



Working Paper

The Evolution of Poverty during the Crisis in Indonesia

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Abstract

The economic crisis caused a clear deterioration in the welfare of the Indonesian people. In this paper, we examine the appropriate method to compare the change in poverty rates over time. We then piece together a consistent series of estimates of poverty rates during the crisis from various sources, covering a period from February 1996 to February 2002. The reconciliation of these various estimates paints a very reasonable picture and neatly tracks events. The poverty rate increased from the lowest point of around 15 percent at the onset of the crisis in the mid of 1997 to the highest point of around 33 percent nearing the end of 1998. This maximum increase in poverty rate during the crisis of 18 percentage points implies that around 36 million additional people were pushed into absolute poverty due to the crisis. After the peak point, the poverty rate started to decline again and reached the pre-crisis level of around 15 percents at the end of 1999, implying the lost time in poverty reduction due to the crisis was around two and a half years. However, the poverty rate after this point appears to have fluctuated. During 2001 until early 2002, poverty was on the rise again.

Keywords: poverty, crisis, welfare, measurement, Indonesia

I. Introduction

After nearly thirty years of uninterrupted rapid growth, low inflation, and a stable currency, in August of 1997 Indonesia's currency began to slide in what at first appeared to be only a spillover from the currency crisis in Thailand. But by May 1998 the country was suffering from the combined effects of a currency, financial, natural, economic, and political crisis. The currency collapsed in waves, from its pre-crisis level of Rp 2,200 to the dollar in mid 1997 to Rp 5,000 by October and Rp 6,000 by December of that year, to a free fall in January 1998 following the almost immediate collapse of the second ill-fated IMF (International Monetary Fund) program, which took the currency as low as Rp 17,000 per dollar, 13 percent of its pre-crisis value.¹

The effect of the currency devaluation on the substantial unhedged foreign currency denominated borrowing by both the domestic financial and corporate sectors – on top of underlying structural weaknesses of the sectors – created a financial crisis. The fear of widespread banking collapse caused the Central Bank to issue a blanket guarantee of inter-bank loans in January 1998 which, in turn, spurred the money supply to nearly triple between early 1998 and late 1999.² In addition, nature was unkind as fires burned out of control in large sections of Sumatra in the second half of 1997 and a drought reduced the primary rice crop.

The combination of these impacts caused the economy to contract by an almost unprecedented magnitude, where real GDP fell 13.7 percent in 1998. The money supply expansion and currency depreciation caused skyrocketing domestic prices particularly for food.³ In 1998, the general inflation rate was 78 percent, while food prices escalated by 118 percent. All of this, combined with signs of weakness and ill health from the then President Soeharto, led to a political crisis. Student deaths and rioting in the capital Jakarta and several other cities led to the May 1998 resignation of Soeharto, who had been in power since the mid 1960s.⁴

The social impact of the crisis was both immediate and substantial, and is still continuing in 2003, six years after the crisis started. Real wages of formal sector workers fell by around one third between August 1997 and August 1998, before beginning to recover in 1999 as nominal wages began to grow again and inflation was controlled. Given the flexible labor market dominated by informal and self-employment, officially measured open unemployment was never really the issue. It only rose from 4.7 percent in 1997, to 5.5 percent in 1998, and to 6.4 percent in 1999.⁵ One large scale household survey, the “100

¹ See Soesastro and Basri (1998).

² See Deuster (2002).

³ Since food is a wholly tradable good, it was more affected by the depreciation than non-food.

⁴ The accounts of the Indonesian economic crisis and its possible proximate and underlying causes have been discussed many times in academic (e.g. McLeod, 1998), official (e.g. World Bank, 1999), and journalistic (e.g. Blustein, 2001) publications.

⁵ For discussions on the impact of the crisis on the labor market, see Feridhanusetyawan (1999), Manning (2000), Papanek and Handoko (1999), Skoufias and Suryahadi (2002).

Village Survey”, showed real per capita consumption expenditures falling 17 percent between May 1997 and August 1998.⁶

The focus of the social impact of the crisis, however, has been placed on poverty. Unfortunately, most studies assessing the impact of the Indonesian crisis on poverty have focused only on partial episodes during the crisis and each of the studies use different thresholds for defining poverty.⁷ Therefore, it is difficult to obtain a complete picture of the whole episode of the changes in poverty during the crisis.

This study is an attempt to piece together a consistent series of data on the headcount measure of absolute consumption expenditure poverty during the crisis from various sources.⁸ There are many broad issues in defining “poverty”, which is intrinsically a complex social construct. Even within a narrow definition of poverty based on a deficit of consumption expenditures, there are numerous thorny technical issues in setting an appropriate “poverty line”.⁹ This note avoids those issues and is limited to examining how poverty – defined on a consistent, welfare comparable basis – changed in Indonesia over the course of the series of crises it has experienced since the mid of 1997. We use a variety of data sets as well as various studies to place together a consistent series of the evolution of poverty, which spans a six-year period from February 1996 to February 2002.

As the issues surrounding poverty measurements are complex, we begin with two basic issues. First, the deflation of nominal to “real” expenditures to maintain comparability in welfare levels and, second, the responsiveness of poverty rates to changes in real expenditures. With these basics in hand, we can estimate changes in headcount poverty rates over time using a range of price deflators. Based on the outlined methods, we create a consistent set of estimates of poverty over the course of the crisis based on various data sets and studies available.

⁶ The differences in the magnitudes of fall in “real” per capita expenditures in the national accounts and the household survey based measures is due to the enormous shift in relative prices, which implies that deflators which used a small share for food such as the consumer price index (CPI) and the GDP deflator showed small “real” falls, while those using food shares for the poorer households showed much larger “real” falls. See Suryahadi and Sumarto (1999).

⁷ See, for examples, BPS and UNDP (1999), Frankenberg, Thomas, and Beegle (1999), Gardiner (1999), Poppele, Sumarto, and Pritchett (1999), Pradhan *et al.* (2001), Skoufias, Suryahadi, and Sumarto (2000), Strauss *et al.* (2002).

⁸ In July 1998 there was a considerable debate the impact of the crisis on poverty as estimates of the increase in headcount poverty rates ranged from as high as 30 to as low as 3 percentage points. These attempts at “real time” estimates suffered from a variety of methodological problems (see Poppele, Sumarto, and Pritchett, 1999).

