cheaper (cassava) and more expensive (meat) sources of calories diverge less in urban than in rural areas. For example, suppose the prices of cassava and meat in rural areas are Rp 1 thousand/kg and Rp 10 thousand/kg, respectively, the price of cassava in rural areas is 10% of meat. Assuming the cost of transportation/kg from rural to urban areas is Rp 0.5 thousand/kg, the prices of cassava and meat in urban areas will be Rp 1.5 thousand/kg and Rp 10.5 thousand/kg, respectively. The price of cassava is now 14% of meat (expensive source of calories), which means the relative price of cassava is more expensive in urban than in rural areas. Therefore, urban people get more of their calories from expensive calorie sources (meat) than rural people.

The Ravallion Methods: Lower and Upper Poverty Lines

Ravallion (1994) proposed two methods for estimating poverty lines when data on non-food prices in different regions are not available, or at least are imperfect, as in Indonesia. Both methods were a refinement of the basic needs methods of Rowntree and Orshansky as explained by Ravallion and Bidani (1994). Both methods start from a food poverty line, FPL, which is estimated in the same way as the food component of the utility consistent poverty line used in this paper. That is, the shares of the various food items are held constant in comparisons across regions and based on the average expenditure patterns of households deemed to be poor.

The fixed food bundle in the Ravallion FPL is an improvement on the FEI method adopted by BPS to estimate regional FPLs. The bias of FEI due to the difference in source of calories is eliminated in the fixed bundle in the Ravallion FPL. However, if there was only one type of food, Ravallion's method would be equivalent to the FEI. BPS seems to have partially adopted the Ravallion method in the BPS-2 method. The Ravallion poverty line also reduces the bias in 'food-share' method of Orshansky. The critical issue in food-share method is which food share should be used to reveal the poverty line. The use of mean share across population as in Orshansky was rather rough. At this point Ravallion makes an improvement to Orshansky's method. Ravallion applies an Engel equation to reveal the food-share in each region so that he is able to adjust the food-share with the impacts of some variables that affect the food share.

The following details Ravallion's two methods and explains how and why they differ. Ravallion's lower poverty line (LPL) is given by the formula:

$$LPL = (2 - \alpha_L) FPL \tag{4}$$

and his upper poverty line (UPL) is given by the formula:

$$UPL = \frac{FPL}{\alpha_U} \tag{5}$$

where α_L and α_U are the shares of food in the total spending of two representative individuals, referred to here as Ms L and Mr U. See Figure 2 and the following explanation.

Mr U's total expenditure on food is equal to the FPL and the share of food in his total spending is α_U. His total expenditure, Y_U, is therefore:

$$Y_U = FPL / \alpha_U \tag{6}$$

This provides the rationale for Ravallion's UPL. That is, the level of expenditure at which the representative person buys enough food to get 2100 calories/day.

