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A New Approach to Modeling the Impacts of Financial Crises on Income Distribution and Poverty

Iwan J. Azis

Most studies attempting to link macroeconomic trends—particularly growth—and poverty have used aggregate cross-country data and unsophisticated regression models with limited usefulness for policy analyses. They do not really explain the mechanisms through which growth, let alone macroeconomic fluctuation, affects poverty. In the context of financial crisis, many studies compare poverty conditions before and after the crisis, as if everything that led to the rise of poverty was due to the financial shock.

The current study is intended to fill the gap, by making use of an economy-wide model with a price endogenous feature, detailed financial sector, and explicit poverty module. Applied to the case of a specific country—Indonesia—the model is subsequently used to generate a set of counterfactual policy scenarios. It is shown that alternative policies during the crisis would have been more favorable in terms of employment, income distribution, and poverty, compared to the actual (benchmark) scenario.

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ABOUT THE AUTHOR

Prof. Iwan J. Azis *of Cornell University and the University of Indonesia is a regular Visiting Scholar at the ADB Institute. On the topic of the Asian Crisis, in early 1998 he spoke before the Joint Economic Committee (JEC) of the U.S. Congress, and was invited to present his views on the Indonesian case at the IMF meeting in Washington D.C. during the fall of 2000.*

He has published on subjects such as ASEAN economies, spatial development, impacts of economic reform, conflicts resolution, exchange rate and capital flows, reform sequencing, and financial crisis. He has authored or co-authored several books, and is currently working on another book on "Modeling Policy Analysis." He received his BA from the University of Indonesia and his MSc and PhD from Cornell University. During 1984-1993 he served as Chairman, Department of Economics, University of Indonesia, and Director of the World Bank-funded Inter-University Center.

Prof. Azis is the author of the earlier ADBI paper to this study entitled Modeling Crisis Evolution and Counterfactual Simulations.

PREFACE

The ADB Institute aims to explore the most appropriate development paradigms for Asia composed of well-balanced combinations of the roles of markets, institutions, and governments in the post-crisis period.

Under this broad research project on development paradigms, the ADB Institute Research Paper Series will contribute to disseminating works-in-progress as a building block of the project and will invite comments and questions.

I trust that this series will provoke constructive discussions among policymakers as well as researchers about where Asian economies should go from the last crisis and recovery.

The conference version of this paper was presented on 7 December 2001 at the ADB Institute's Fourth Anniversary on "Poverty Reduction: Quality of Growth, Governance, and Social Development". (www.adbi.org/povred/pov2001.htm)

Masaru Yoshitomi
Dean
ADB Institute

ABSTRACT

This study—a sequel to ADBI paper no.23—attempts to establish a link between macroeconomic (financial) shocks and poverty by modeling the detailed and complex mechanisms of how household incomes and prices are determined. The model is of a general equilibrium type with an explicit and detailed financial sector. One of the novel features is that the poverty measures are derived endogenously.

Indonesia during 1997-1999 is used as a case. The strong co-existence of economic and political crises not only makes the country most interesting to study, but also forces the model to include a parameter reflecting the political risk, the fluctuation of which is commensurate with the country's risk premium.

There are two major components to the model: (1) the macroeconomic and financial sector; and (2) social indicators such as household incomes, prices, and poverty measures. The macroeconomic part details the relations among macroeconomic variables, e.g., outputs, inputs, general prices including exchange rate, exports, imports, capital flows, interest rates, government budget, and labor market. The general social indicators include unemployment, income distribution, and income poverty. The latter is measured particularly by the headcount ratio, poverty gap, and poverty severity. The main thrust of the study is how to link (1) and (2).

Major sources of household incomes are factor incomes, transfers, and returns on assets. The latter is specified according to Tobin's portfolio model, in which there is no perfect substitutability in the allocation of narrow money, domestic time deposits, foreign time deposits, and equity. The specific allocation is determined by households' preferences and/or tastes.