⁹ See Pradhan *et al.* (2001), Ravallion (1994), and Sen (1981).

II. Defining “Real” Expenditures

The deflation of nominal to “real” expenditures is central to a “welfare comparable” basis for comparisons of poverty over time. For any given distribution of expenditures across households, the determinant of the poverty rate is the “poverty line”. The poverty line is expressed in *rupiah* term. It is simply the amount of expenditures above which households are considered “not poor” and below which households are in (varying degrees of) poverty.

A fruitful way of thinking about the deflation of poverty line in nominal *rupiah*, so that it represents “the same” amount of “real” rupiahs in another period, is using standard microeconomic theory of consumer choice with individual welfare maximization. The consumer choice problem is to choose a consumption basket for given expenditure budget and prices so as to maximize their utility.¹⁰ This of course assumes away the decision between savings and consumption.

For any given preference mapping, the solution to that problem is the “indirect utility function”, which gives the maximum level of utility achievable for given prices and expenditures. The “dual” of this maximization problem for the consumer is to choose a consumption basket minimizing the expenditures necessary to achieve any given level of utility. The outcome of this problem is the “expenditure function”, i.e. the minimum level of expenditures necessary to achieve any fixed standard of living (level of utility):

$$(1) \quad e(p, U^0) = \min_x p'x, \text{ subject to } U(x) = U^0$$

where p and x are N by 1 vectors of prices and quantities of commodities.

One way to conceptualize the poverty line is to choose a level of welfare below which a household is considered “poor”, $U^{poverty}$, and then define the poverty line as the money expenditures necessary to attain that level of welfare:

$$(2) \quad PL = e(p, U^{poverty})$$

where PL is the poverty line.

Using expenditure functions allows us to draw on a large body of consumer welfare economics in thinking about comparing poverty lines over time. Suppose that prices change from the ($N \times 1$ vector of) prices in base time t_0 , p^0 , to the ($N \times 1$ vector of) prices in one period ahead t_1 , p^1 . This shift in prices could involve changes in the level and changes in relative prices. The “exact” index of inflation in the poverty line is the amount of expenditures necessary at the new price level (p^1) to achieve the level of welfare which defined poverty at the old prices (p^0):

$$(3) \quad PL^1 = e(p^1, U^{poverty}) = (1 + \tilde{\Pi}_{PL}^{0,1}) * e(p^0, U^{poverty}) = (1 + \tilde{\Pi}_{PL}^{0,1}) * PL^0$$

where $\tilde{\Pi}_{PL}^{0,1}$ is the poverty line’s inflation rate between t_0 and t_1 .

¹⁰ See Varian (1992), Chapter 7.

This “exact” inflation index is difficult to implement in practice as the appropriate weights on the N individual prices in such an index would depend on the underlying preferences, or empirically on the entire matrix of own and cross price elasticities. Nevertheless, this approach provides a solid conceptual basis for intertemporal comparisons: What is the money expenditures at the new prices necessary to achieve the same utility level as at the old prices?

The deflation of nominal expenditures in Indonesia over the crisis period is highly problematic because of the huge change in relative prices. If all prices had changed uniformly then deflation would not be a serious problem as the price of any commodity (or any bundle of commodities) could be used. But in Indonesia over this period, the relative price of food rose tremendously. Inflation in the price of food from February 1996 to February 1999 was 160 percent, while the increase in the non-food components of the CPI was much lower at 81 percent. This means when we deflate nominal expenditures into “real” expenditures, we have to be very careful in defining how exactly “real” is calculated.¹¹

Table 1 illustrates this problem. Median nominal consumption expenditures increased by 110 percent from February 1996 to February 1999. How much did median “real” expenditures rise? If one made the mistake of defining “real” expenditures as purchasing power over non-food items only, then median “real” expenditures have actually risen by 16.2 percent. If, in contrast, a price deflator was defined only as purchasing power over rice, then “real” expenditures have fallen by 26 percent. But this “rice only” deflator is just as unrealistic as a “non-food only” deflator as all households actually consume a mix of goods.¹²

¹¹ See Suryahadi and Sumarto (1999).

¹² Rice is indeed a very important component of household consumption in Indonesia. In 1999, on average expenditures on rice made up 20 percent of total household expenditures and 30 percent of food expenditures. However, the analysis in this study does not separate rice as a specific component in the price deflator. Rather, it focuses on the weight of food versus non-food in the deflator as the main issue is the too low share of food as a whole in the consumer price index (CPI).

Table 1: Sensitivity of “Real” Expenditures Change between February 1996 and February 1999 to Deflator Used to Deflate Nominal Expenditures

Deflator	Food share	Percentage increase in prices	Percentage change in median “real” expenditures
All non-food	0	81	16.2
CPI	0.40	113	-1.3
Mean food share of Susenas	0.55	124	-6.1
Household specific deflator based on Engel’s Law	0.63	131	-9.0
Food share based on actual consumption of the bottom 30 percent of the population	0.70	136	-10.9
Fixed weights using poverty basket in 1996	0.80	144	-13.8
All Food	1	160	-19.1
Rice Price only	-	184	-26.0

Notes:

- This table uses median expenditures, whose nominal value rose by 110 percent (from Rp. 52,123 to Rp. 109,587). Mean nominal expenditures rose by less, only 96 percent (from Rp. 69,972 to Rp. 137,284).
- The percentage change in real expenditures (RE) does not fall one for one with a rise inflation ($\% \Delta P = \Pi$) for a given percentage change in nominal expenditures (E). Since $\% \Delta RE = (\% \Delta E - \Pi) / (\Pi + 1)$ then:

$$\frac{\partial(\% \Delta RE)}{\partial \Pi} = \frac{(1 - \% \Delta E)}{(\Pi + 1)^2}$$

Source: Susenas Consumption Module 1996 and 1999

If one uses the standard approach and deflates nominal expenditures by the consumer price index (CPI), this implies that “real” expenditures were only 1.3 percent lower in February 1999 than in February 1996. But the share of food in the CPI basket, which is around 40

percent, is much lower than in actual consumption expenditures as recorded in the Susenas, and certainly understates the importance of food for the poor.¹³

If one constructs a price index using the CPI price series but with weights for prices based on the actual consumption basket of the poorest 30 percent of households then inflation in that consumption basket was 136 percent and median “real” expenditures fell 10.9 percent. This sensitivity of the measurement of “real” expenditure changes to deflation in the presence of large changes in relative prices especially complicates the calculation of the poverty index, because the poor have a higher share of food in the consumption than do the non-poor.¹⁴