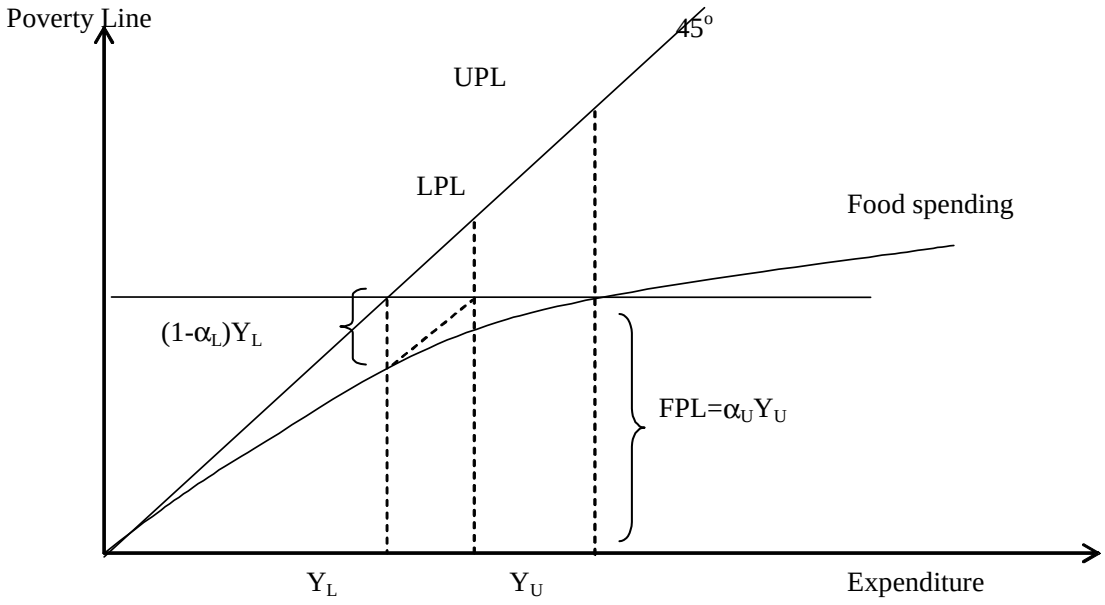

Figure 2: The Lower and Upper Poverty Line of the Ravallion Methods

Ms. L is substantially poorer than Mr. U and only has enough expenditure in total to buy the FPL:

$$Y_L = FPL \quad (7)$$

Since she consumes some non-food items her expenditure on food is less than FPL and she therefore consumes less than 2100 calories/day. The share of food in her total expenditure is α_L and the share of her total spending that goes on non-food is therefore $(1-\alpha_L)$. Her total expenditure on non food items is $(1-\alpha_L)Y_L$. The Ravallion LPL is got by adding Mr U's expenditure on food, $\alpha_U Y_U$, to Ms L's expenditure on non-food, $(1-\alpha_L)Y_L$:

$$LPL = \alpha_U Y_U + (1-\alpha_L)Y_L \quad (8)$$

Using equations 6 and 7, this can be rearranged to give Ravallion's LPL formula:

$$LPL = FPL + (1-\alpha_L)FPL = (2-\alpha_L)FPL \quad (9)$$

The Ravallion LPL method has been widely used in poverty measurement studies in Indonesia. Apart from Bidani and Ravallion (1993) and Ravallion and Bidani (1994), the LPL method was also applied by Pradhan et al. (2001; 2000), Suryahadi et al. (2000), Alatas (2000), and Ikhsan (1999). The latter (Ikhsan 1999) also used the UPL method.

RESULTS DISCUSSION

Indonesian Poverty Lines: Are They Utility-Consistent?

This section analyses the poverty lines that have been used for Indonesia including the official method (BPS). The analysis focuses on whether estimated poverty lines during the period 1987 to 2002 are utility consistent and focuses on the BPS and Ravallion LPL methods.

BPS Methods

Discussion on the BPS methods focuses on poverty lines at the provincial level. In the six Susenas (*Survei Sosial-Ekonomi Nasional*, National Socio-Economic Survey) years (i.e., 1987, 1990, 1993, 1996, 1999, and 2002), BPS has applied five different methods for estimating poverty lines, which are referred to here as BPS-1, BPS-2, BPS-3, BPS-4, and BPS-5. The next subsection looks at one feature that distinguishes all the BPS methods from the UCPL method. That is, in each Susenas year, the quantities of items for estimating both the food poverty line (FPL) and non-food poverty line (NFPL) are variable across urban or rural areas and provinces in the BPS method, whereas these quantities are fixed in the Laspeyres price index used by the UCPL method.

BPS estimates regional poverty lines in two steps, i.e., estimating food poverty lines and estimating non-food poverty lines for each reagion. The poverty line for each region is the summation of the two lines. The analysis focuses only on the estimating method for food poverty line.