The benchmark simulations shows that the generated income distribution tends to fluctuate, i.e., worsening towards Stage 6 (May 1998) and Stage 7 (December 1998), and improving towards the end of the simulation period (Stage 8, March 1999). It is revealing that there is a close correlation between worsening (improving) income distribution and the trend of increased (decreased) interest rates. Surely, asset (interest) incomes and windfalls from foreign assets holdings in an environment of super-high interest rates and exchange rate collapse during the crisis have produced a not insignificant effect.

As far as poverty impacts are concerned, the main channel of transmission is through endogenous price changes (affecting the poverty line) and household incomes (affecting the level and patterns of consumption). Under the benchmark simulation, the poverty incidence increases faster in urban than in rural areas. In some rural households (i.e., agricultural workers), the head-count ratio actually drops, since many of them are employed in the plantation export sector, which benefited from currency depreciation. Similar trends are also observed for poverty gap and poverty severity.

Two counterfactual experiments are conducted, i.e., preventing interest rates from rising persistently, and a combination of such a policy with a partial debt resolution.

IV

The results show that these two alternative policies would have produced lower poverty lines. But the per capita household incomes would have been also lower under the policy mix of less tight and partial debt resolution; they are higher only under the less tight interest rates policy. When the poverty line is lower and the per capita incomes decline, the poverty incidence can change in different directions (indeterminate).

In the Indonesian case, however, the results clearly indicate that both counterfactual policies produce lower poverty incidence than in the benchmark case, suggesting that the impacts of prices on poverty are far more significant than the impacts of income changes during the crisis. From this standpoint, the actual policies of removing subsidies at once in order to tighten the budget, and injecting liquidity funds to the banking sector that made the base money surge should have been avoided.

The model is also capable of endogenizing poverty gap (P_1) and poverty severity (P_2). The latter is particularly important since a person that can afford to consume only food that is 1,000 calories short of daily requirements might be 16 times more vulnerable to diseases than a person with a 250 calorie shortfall, not four times as would be the case if the poverty gap measure had been adopted. Should policymakers be concerned with such distributional issues, they must pay more attention to the measure of poverty severity. During the crisis, the increase of poverty severity was higher in urban than in rural areas. This trend is fairly robust, valid for the benchmark as well as the two counterfactual experiments.

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1. Introduction

There is a vast array of literature about income poverty, covering such issues as measurements, determinants, and policies. Studies showing the link between growth and poverty are equally numerous.[1] Most of them, however, have used aggregate data and unsophisticated regression models with limited usefulness for policy analyses. To recommend that "growth contributes positively to poverty reduction" has no particular value to policymaking and asserting that "growth is a necessary condition for poverty reduction" is of not much use to policymakers either. The problem is that these studies do not really explain the mechanisms of how growth affects poverty, let alone in what way various macroeconomic variables impinge on the poverty line and incomes, the two critical variables in income poverty measures.

In the context of a financial crisis, most studies compare poverty conditions before and after the crisis, as if everything that led to the rise of poverty was due to the financial shock. Yet, as in the case of the 1997 Asian financial crisis, various events such as weather (El Niño), massive haze problems from forest fires, and political crises that may occur irrespective of the economic crisis have pronounced effects on socioeconomic conditions, including poverty and income distribution. Unless these different explanatory factors can be disentangled, the related policy analysis could be erroneous.

This study, a sequel to Azis (2001) and Azis (2000a), is intended to fill the gap. More specifically, it attempts to investigate the intricate mechanisms that link the macroeconomic-financial sector with indicators of poverty and income distribution. A fairly comprehensive economy-wide model with a price endogenous feature and detailed financial sector is used. Unlike cross-country analyses of poverty, this study looks at the specific case of a macroeconomic system being perturbed (shocked) in a