III. Sensitivity of Poverty Rate to the Poverty Line

The second basic issue is how much poverty rates are “expected” to change from a given distributionally neutral change in real expenditures. Starting from a general class of decomposable poverty measures proposed by Foster, Greer, and Thorbecke (1984), the formula for a poverty measure P with poverty line z , expenditures y , and poverty aversion parameter α is:

$$(4) \quad P(\alpha, z) = \int_0^z ((z - y) / z)^\alpha f(y) dy$$

The estimate of the headcount poverty rate $P(0)$, when $\alpha = 0$, is simply the count of the number of households whose expenditures are below the poverty line divided by the total population. In terms of continuous distribution, this is simply the integral of the probability density function (pdf) up to the poverty line. But this integral is the cumulative density function (cdf), denoted $F(\cdot)$, of expenditures:

$$(5) \quad P(\alpha = 0, z) = \int_0^z f(y) dy = F(z)$$

This means that the sensitivity of the headcount poverty rate to changes in the poverty line at any given point is simply the slope of the cumulative density function, which is the value of the probability density function. This has two implications. First, this sensitivity is at a maximum at the mode of the probability density function. Second, generally the poverty rate will be more sensitive to changes in the poverty line around the mode when inequality is low, as this implies more of the pdf is concentrated around that point and hence the steeper the slope of $F(z)$ at that point.¹⁵ In the case of Indonesia, inequality is relatively low and the

¹³ Susenas is the “National Socio-Economic Survey” conducted by Statistics Indonesia (BPS). The “Core” of this survey, which contains summary characteristics of households and individuals, is conducted annually. The detailed “Consumption Module” of the survey, which forms the basis for the official poverty statistics, is conducted every three years. For more details about Susenas, see Imawan and Ahnaf (1997).

¹⁴ This relationship is known as Engel’s Law.

¹⁵ Just imagine the special case in which everyone has exactly the same expenditures, then either everyone is in poverty or no one is, and the cdf is discontinuous (has essentially infinite slope) at that point.

poverty line is relatively near the mode, so the sensitivity of the headcount poverty rate to the poverty line is quite high.

For a given percentage rise in the poverty line, how many percentage points does poverty change? Table 2 gives an illustration of the answer. Using both the 1996 and 1999 Susenas consumption module data, a poverty line is chosen that produces a 10 percent poverty rate. We then increase these poverty lines by 5, 10, 15, 20, and 25 percent and calculate the respective poverty rates. Based on this we estimate the (semi-)elasticity of the poverty rate as the percentage point changes in the poverty rate with respect to percentage changes in the poverty line. The results are around 0.4, which suggests that for every one percent fall in real expenditures the poverty rate rises by 0.4 percentage point, if the poverty rate is around 5 percent. However, the sensitivity to poverty increases with the poverty line. At 25 percent above the poverty line a one percent change in expenditures produces around 0.5-0.6 percentage point change in poverty, as one moves into a range with a higher values of the pdf (steeper cdf).

Table 2: Sensitivity of Headcount Poverty to the Poverty Line

Percentage increase in poverty line over lowest level	Using 1996 Susenas Data			Using 1999 Susenas Data		
	If poverty line is (Rp/person/month)	Then headcount poverty is (percent)	Elasticity (percent point change in poverty/percentage change in expenditures)	If poverty line is (Rp/person/month)	Then headcount poverty is (percent)	Elasticity (percent point change in poverty/percentage change in expenditures)
0	28,516	10 ^a	-	62,877	10 ^a	-
5	29,942	12.0	0.40	66,021	12.1	0.42
10	31,368	14.4	0.48	69,165	14.6	0.50
15	32,793	16.9	0.50	72,309	17.4	0.56
20	34,219	19.5	0.52	75,452	20.2	0.56
25	35,645	22.1	0.52	78,596	23.0	0.56

Notes: ^aThe starting poverty rate of 10 percent in each year is for illustrative purpose only.

The combination of (a) the sensitivity of measured price inflation to the changes food share, (b) the change in real expenditures to changed inflation estimates, and (c) the sensitivity of poverty rates to expenditure changes can give us some rough rules of thumb as to what to expect from various food shares (ω) in price deflation embedded in the poverty calculations. The formula is:

$$(6) \quad \Delta Poverty(\omega) - \Delta Poverty(\omega') = (\omega - \omega') * (\Pi_{food} - \Pi_{non-food}) * \left(\frac{\partial RE}{\partial \Pi} \right) * \left(\frac{\partial Poverty}{\partial RE} \Big|_{dist} \right)$$

Stated in words, the difference in the estimate of poverty between two periods from using two different weights given to food in a price deflator is (a) the difference in the food share times (b) the difference in food and non-food inflation (which determines the change in measured inflation) times (c) how much real expenditures change due to a change in inflation times (d) how much the poverty rate changes for a distributionally neutral change in real expenditures.

IV. Methods for Estimating the Change in Headcount Poverty

Even though we are just estimating changes in poverty, to understand the deflation of the poverty line we do need to explain what is, and hence how one arrives at, the food share of the poverty basket. In other words, we need to explain how our poverty line is set. To put it simply, the poverty line is set as a food poverty line plus a non-food allowance:

$$(7) \quad PL = FPL + NFA$$

The food poverty line (*FPL*) is defined as the level of expenditures necessary to reach a defined minimum calorie intake requirement of 2,100 calories at the consumption pattern (quantities (*q*'s) of the *K* commodities in the poverty basket) and prices (*p*'s over the same *K* commodities) of a reference group. The reference group is defined on the basis of real expenditures (*e*):

$$(8) \quad FPL = \sum_{k=1}^K p_k(e) * q_k(e) * \theta(e)$$

where the constant θ is the ratio of 2,100 to the actual daily calories of the food basket represented by the quantities (*q*'s) times the calorie intake per unit (*c*'s). This constant serves to scale up the quantities in the consumption basket so that caloric intake is 2,100 calories per person per day to fulfill the defined minimum calorie intake requirement:

$$(9) \quad \theta(e) = \frac{2,100}{\sum_{k=1}^K q_k(e) * c_k}$$

Therefore, the FPL is the expenditures of those households who, if they spent all their expenditures on food could just afford to attain 2,100 calories at the consumption patterns of the reference group.¹⁶