BPS-1 (1987, 1990): Food Energy Intake (FEI) Method

The FPL in each region is the average monthly per capita expenditure (PCE) on all food items of a 'reference population' *in that region*, multiplied by the ratio of 2100 to the average per capita daily calorie intake of the same group. The definition of the reference population has changed over. The scaling ratio ensures the FPL in each region is the cost per month of a quantity of food that provides 2100 calories per person/day.

BPS-2 (1993), BPS-3 (1996), BPS-4 (1996, 1999): FEI Method [2]

The FPL in each region is the average monthly PCE on some '***selected***' food

[2] Note that both FEI methods were applied in 1996.

items of a '***reference population***' *in that region*, multiplied by the ratio of 2100 to the average per capita calorie intake of the same reference group of people from the same selected group of food items. Both *the composition* of selected items and *the definition* of the reference population changed over time and across provinces, as explained below. As in the case of BPS-1, the scaling ratio ensures the FPL in each region is the cost per month of a quantity of food that provides 2100 calories per person/ day. The selected items were the ones consumed by the majority of the reference population (BPS, 1999). The luxury (expensive) foods, such as imported rice, beef, lamb, *ikan bandeng* (milkfish), and so on were also included in the selected items. In contrast, corn flour, wheat flour, potatoes, dried cassava, and so on, which were consumed by a small number of the reference population, were excluded from the selected items. Since luxury foods were still in the bundle, one of the biases inherent in the FEI method was also still there. That is, it produces a relatively high poverty line in regions where there is significant consumption of foods that are a very expensive source of calories. Also, since the *composition* of the food bundle varies from region to region, the objection of the UCPL approach and Ravallion method (Bidani and Ravallion 1993) to the BPS-1 method was still valid for the BPS-2, BPS-3, and BPS-4 methods.

BPS-5 (2002): FEI Method

In the explanation of BPS-5, BPS acknowledged the FPLs in the previous methods were not comparable across regions (BPS 2003b, p.5) and addressed this problem. The following steps were taken by BPS to estimate the FPL in BPS-5 so that the FPL are claimed to be comparable across regions. First, BPS estimated the distribution of the *real* PCE of households in every region using a price deflator for each region. Second, BPS chose the reference population and determined the '***selected***' food items. Third, the FPL for each region was then estimated in the same way as in previous methods. The FPL in each region in the BPS-5 method is the average monthly *real* PCE (rather than *nominal* PCE as in previous methods) on some '***selected'*** food items of a 'reference population' *in that region*, multiplied by the ratio of 2100 to the average per capita calorie intake of the same reference group of people from the same selected group of food items. Finally, the estimated poverty lines are compared with real PCE to get the poverty indicators.

According to BPS, the use of real PCE to determine the reference population was to eliminate the effect of difference in the level of expenditure (income) to the selected food items and FPL. In doing so, the difference in the composition of selected food items and therefore in the FPL in each region was not due to difference in the level of expenditure (income), but to difference in preferences and prices (BPS 2003b).

The objection of the UCPL approach and Ravallion methods to the BPS-1 through to BPS-4 methods was not addressed in the BPS-5 method. The composition of selected food items in the BPS-5 method still varied across regions. Furthermore, the differences in preferences of households across regions adopted by BPS were in contrast with the UCPL approach. As mentioned at the end of Section UCPL Method, to get consistent poverty lines across regions, the UCPL approach takes an identical preference across all households.

The Ravallion Lower Poverty Line (LPL) Method

As mentioned, the Ravallion LPL method has been very popular for poverty studies in Indonesia. Studies applying this method are Bidani and Ravallion (1993), Ravallion and Bidani (1994), Pradhan et al. (2001; 2000), Suryahadi at al. (2000; 2003), and Alatas

(2000), and Ikhsan (1999) who also applies the Ravallion UPL. It should be noted that although these studies use the Ravallion LPL, each study determined the reference household differently. Detailed below are the steps applied by Bidani and Ravallion in 1990 - the first poverty study in Indonesia applying the LPL method.