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[1] Dollar and Kray (2000) is probably the most quoted study of this type. They used data from 80 countries over four decades, concluding that income of the poor rises one-for-one with overall growth. Accordingly, policy-induced growth is as good for the poor as it is for the overall economy and the effect of growth on income of the poor is no different in poor countries than in rich ones. More surprisingly, according to the study, reducing government spending is even better for the poor than for the rest of the population and neither democracy nor spending on health or education makes any difference to growth cf. Quibria (2002). However, related to these issues, there have been fierce debates and disagreement on the relative weight to be placed on "opportunity," i.e., economic liberalization and growth, and "empowerment," i.e., redistribution of income and other interventions to assist the poor. One episode reflects the gravity of the disagreement. Ravi Kanbur, author of the World Bank's annual *World Development Report, 2001,* being expected to shift the emphasis towards "opportunity," resigned in protest against the adoption of the Dollar and Kray line. His own views are expressed in Kanbur (2001). Kevin Watkins of Oxfam described Kanbur's departure as "marking the ultimate triumph of the Neanderthal tendency within the World Bank."

specific country. The shock to be explored is that caused by the 1997 Asian financial crisis, while Indonesia is the country to which the model is applied.

Among the Asian crisis countries, Indonesia suffered the most in terms of output downfall, exchange rate collapse, and poverty incidence. More important, the co-existence of economic and political crises in Indonesia made the selection of this country even more compelling.

The rationale for using a comprehensive economy-wide model is to enable one to trace the explicit mechanisms through which household incomes and poverty line prices—two important variables in income poverty measures—are affected by, say, capital outflows and an exchange rate collapse, a common phenomenon in a financial crisis. Simulating a model with complex macro-micro interactions such as this one would also avoid the tendency to undermine the effects of the changes in complementary policies during a crisis that facilitate adjustments to the post-crisis equilibrium. Indeed, the importance of interactions among different policies, not just one poverty-reducing policy, has been repeatedly emphasized and supported by ample evidence in many countries (Kanbur and Squire, 2001).

Macroeconomic components of the model have already been described in Azis (2001). Thus, in the next section I discuss only the components that specify two major variables in income poverty estimates, i.e., incomes and prices (more specifically poverty line prices), and show how, given the financial shock in 1997, income distribution and poverty measures can be derived endogenously.[2] Prior to applying the model to the Indonesian experience, I summarize in Section 3 the country's trends in poverty during the crisis and related policies are briefly discussed in Section 4. The application of the model is presented in Section 5.

2. Modeling Household Income, Price Determination, and Poverty Module

Most analysts believe there is little systematic link between changes in a financial shock—or most macroeconomic shocks for that matter—and poverty. The links with income distribution, however, are well known, since many studies in the 1980s have looked at the repercussions of macroeconomic reforms on inequality. The modeling of the latter follows, among others, the macro-micro tradition as described in Bouguignon, Branson, and de Melo (1989).

In the current study, I use an economy-wide model consisting of eight blocks. The model is designed to include a poverty module (see Azis et al., 2001, and Decaluwe et al., 1999).[3] The main data system used is an extended *social accounting matrix* (SAM) combined with the flows-of-funds table covering a detailed financial sector. The eight blocks are for output and factors markets, aggregate demand, prices, income and saving, labor market and migration, investment and capital flows, financial sector, and poverty/inequality measures. In Azis (2001), I have discussed the structure of the model, consisting of almost 900 equations. Here, I will concentrate only on the relevant

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[2] The elaboration of macroeconomic components of the model is also given in Azis (2001) and Azis et al. (2001).

[3] While Decaluwe, Patry, and Thorbecke (1999) was among the first to link a macro-Computable General Equilibrium (CGE) type of model with poverty, their work is more like a stylized fact, not based on actual empirical data.

parts that have important relations with—although seemingly unrelated to—income distribution and poverty.

Take the case of a financial shock that leads to an exchange rate collapse. In addition to standard macroeconomic impacts, such a shock tends to affect also the following variables: prices that low-income households must pay; labor and non-labor incomes; and the fluctuation in the labor market, including migration. As far as impacts on poverty are concerned, changing prices and income levels are the two most important determinants of headcount poverty measures.