The non-food allowance is set as the actual non-food expenditures of those households whose total expenditures are equal to the food poverty line.¹⁷ These non-food expenditures are derived from an Engel curve estimated using food share (ω) with natural log of ratio of expenditures to food poverty line. Using this specification, the estimated constant of the regression is the predicted food share of those at the food poverty line:¹⁸

$$(10) \quad \omega_i = \bar{\omega} + \beta * \ln\left(\frac{e_i}{FPL}\right) + \varepsilon_i$$

Now let's assume we have a poverty line PL^0 at the time t_0 and see how the poverty line changes between t_0 and t_1 . The poverty line at t_1 is:

$$(11) \quad PL^1 = (1 + \Pi_{PL}) * PL^0$$

where Π_{PL} is the poverty line inflation rate. As described above, the ideal or exact inflation (Π_{PL}) rate should be chosen so that the money expenditures of the poverty line in t_1 (PL^1) at the level and pattern of prices in t_1 provides the same level of welfare as the poverty line in t_0 (PL^0). While this is impossible to implement because of the large changes in relative prices, the key issue is the weight given to food (w_F) in the poverty line's deflator:

$$(12) \quad \Pi_{PL} = w_F * \Pi_F + (1 - w_F) * \Pi_{NF}$$

We explore using three different methods of choosing weights for food versus non-food prices in defining that deflator. We are building an overall price index out of two sub-indices, one for food and one for non-food. For food prices, there are currently two choices as a food price index can be constructed either from the underlying CPI price series or from the unit prices (values divided by quantities) reported in the Susenas database (for a given reference group). Either of these detailed food price series can be used to construct an inflation rate for food using expenditure shares for items within the food basket based on a sample of poor consumers.¹⁹ However, for non-food prices only CPI prices exist as there is no Susenas equivalent.

¹⁶ But this is not the only way as there are cheaper as well as more expensive ways to attain a calorie intake of 2,100 calories.

¹⁷ Even though the FPL is not the actual food expenditures, but is scaled up to reach a predetermined calorie intake.

¹⁸ This uses the fact that $\ln(1)=0$, so that when actual expenditures are equal to the food poverty line ($e=FPL$), the predicted value of the food share is just the constant since the $\beta * \ln(\cdot)$ term of the prediction disappears.

¹⁹ The expenditure shares were taken from the consumers in the 100 Village Survey, whose food share was near that of the bottom 30 percent of consumers from the Susenas.

We begin by using two Laspeyres indices, with the only issue being the weight on food and non-food inflation (both from the CPI).²⁰ The first deflator, which we call Method I, uses the actual expenditures of each household. This would be the natural deflator in defining households' real expenditures, as it uses their actual food and non-food consumption shares. In order to do this we estimated an Engel curve:

$$(13) \quad \omega_i = \bar{\omega} + \beta * \ln(e_i) + \varepsilon_i$$

Based on the predicted values of the food share from this regression, we created a deflator for each household:

$$(14) \quad \Pi_i = \hat{\omega}_i * \Pi_F + (1 - \hat{\omega}_i) * \Pi_{NF}$$

Using this Method I deflator for updating the poverty line, Table 3 shows that if the poverty rate is set at 10 percent in February 1996, the poverty rate in February 1999 increased by 53 percents using CPI for food and non-food inflation rates and by 69 percents when using Susenas unit prices for the food inflation and CPI for non-food inflation.²¹ Obviously this difference in the magnitudes of poverty increase arises because of the differences in food price inflation in the CPI versus Susenas unit prices. Table 4 shows that in aggregate the Susenas food price inflation is 8 percentage points higher than CPI food inflation, resulting in 5 percentage points higher in total inflation in Method I.²²

²⁰ It is well known from consumer theory that a fixed weights (Laspeyres) price index overestimates the change in welfare from a given change in prices because the fixed weights do not allow for substitution effects from the relative price changes.

²¹ The food and non-food price inflation of CPI used are the provincial level. Meanwhile, the food price inflation of Susenas unit prices are not only varied across provinces, but also across urban-rural areas within province.

²² The aggregate inflation rates are obtained as weighted averages of inflation rates faced by households in the sample.

Table 3: Changes in Poverty Rates Using Various Food Shares and Prices (%)

Method: Share of food in inflation	Base Case ^a	Using CPI		Using Susenas Unit Prices for Food	
	1996	1999	% Change	1999	% Change
Method I: Predicted share of food in each household's consumption expenditures	10	15.3	53	16.9	69
Method II: Using the share of food in the poverty basket	10	16.3	63	17.9	79
Method III: Using new food poverty line and recalculating non-food share ^b	10	20.3	103	22.4	124

Notes:

^aThe base case of poverty rate 10 percent in 1996 is for illustrative purpose only.

^bThis procedure is methodologically consistent, but not welfare consistent. Methodologically consistent means that poverty basket is calculated using the same procedure each year. Meanwhile, welfare consistent means that individual is at the same level of utility (the same material standard of living) in the two periods. Methodologically consistent is not necessarily welfare consistent and vice versa.

Table 4: Differences in Inflation Rates between CPI and Susenas Unit Prices (%)

	Food share	Inflation Rate (%)	
		Using CPI	Using Susenas Unit Prices for Food ^a
Food		160	168
Non-food		81	81
Total:			
- CPI	0.4	113	116
- Method I	Actual	137	142
- Method II	0.8	144	151
- Method III	1.0	160	168

Notes: ^a BPS food poverty basket has 52 commodities. The weights of each of the 52 commodities in the Susenas unit prices are based on their shares in the 1996 poverty line.

The second method, which we call Method II, uses the share of food in the poverty basket in base time as the weight for food in the estimate of inflation. Given the methodology used, where the non-food allowance is the non-food expenditures of those at the food poverty line, one might have thought the share of food in the poverty basket (FPL/PL) would be the actual food share of those at the food poverty line (FPL), or perhaps the actual share of food of those at the poverty line (PL). However, the share of food in the poverty basket is substantially higher than both of those. As shown in Figure 1, the reason for this is simply that the Engel curve is non-linear. This non-linearity implies that when an NFA is added to the FPL to reach the PL, the marginal propensity to spend on food is lower than the average propensity to spend. This implies that in moving from the FPL to PL, total expenditures increase by NFA but food expenditures increase less proportionally.