The FPL for each region can be written as:

$$FPL_j = \sum_{i=1}^{31} p_{i,j} q_i \left(\frac{2{,}100}{k} \right) \qquad (10)$$

where i is food item = 1, 2, .., 31; j is a region (urban Aceh, rural Aceh, etc.), j = 1, 2, …, 50 (all Indonesian regions except East Timor and rural Irian Jaya); FPL_j is the food poverty line in region j; $p_{i,j}$ is the price of food item i at the relevant region; k is the total calorie intake obtained from the 31 selected food items; q_i is the quantity of food item i and is nationally fixed across all regions. It was derived from the lowest 15% of nominal PCE distribution in the Susenas 1990.

The food share used to reveal LPL - α_L - was estimated using an Engel equation applied to all households in the Susenas 1990. Some dummy variables were included, such as regional dummy variables to control factors other than regional cost of living.

The FPL of the Ravallion method alone is consistent with the UCPL approach. However, the Ravallion LPL method results in a big difference in poverty lines compared with the UCPL approach. It generates an inconsistent poverty line since it fails to capture regional non-food price differences. The regression to estimate regional food share cannot separate the effect of non-food price from other variables (Kakwani 2001). Kakwani concludes it is essential to construct a cost of living index across regions comprising both food and non-food items in order to obtain consistent poverty lines.

The Implementation of the UCPL Approach

There are two main steps to apply the UCPL approach. First, a level of poverty line in a base region, for which spatial price index is set at 100, must be chosen. The index is referred here as Spatial Cost of Living Index (SCOLI). Second, based on this benchmark poverty line and the index of 100 at the base region, the SCOLI for each other regions is converted into a poverty line.

By these steps, the level of poverty line at the base region might be chosen at any reasonable levels. In other words, the level of poverty line is to some extent arbitrary. The focus of this approach is how to estimate regional poverty lines generating one level of utility, i.e., an identical level of utility, across the relevant regions. The following section explains the arguments for the arbitrariness of poverty line.

The Arbitrariness of Poverty Lines

The level of poverty line is somewhat arbitrary. The arbitrariness of poverty lines is the implication of some issues related to the concept of minimum necessities relating to poverty definition, such as the cut-off for the minimal requirement of nutrition intake. There has been no consensus as to how many calories should be regarded as the minimum. For example, the consensus for the minimum energy requirement in Indonesia has been 2100 calories per capita per day regardless of where the person lives, their age, gender, or occupation. However, Rao of the World Bank (1990) used 2,150 calories for a poverty study in Indonesia in the 1980s. Bangladesh uses 2,122 (Wodon, 1997); India uses 2,435 calories for rural and 2,095 for urban areas; and Thailand uses 2100 to 2787 calories depending on ages and sex (see, Kakwani, 2003). This variability of calorie require-

ments in India and Thailand reflects the notion that, on average, rural people need more energy than urban people because they do more physically demanding work. Males, on average, need more energy than females for similar reasons.

The second issue is how to translate the minimum nutritional requirements to a minimum food requirement. Consumption patterns can vary by region. Therefore, the minimum requirement of nutrition intake based on these consumption patterns could end up in different kind of foods corresponding to these patterns. Clearly, there could be a lot of food combinations that satisfy the same minimal nutrition requirement. This raises the issue of which consumption patterns should be chosen. The third issue is even more difficult. This is to specify the minimum requirement for non-food items.

These critical issues reflect the arbitrariness of any poverty line. The determination of 'how much is enough' in terms of energy requirement, the choice of the kinds of food from the consumption patterns of the society and the choice of what is the minimum quantity of each food, are based on consensus and therefore are more or less arbitrary. Nevertheless, the reasons for choosing what and how much of 'essential' food items are better grounded empirically than for non-food items. For example, Rowtree's food basic needs were based on studies carried out by nutrition experts. However, there is no clear basis for determining what and how much of non-food items should be regarded as 'basic needs'.

The arbitrariness of the poverty lines has been pointed out by many researchers. Among them are Orshansky (1965), Watts (1967), and Ravallion and Bidani (1994). A strong impression of this arbitrariness can be seen in Hagenaars and de Vos (1988). They did a survey of the definition of poverty and analyzed the effect of the different definitions of poverty on poverty incidence.

From any arbitrary levels of poverty line, the basic needs approach picks a certain (a fixed) bundle of goods with certain types and quantities of each good and a certain level of calorie requirement to reflect the absolute poverty line. In doing so, an individual has to consume more than the minimum calorie requirement in order to be non-poor.

In contrast, the UCPL approach taken in this paper is to pick a constant level of utility. This means the notion of minimum calorie intake used in the basic needs approach is not reflected in the expenditure level, since households can make trade offs between food and non-food. Although the household may be able to buy more than the minimum calories it may buy less owing to expenditure on non-food to a relatively large degree.

The Estimated Spatial Cost of Living Index (SCOLI) and Poverty Lines

As explained, to estimate regional poverty lines, the UCPL Approach heavily relies on spatial price index data or Spatial Cost of Living Index (SCOLI). However, the data are not publicly available yet. BPS has indeed estimated a Consumer Price Index (CPI) over a very long period. The CPI is an over-time index, i.e., an index used to estimate price changes in one place (region or city) from one point of time to another point of time. For example, in 2002, the CPI was estimated for each of 43 cities in Indonesia including all provincial capital cities (BPS 2003a). However, a cross-sectional CPI known as a spatial cost of living index, SCOLI, is not calculated by BPS. There are no official explanations as to why SCOLI have not been provided publicly. One of the difficulties might be that the published price data cannot be compared directly possibly because the brand and the quality of the items across cities differ significantly (BPS 1997). More than one decade ago the needs for spatial price index data was already raised. Booth

(1993) and Bidani and Ravallion (1993) have pointed out that the lack of across provinces price indices has clouded poverty analysis in Indonesia. The following are steps to estimate the SCOLI taken from Nashihin (2007).

Firstly, a bundle of consumption good representing consumption patterns of the poor has to be determined. For example, he chose a bundle consumption good consisting of 49 items (31 food and 18 non - food items), which were selected from the consumption pattern of the lowest 30 per cent households by nominal per capita expenditure based on 2002 Susenas. Each of the items was assigned with a proper weight according to the household consumption pattern as recorded in the Susenas. Secondly, regional price data for the chosen items have to be collected. For example, he collected regional price data for the items in the consumption bundle from traditional markets in 20 regions, 10 provinces by urban and rural areas (The list of these regions can be seen at Table 1). These regions were basically selected based on the fact that 75 per cent of the poor in 2002 according to official data lived. Finally, the SCOLI is estimated.

As can be seen from Equation 3, the SCOLI is constructed using Laspeyres price index formulae and is rewritten here as in Equation 4. Let $\overline{p}(i,2002)$ be the simple unweighted average of $p(i, j,2002)$ over the 20 regions. The SCOLI for region *j* in 2002 is given by:

$$P(j,2002) = \alpha\left(\sum_{i=1}^{49} s(i,2002)\frac{p(i,j,2002)}{\overline{p}(i,2002)}\right), \quad \text{for } j = 1, 2,\ldots, 20. \qquad (11)$$

where α is a constant chosen to ensure that the population weighted average of the index in rural areas in the 10 provinces is equal to 100 in 2002; $s(i, 2002)$ is the a weight assigned to item *i* based on the share of item *i* in the total spending of the lowest 30% of households by their per capita nominal expenditure. The estimated SCOLI and regional poverty lines are reported in Table 1.