Figure 1: Engel Curve and Poverty Line

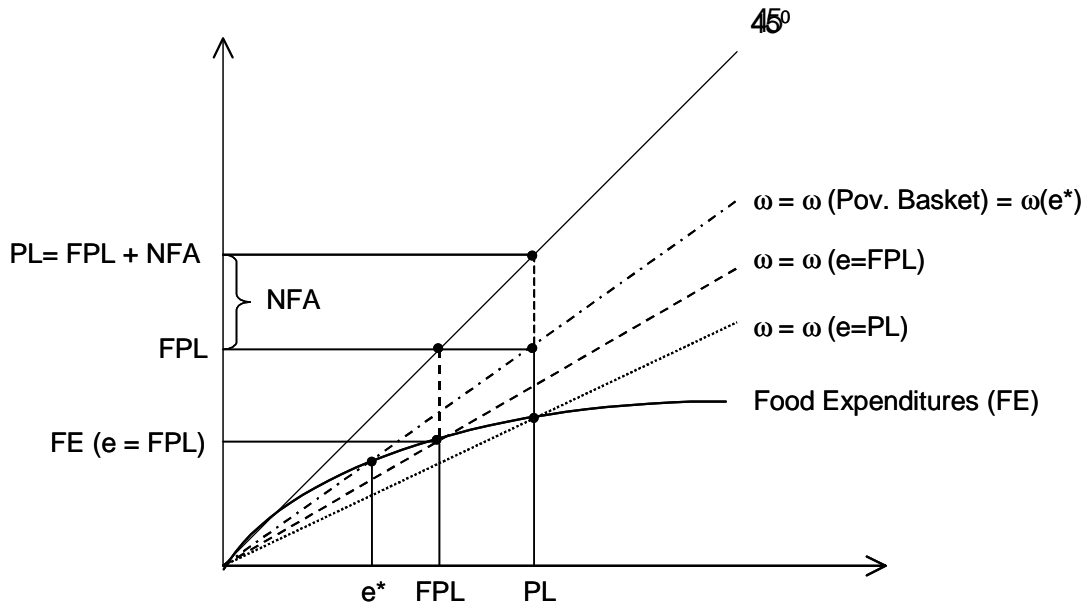


Figure 1 shows that food share at the food poverty line is:

$$(15) \quad \omega(e = FPL) = \frac{FPL - NFA}{FPL}$$

so that the non-food allowance can be calculated as:

$$(16) \quad NFA = (1 - \omega(e = FPL)) * FPL$$

From this we can calculate that the resulting share of food expenditures in the poverty line (FPL/PL) is not the food share of those at the FPL, but equal to:

$$(17) \quad \frac{FPL}{PL} = \frac{FPL}{FPL + NFA} = \frac{FPL}{FPL + (1 - \omega(e = FPL)) * FPL} = \frac{1}{2 - \omega(e = FPL)} = \omega(PB)$$

As shown in Figure 1, this “food share” of the poverty line is in fact higher than the actual food share of those households at either the FPL or PL.

Therefore, the fixed weights price deflator of the Method II is:

$$(18) \quad \Pi_{PL}^{\omega(PB)} = \omega(PB) * \Pi_F + (1 - \omega(PB)) * \Pi_{NF}$$

where $\omega(PB)$ is the food share of the poverty basket or poverty line. Since rays from the origin in Figure 1 represent constant food shares, one can see that there is an expenditure level (e^*) such that at that expenditure level the food share chosen equals the food share in the poverty basket. Since $\omega(e^*) > \omega(e = FPL) > \omega(e = PL)$, this implies $e^* < FPL < PL$. This suggests that the price index using the food share of the poverty basket represents the welfare

change of a very poor group. This price index will overstate the real expenditure loss of those above that level and hence will moderately overstate the change in poverty rate.

Using this deflator, Table 3 shows that if the poverty rate is set at 10 percent in February 1996, the poverty rate in February 1999 increased by 63 percents using the CPI series and 79 percents using the Susenas unit prices. The reason for this difference, as shown in Table 4, is that the Susenas unit prices total inflation rate is 7 percentage points higher than the CPI inflation rate.

The third possible procedure, which we call Method III, is to inflate the food poverty line (FPL) from t_0 to t_1 by a food price index and then compute the non-food allowance again in t_1 using the same Engel curve methodology as for t_0 . This is a procedure which is methodologically consistent, but which is not welfare consistent as it produces, implicitly, a weight on the share of food in the inflation rate that is extremely high, i.e. almost 1. The impact of this procedure, when considered as an inflation in the poverty line is:

$$(19) \quad PL^1 = PL^0 * (1 + \Pi_F) * \left(\frac{2 - \omega_{e=FPL^1}^1}{2 - \omega_{e=FPL^0}^0} \right)$$

In this method, the *FPL* in both periods is calculated as a proportion of the *PL*. If the food share is unchanged between t_0 and t_1 , then the final term in the bracket is equal to 1. This will make the inflation in the poverty line the same as food price inflation, implying the weight of food in the deflator is 100 percent ($\omega=1$). In fact, when the FPL in February 1996 was inflated to a FPL in February 1999 and the food share of the PL was recalculated in 1999, the food share was in fact very nearly the same (79.42 percent versus 80.21 percent).²³ Therefore, this method produces a much higher inflation rate than any reasonable price deflator as the poverty line is raised by essentially the full amount of food price inflation. Hence, Table 3 shows that using this deflator the poverty rate climbs by around 103 percents using CPI inflation and around 124 percents using Susenas unit prices inflation. This is an important point as it shows that the methodologically consistent procedure for fixing the non-food basket does not produce a welfare consistent ranking.

We know from basic consumer theory that Method I, using a Laspeyres index of food and non-food inflation rates based on actual consumption shares of each household, should overstate the welfare impact as it does not allow for consumers' response to changing relative prices by changing their consumption patterns. As is well known, the Laspeyres index will exceed the "exact" inflation rate from an expenditures function since the increase in the amount of money expenditures needed to reach the same level of utility is lower when one allows for substitution across commodities (e.g. buying relatively less of items whose prices increased).

Method II, using the poverty basket food share, also overstates poverty increases, not only because it does not allow substitution (as in Method I) but also because it does not use the

²³ Hence, in Method II and hereafter, the food share at the poverty line is fixed at 0.8.

actual consumption bundle of each households. However, this method is perhaps defensible as the food weight in the price index represents the actual consumption pattern of some group in poverty (although a group considerably below the poverty line).