Table 1: The Estimated SCOLI (Average Rural Areas =100) and Regional Poverty Lines (Rupiah per Capita per Month) in 2002

Provinces [a]	Spatial Cost of Living Index (Average rural areas = 100)[1]		Regional poverty lines (Rp/ capita/ month)	
	Urban	Rural	Urban	Rural
N Sulawesi	121.0	113.6	123,299)[a]	115,758
N Sumatra	111.4	104.8	113,517	106,791
S Sumatra	111.7	104.5	113,822	106,486
W Java	119.4	103.6	121,669	105,568
W Nusa Tenggara	106.4	100.1	108,422	102,002
S Sulawesi	109.7	100.1	111,784	102,002
C Java	102.9	98.4	104,855	100,270
Lampung	107.4	96.8	109,441	98,639
E Java	113.0	94.9	115,147	96,703
S Kalimantan	111.1	94.4	113,211	96,194
Wtg. Avg. 10 prov.	112.8	100.0	114,943	101,900

Notes: (1) [a] Poverty line in the base region is set at the same level as official poverty line for Indonesian rural areas, i.e., Rp 101,900 per capita per month. Poverty line for urban North Sulawesi is estimated as follows: 101,900 multiplied by SCOLI for North Sulawesi and divided by 100, i.e., 101,900*121/100= Rp. 123,299. Likewise, the poverty line for rural North Sulawesi is 101,900*113.6/100= Rp. 115,758. The same procedure applies for other regions. (2) [1] The data is from Table 4.5 in Nashihin (2007)

Table 1 shows the SCOLI for the ten provinces in which the regional price data were collected. It also shows the estimated regional poverty lines for the ten provinces (by urban and rural areas). As shown in the table 1, the SCOLI for urban areas in 2002 was on average 112.8 with a base of rural areas as 100. This means people who lived in urban areas had to spend 12,8 per cent more than ones who lived in rural areas in nominal term. This result is consistent with other studies on urban-rural cost of living differentials.

According to Asra (1999), the cost of living differentials in 1987 to 1996 was estimated at 13-16 per cent and according to a much earlier estimate by Ravallion and van de Walle (1991), it was 10 per cent for 1981. In addition, the result is also broadly consistent with the cost of living differentials implied by other poverty lines studies such as Bidani and Ravallion (1993), which was 18 per cent, and Pradhan et al (2001; 2000), which were between 12 and 17 per cent.

The SCOLI for urban North Sulawesi in 2002 was 121.0, which was the highest SCOLI across the urban areas in the ten provinces. This means that average price in urban North Sulawesi was estimated at 21 per cent higher than the prices in average rural areas (i.e., base region). This implies the estimated poverty line for urban North Sulawesi was also 21 per cent higher than the poverty line for the base region. Likewise, the SCOLI for rural North Sulawesi in 2002 was 113.6, which was also the highest SCOLI across the rural areas in the ten provinces. This implies the poverty line for rural North Sulawesi was 13.6 per cent higher than the poverty line for the base region.

As mentioned in previous section, the poverty line is somewhat arbitrary and any reasonable poverty lines can be picked-up as the benchmark poverty line, for example, official poverty line for average Indonesian rural (or urban) areas, or $ 1 /day, or any other levels. In this approach, the most important step in setting regional poverty lines is that once the poverty line in a base region is estimated, the poverty lines for any other regions have to be estimated using their spatial price indices or SCOLI. In this paper, the chosen level of poverty line in the base region is official poverty line for average rural Indonesia in 2002, i.e., Rp 101,900,- per capita per month. Since the estimated SCOLI for average urban areas was 112.8, the poverty line for urban areas was estimated at the level of Rp 114,943,- per capita per month. Likewise, the estimated SCOLI for urban and rural North Sulawesi in 2002 were 121.0 and 113.6, respectively. Using the chosen level of poverty line for the base regions, these two SCOLIs were converted into poverty lines for each area, i.e., Rp 123,299,- and Rp. 115,758,- per capita per month, respectively.

By using the SCOLI, the poverty line in one region has the same purchasing power as the poverty lines in any other regions. The poverty line in one region is also consistent with the poverty lines in any other regions in terms of utility level. Therefore, in this approach, the regional poverty lines ensure that all people, whose expenditure is at the poverty lines, have the same utility level.

CONCLUSION

Based on the theory cost of living, this paper reveals that both the official poverty lines and the Ravallion LPL method do not fulfill the criteria of utility consistency. The official food poverty lines (FPL) are all based on the food energy intake (FEI) method since the *composition* of the food bundle to get the calories requirement of 2100 calories/day varies from region to region and also from year to year. Therefore, the official food poverty lines are biased upwards in relatively rich regions.

The poverty lines generated by the Ravallion LPL method as applied by Bida-

ni and Ravallion and many other researchers are also not-utility consistent poverty lines. The LPL (and UPL) are upward biased for regions with a higher food price level relative to regions with cheaper food price levels. Both methods over compensate people on the poverty line for higher prices in higher food price regions. In the absence of reliable non-food price data, some adjustment must be taken and this method is very intuitive. If non-food price data are available, another approach should be taken and calculating a price index (both for food and non-food) in each region is a better approach and is the one used in this paper.

The estimated 2002 SCOLI indicates that people who live in urban areas has to spend 13 per cent higher than who live in rural areas. Based on this estimate, poverty line in urban areas on the average are estimated at 13 per cent higher than poverty line in rural areas in 2002. The SCOLI for urban and rural North Sulawesi was estimated at the levels of 121.0 and 113.6, respectively. Both SCOLIs were the highest among urban and rural areas, respectively, in 2002. Following the argument that poverty line is somewhat arbitrary, the UCPL approach set the poverty line for the base region, i.e., average rural areas, at Rp 101,900,- per capita per month. This chosen level of poverty line was official poverty line for Indonesian rural areas in 2002. Following the estimated SCOLI for average urban areas of 112.8, the poverty line for urban areas was estimated at the level of Rp 114,943,- per capita per month. Likewise, the estimated SCOLI for each other region was converted into poverty lines for the respective region.

REFERENCES

Aizcorbe, A.M. and P.C. Jackman (1993), "The Commodity Substitution Effect in CPI Data, 1982-91," *Monthly Labor Review*, 116(12), 25-33.

Alatas, V. (2000), *Analyzing Indonesia's Poverty Profile*, Ph.D Dissertation, Princeton University.

Asra, A. (1999), "Urban-Rural Differences in Costs of Living and Their Impact on Poverty Measures," *Bulletin of Indonesian Economic Studies*, 35(3), 51-69.

Bidani, B. and M. Ravallion (1993), "A Regional Poverty Profile for Indonesia," *Bulletin of Indonesian Economic Studies*, 29(3), 37-68.

Booth, A. (1993), "Counting the Poor in Indonesia," *Bulletin of Indonesian Economic Studies*, 29(1), 53-83.

Boskin, M.J., R.D. Ellen, R.J. Gordon, Z. Griliches, and D.W. Jorgenson (1998), "Consumer Prices, the Consumer Price Index, and the Cost of Living," *Journal of Economic Perspective*, 12(1), 3-26.

BPS (1997), *Harga Konsumen beberapa Barang dan Jasa di Seluruh Ibu Kota Provinsi Indonesia 1996 [Consumer Price of some Goods and Services in All Provincial Capital Cities in Indonesia 1996]*, BPS, Jakarta.

BPS (2003a), *Indeks Harga Konsumen 44 Kota di Indonesia 2002, 1996=100 [Consumer Price Indices in 44 Cities in Indonesia 2002, 1996=100]*, BPS, Jakarta.

BPS (2003b), Metodologi dan Profil Kemiskinan Tahun 2002 [Methodology and Poverty Profile in 2002], BPS, Jakarta.

BPS (1999), *Pengukuran Tingkat Kemiskinan di Indonesia 1976-1999: Metode BPS*, Seri Publikasi Susenas Mini 1999: Buku I, BPS, Jakarta.

Greer, J. and E. Thorbecke (1986), "A Methodology for Measuring Food Poverty Applied to Kenya," *Journal of Development Economics*, 24(1), 59-79.