On the other hand, Method III, that expands the 1996 inflation line to 1999 by more than the amount of Method II, is creating a poverty line at which the welfare of those at the poverty line in 1999 is higher, perhaps substantially higher, than those at the poverty line in 1996. The repetition of the same method on different data sets does not guarantee a result such that the material standard of living represented by the resulting poverty lines is equivalent. Why this is so is something of a puzzle. Apparently the Engel curve relationship shifted over time. Therefore, for consistent welfare measures over time, Method III should not be used.

V. A Consistent Set of Poverty Estimates during the Crisis

Over the course of the crisis there have been a number of estimates of poverty rates using different large scale – but not necessarily nationally representative – household surveys. Unfortunately, each of those used a different and non-comparable base for the “pre-crisis” poverty rate and a different method of deflation for the changes in the poverty line, so that these estimates of the headcount poverty rate are not comparable for either levels or changes. In this section we create, as best as possible, a consistent series of poverty rates using our own estimates from various data sets which we have access to and by adjusting the estimates from different sources where we do not have the raw data.

All of the estimates must start from a consistent base. First, this needs to take into account that the economy was growing from February 1996 at least through to the middle of 1997 just before the crisis started.²⁴ This additional income would have likely reduced poverty, so that the poverty rate just before the crisis is not simply the level of poverty in February 1996, but the level reached accounting for poverty reduction from February 1996 to the beginning of the crisis. Second, the estimates must use a common method of computing changes over time, in particular how the poverty line is inflated.

The household survey databases which we have access to and from which we calculate our own estimates are:

- Susenas Consumption Module (with a sample of 65,000 households): February 1996, February 1999, and February 2002;
- Mini Susenas (with a sample of 10,000 households): December 1998 and August 1999;
- Susenas Core (with a sample of 200,000 households): February 1999, February 2000, and February 2001;

²⁴ February 1996 is the last Susenas consumption module available before the crisis.

- 100 Village Survey (with a sample of 12,000 households): May 1997, August 1998, December 1998, May 1999, and October 1999.

These databases were all collected by Statistics Indonesia (BPS). There were two types of questionnaires on household consumption used: (i) the detailed consumption questionnaire that contains 339 goods, used in Susenas Consumption Module and Mini Susenas; (ii) the aggregated consumption questionnaire that contains only 23 goods, used in Susenas Core and 100 Village Survey. Since the former produces a significantly higher level of household consumption than the latter,²⁵ this difference in the types of questionnaires used has to be taken into account in calculating poverty lines.

Table 5 illustrates how we calculate the poverty rates over time using these primary data. We start by using the poverty rate for February 1999 of 27.1 percent as estimated by Pradhan *et al.* (2001) as the basis. We then use Method I and Method II for calculating changes in poverty lines during the period. Since the regional representation of the databases varies, we use a single national level poverty line – and the national level CPI prices – to calculate the poverty rates.

²⁵ See Sumarto, Suryahadi, and Widyanti (2002).

Table 5: Estimates of Poverty Rates Calculated from Primary Data

Data Source	Period	Method I (%)	Method II (%)
Susenas Consumption Module	Feb 1999	27.1	27.1
	Feb 1996	23.0	18.7
	Feb 2002	14.2	13.1
Mini Susenas	Dec 1998	23.3	22.9
	Aug 1999	19.9	18.7
Susenas Core	Feb 1999	27.1	27.1
	Feb 2000	14.9	14.2
	Feb 2001	11.2	10.3
100 Village Survey	Dec 1998	23.3	22.9
	May 1997	18.0	15.4
	Aug 1998	28.7	28.0
	May 1999	22.5	22.3
	Oct 1999	18.8	18.1

Notes: See text for explanation.

As a first step, using the Susenas Consumption Module for February 1999, we calculate a national level poverty line which produces a national poverty rate of 27.1 percent. Then, using both Method I and Method II, we inflate the poverty line backward and forward to February 1996, December 1998, August 1999, and February 2002. We then apply the estimated poverty lines to the corresponding Susenas Consumption Module and Mini Susenas databases to obtain the estimates of poverty rates for the respective periods.

A similar procedure is then exercised for the Susenas Core data bases. First, using the Susenas Core for February 1999, we calculate a national level poverty line which produces a national poverty rate of 27.1 percent for this database. Then, using both Method I and Method II, we inflate the poverty line forward to February 2000 and February 2001. We then apply the estimated poverty lines to the corresponding Susenas Core databases to obtain the estimates of poverty rates for those periods.

The 100 Village Survey data need to be treated differently for two reasons. First, it was not a nationally representative sample. Second, its sample areas and households are purposively selected to represent the poor. So in this case we calibrate the 100 Village Survey poverty rate to match the other surveys at one point in time. As a first step, therefore, for each method we calibrate the poverty line for the 100 Village Survey December 1998 database so that it produces the same poverty rate as that calculated from the Mini Susenas December 1998. In the final step, we then update the resulted poverty lines backward to May 1997 and August 1998 and forward to May and October 1999, and then calculate the poverty rates in the respective periods.

Confirming the expectation, Method II deflator results in greater changes in poverty rates during the period compared to Method I deflator. In general, however, the differences in the poverty rates produced by both methods are not large.

In addition to these data, we use three studies which estimate poverty rates for at least two points in time during the crisis:

- Gardiner (1999), that used the Susenas Core to create poverty estimates for February 1996, February 1997, and February 1998;
- Strauss *et al.* (2002), that used the Indonesia Family Life Survey (IFLS) to produce poverty estimates for August-November 1997 (IFLS2) and June-October 2000 (IFLS3);
- Frankenberg, Thomas, and Beegle (1999), that also used the IFLS to produce poverty estimates for August-November 1997 (IFLS2) and September-December 1998 (IFLS2+).²⁶

Table 6 shows the original poverty estimates from these studies and their adjusted estimates to make them consistent with the threshold of 27.1 percent poverty rate in February 1999 and changes in poverty according to Method II.²⁷ For Gardiner (1999), in the first step, the poverty estimate for February 1996 of 11.5 percent is changed to 18.7 percent to make it consistent with the estimate for the period in Table 5. In the second step, the estimates for February 1997 and 1998 are then changed proportionally. Since the deflator used in this study has a food share of 0.7, which is quite close to the 0.8 food share in our Method II, there is little need to adjust the deflator.