Hagenaars, A. and K. de Vos (1988), "The Definition and Measurement of Poverty," *Journal of Human Resources*, 23(2), 211-221.

Ikhsan, M. (1999), *The Disaggregation of Indonesian Poverty: Policy and Analysis*, Ph.D Dissertation, University of Illinois.

Kakwani, N. (2001), "On Specifying Poverty Lines," in *Asia and Pacific Forum on Poverty: Reforming Policies and Institutions for Poverty Reduction*, Manila.

Kakwani, N. (2003), "Issues in Setting Absolute Poverty Lines," In Poverty and Social Development Papers No.3, June, Asian Development Bank.

Kakwani, N. and R.J. Hill (2002), "Economic Theory of Spatial Cost of Living Indices with Application to Thailand," *Journal of Public Economics*, 86, 71-97.

Moulton, B.R. (1996), "Bias in the Consumer Price Index: What is the Evidence," *Journal of Economic Perspectives*, 10(4), 159-177.

Nashihin, M. (2007), *Poverty Incidence in Indonesia, 1987-2002: A Utility-Consistent Poverty Line Approach Based on a New Survey of Regional Prices*, Ph.D Dissertation, the Australian National University (ANU).

Orshansky, M. (1963), "Children of the Poor," *Social Security Bulletin*, 26(7), 3-13.

Orshansky, M. (1965), "Counting the Poor: Another Look at the Poverty Profile," *Social Security Bulletin*, 28(January), 3-29.

Orshansky, M. (1969), "How Poverty is Measured?" *Monthly Labor Review*, 92(2), 37-41.

Paul, S. (1989), "A Model of Constructing the Poverty Line," *Journal of Development Economics*, 30, 129-44.

Pradhan, M., A. Suryahadi, S. Sumarto, and L. Pritchett (2000), "Measurements of Poverty in Indonesia: 1996, 1999, and Beyond," SMERU Working Paper, Jakarta.

Pradhan, M., A. Suryahadi, S. Sumarto, and L. Pritchett (2001), "Eating Like Which Joneses? An Iterative Solution to the Choice of a Poverty Line Reference Group," *Review of Income and Wealth*, 47(4), 1-12.

Ravallion, M. (1994), *Poverty Comparisons*, Chur: Harwood Academic Publishers GmbH.

Ravallion, M. and B. Bidani (1994), "How Robust is a Poverty Profile?" *World Bank Economic Review*, 8(1), 75-102.

Ravallion, M. and D. van de Walle (1991), "Urban-Rural Cost-of-Living Differentials in a Developing Economy," *Journal of Urban Economics*, 29, 113-27.

Rowntree, B.S. (1902), *Poverty: A Study of Town Life*, 4th Edition, Macmillan and Co., Limited.

Suryahadi, A. S. Sumarto, and L. Pritchett (2003), "Evolution of Poverty during the Crisis in Indonesia," *Asian Economic Journal*, 17(3), 221-41.

Suryahadi, A. S. Sumarto, Y. Suharso, and L. Pritchett (2000), "The Evolution of Poverty during the Crisis in Indonesia, 1996 to1999 (Using Full Susenas Sample)," SMERU Working Paper, Jakarta.

Tarp, F., K. Simler, C. Matusse, R. Heltberg, and G. Dava (2002), "The Robustness of Poverty Profiles Reconsidered," FCND Discussion Paper No. 124, Vol. 2004, International Food Policy Research Institute, New York.

Watts, H.W. (1967), "The ISO-Prop Index: An Approach to the Determination of Differential Poverty Income Thresholds," *Journal of Human Resources*, 2(1), 3-18.

Wodon, Q.T. (1997), "Food Energy Intake and Cost of Basic Needs: Measuring Poverty in Bangladesh," *Journal of Development Economics*, 34(2), 66-101.

World Bank (1990), "Indonesia: Poverty Assessment and Strategy Report," Report No. 8034-IND, The World Bank, Washington.