²⁶ The IFLS2 and IFLS2+ were carried out jointly by RAND and Demography Institute of the University of Indonesia (LDUI), while the IFLS3 was carried out jointly by RAND and Gadjah Mada University. The extended periods for each round are due to the tracking of individuals in the panel survey.

²⁷ Adjustments following Method I cannot be implemented because they require access to the primary data to calculate the predicted household specific food share.

Table 6: Estimates of Poverty Rates from Secondary Data

Study and Data Source	Period	Original Rate (%)	Adjusted to Method II (%)
Gardiner (1999) using Susenas Core	Feb 1996	11.5	18.7
	Feb 1997	9.4	15.3
	Feb 1998	14.8	24.1
Strauss <i>et al.</i> (2002) using IFLS2 and IFLS3	Aug-Nov 1997	17.4	17.4
	Jun-Oct 2000	15.5	15.5
Frankenberg, Thomas, and Beegle (1999) using IFLS2 and IFLS2+	Aug-Nov 1997	11.0	17.4
	Sep-Dec 1998	19.9	33.2

Notes: See text for explanation.

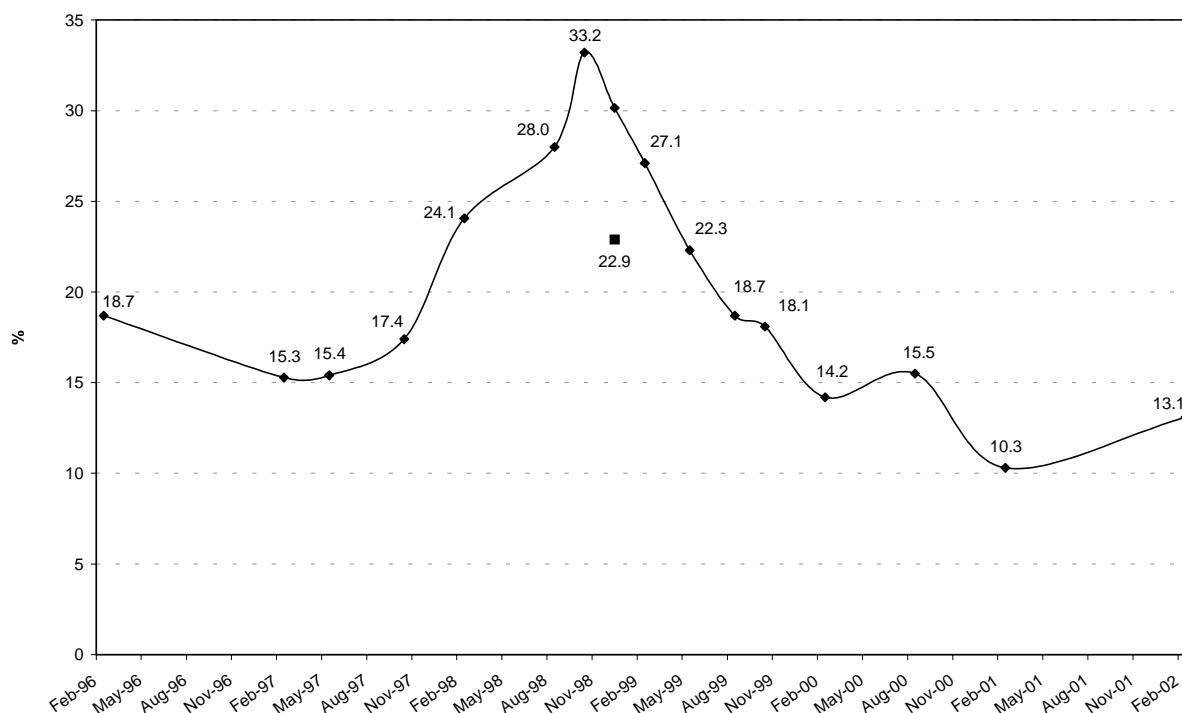
Strauss *et al.* (2002) calculate all poverty estimates following Pradhan *et al.* (2001), which makes their estimates already consistent with the threshold of 27.1 percent poverty rate in February 1999 and changes in poverty according the Method II. Following this, the estimate of Frankenberg, Thomas, and Beegle (1999) for August-November 1997 is adjusted from 11 to 17.4 percent. The estimate for September-December 1998 is then adjusted proportionally plus an amount to take into account the fact that the deflator has a food share of only 0.55. During the period, the increase in Method II deflator is 31 percentage points higher than CPI inflation.²⁸

The reconciliation of all the above estimates using Method II in Tables 5 and 6 is presented in Figure 2. The December 1998 estimate point is not connected because the temporary drop in poverty during this period is difficult to explain. Overall, this series of poverty estimates paints a very reasonable picture, around which the data show a striking consensus, as it neatly tracks known events (devaluation, inflation, rice prices, riots, stabilization, economic growth). Five observations points emerge from Figure 2:

²⁸ The increase in poverty rate due to this factor is approximated as $((0.8-0.55)/(0.8-0.4))*0.31*$ (the percentage point increase in original poverty rates).

- First, the estimates confirm that from February 1996 to around the mid of 1997 the poverty rate fell. This adjustment is important as assuming the poverty rate immediately before the crisis was the same as the February 1996 rate would not give a true picture of the crisis impact on poverty.
- Second, the maximum increase in poverty rate – from the lowest point of around 15 percent just before the crisis to the highest point of around 33 percent at the peak of the crisis – is around 18 percentage points. This implies around 36 million additional people were pushed into absolute poverty due to the crisis. In relative terms, this was an increase of 120 percent from the pre-crisis rate.
- Third, the poverty rate appears to have peaked some time around the end of 1998, which followed the large surge in the price of rice and before the beginning of the stabilization of general inflation in 1999.
- Fourth, after the peak point, the poverty rate started to decline again. It reached the pre-crisis level of around 15 percents at the end of 1999. Therefore, according to this series, the lost time in poverty reduction due to the crisis was around two and a half years.
- Fifth, the poverty rate after this point appears to have fluctuated. During the first half of 2000, it worsened again slightly, then decreased again during the second half of the year until early 2001. During 2001 until early 2002, however, the poverty condition seems to have worsened again.

Figure 2: Consistent Estimates of Poverty Rates, February 1996 – February 2002



VI. Conclusions

In 1997 and 1998, Indonesia was severely hit by the effects of a combined currency, financial, natural, economic, and political crisis, causing the economy to contract substantially. This was made worse by skyrocketing domestic prices, particularly for food. The impact of the crisis on social welfare was substantial and is still continuing years after the crisis began. In this study, we attempt to piece together a consistent series of estimates on the headcount measure of absolute consumption expenditure poverty during the crisis using various primary databases as well as secondary sources.

Given the large change in the relative price of food over the period during the crisis, the comparison of poverty rates over time depends critically on the choice of price deflation and, within that, the choice of the weight (explicitly or implicitly) put on the food price inflation rate. These choices greatly affect the resulting poverty level. On the other hand, computation of the poverty line that adopts the same method in each period may not produce consistent comparisons of welfare. Equivalently, such a method may not produce poverty lines which represent the same material standard of living in the two periods.

The reconciliation of various estimates from various primary and secondary data paints a very reasonable picture of poverty evolution in Indonesia during the crisis and neatly tracks events. The poverty rate increased from the lowest point of around 15 percent at the onset of the crisis in the mid of 1997 to the highest point of around 33 percent nearing the end of 1998. The maximum increase in poverty during the crisis of 18 percentage points implies

that around 36 million additional people were pushed into absolute poverty due to the crisis, albeit temporarily.

The poverty rate peaked some time around the end of 1998, which followed the large surge in the price of rice and before the beginning of the stabilization of general inflation in 1999. After the peak point, the poverty rate started to decline again and reached the pre-crisis level of around 15 percents at the end of 1999. This implies that the lost time in poverty reduction due to the crisis was around two and a half years. However, the poverty rate after this point appears to have fluctuated. During the first half of 2000, it increased again slightly, but then decreased again during the second half of the year until early 2001. During 2001 until early 2002, however, the poverty condition seemed to have worsened again.

References

- Blustein, Paul, 2001, *The Chastening: Inside the Crisis that Rocked the Global Financial System and Humbled the IMF*. Public Affairs, New York.
- BPS and UNDP, 1999, *Crisis, Poverty and Human Development in Indonesia*. Badan Pusat Statistik, Jakarta.
- Deuster, Paul R., 2002, Survey of recent developments. *Bulletin of Indonesian Economic Studies*, 38(1), pp. 5-37.
- Feridhanusetyawan, Tubagus, 1999, The impact of the crisis on the labor market in Indonesia. Report prepared for the Asian Development Bank, Centre for Strategic and International Studies, Jakarta.
- Foster, James, J. Greer, and Erik Thorbecke, 1984, A class of decomposable poverty measures. *Econometrica*, 52, pp. 761-766.
- Frankenberg, Elizabeth, Duncan Thomas, and Kathleen Beegle, 1999, The real cost of Indonesia's economic crisis: Preliminary findings from the Indonesia Family Life Surveys. RAND, Santa Monica, CA, mimeo.
- Gardiner, Peter, 1999, Poverty estimation during the economic crisis. *Insan Hitawasana Sejahtera*, Jakarta, mimeo.
- Imawan, Wynandin and Arizal Ahnaf, 1997, *Pedoman Analisis Data Susenas Bidang Kesejahteraan Rakyat* [Guidelines for Susenas Data Analysis on Social Welfare]. Biro Pusat Statistik, Jakarta.
- Manning, Chris, 2000, Labour market adjustment to Indonesia's economic crisis: Context, trends and implications. *Bulletin of Indonesian Economic Studies*, 36(1), pp. 105-136.
- McLeod, Ross H., 1998, Indonesia. *In* Ross H. McLeod and Ross Garnaut (eds.), *East Asia in Crisis: From being a Miracle to Needing One?*. Routledge, London.
- Papanek, Gustav F. and Budiono Sri Handoko, 1999, The impact on the poor of growth and crisis: Evidence from real wage data. Paper presented at Conference on the Economic Issues Facing the New Government, LPEM-FEUI, August 18-19, Jakarta.
- Poppele, Jessica, Sudarno Sumarto, and Lant Pritchett, 1999, Social impacts of the Indonesian crisis: New data and policy implications. A SMERU Report, February, Social Monitoring & Early Response Unit, Jakarta.
- Pradhan, Menno, Asep Suryahadi, Sudarno Sumarto, and Lant Pritchett, 2001, Eating like which 'Joneses'? An iterative solution to the choice of poverty line reference group. *The Review of Income and Wealth*, 47(4), pp. 473-487.
- Ravallion, Martin, 1994, *Poverty Comparisons*. Fundamentals of Pure and Applied Economics Volume 56, Harwood Academic Press, Chur, Switzerland.

- Sen, Amartya, 1981, *Poverty and Famines: An Essay on Entitlement and Deprivation*. Oxford University Press, Oxford.
- Skoufias, Emmanuel and Asep Suryahadi, 2002, A cohort analysis of wages in Indonesia. *Applied Economics*, 34(13), pp. 1703-1710.
- Skoufias, Emmanuel, Asep Suryahadi, Sudarno Sumarto, 2000, Changes in household welfare, poverty and inequality during the crisis. *Bulletin of Indonesian Economic Studies*, 36(2), pp. 97-114.
- Soesastro, Hadi and M. Chatib Basri, 1998, Survey of recent developments. *Bulletin of Indonesian Economic Studies*, 34(1), pp. 3-54.
- Strauss, John, Kathleen Beegle, Agus Dwiyanto, Yulia Herawati, Daan Pattinasarany, Elan Satriawan, Bondan Sikoki, Sukamdi, Firman Witoelar, 2002, Indonesian living standards three years after the crisis: Evidence from the Indonesia Family Life Survey. RAND, Santa Monica, mimeo.
- Sumarto, Sudarno, Asep Suryahadi, and Wenefrida Widyanti, 2002, Designs and implementation of the Indonesian social safety net programs. *Developing Economis*, 40(1), pp. 3-31.
- Suryahadi, Asep and Sudarno Sumarto, 1999, Update on the impact of the Indonesian crisis on consumption expenditures and poverty incidence: Results from the December 1998 round of 100 Village Survey. SMERU Working Paper, August, Social Monitoring & Early Response Unit, Jakarta.
- Varian, Hal R. (1992), *Microeconomic Analysis*, Third Edition. W.W. Norton & Company, New York.
- World Bank (1999), *Indonesia: From Crisis to Opportunity*. The World Bank, Washington, D.C.