Concerning income levels, one of the most dynamic components in the financial block during the crisis is the changing allocation made by agents. More important, in order to translate a financial shock into welfare indicators, one needs to specify agents' behavior in allocating their wealth, which, in turn, determines the stream of incomes (earnings) flowing to different household groups and other institutions.

For the household portfolio allocation (Figure 1), I follow the approach of Tobin (1970); Brunner and Meltzer (1972); Bernanke and Blinder (1988), which was later adopted by Bouguignon, Branson, and de Melo (1989); and Thorbecke et al. (1992): in which it is assumed that there is no perfect substitutability in household portfolio allocation. More specifically, households' wealth is allocated between liquid assets (narrow money) and other assets. The latter is further allocated between time deposit and equity holdings. Hence, there are four assets in the model: narrow money, domestic time deposits, foreign time deposits, and equity. The specific allocation is determined by households' preferences and/or tastes.

Figure 1. Household Portfolio Allocation Decision
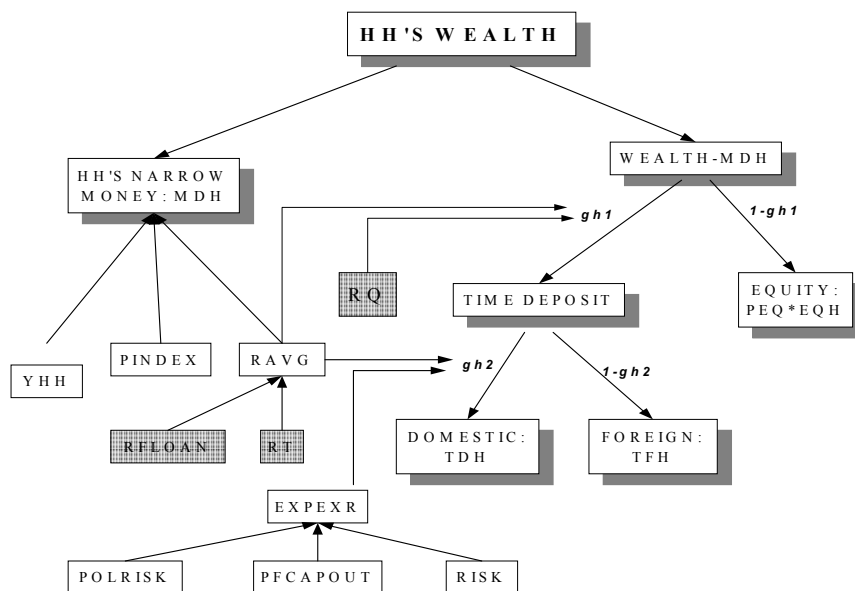
The preference for time deposits and equity is reflected through parameter *gh1*, the size of which is influenced by the expected returns to those assets (*RAVG* and *RQ*).

The choice of holding domestic or foreign time deposits (*TFH* and *TDH*) is also determined by preferences via parameter *gh2*, which is influenced by returns to time deposits *RAVG*, and the expected depreciation *EXPEXR* (see Figure 1). In this way, the portfolio selection is also affected by the country's political conditions in addition to the standard economic risks, since the exogenous political risks, *POLRISK*, affects *EXPEXR*. More specifically, *EXPEXR* is influenced by *POLRISK*, standard economic risk, *RISK*, and private capital outflows (*PFCAPOUT*).[4] The size of households' assets in the form of narrow money (*MDH*) is affected by households' income *YHH*, price index *PINDEX*, and returns to other assets *RAVG*. The latter is expressed as a weighted average of domestic and foreign interest rate (*RT* and *RFLOAN*). Eventually, the total wealth of households (*WEALTH*) will constitute time deposits (*TFH* and *TDH*), equity asset (*EQH*), and narrow money *MDH*.

The selection of foreign or domestic time deposits by the production sector is determined by (as a fraction of) the size of foreign loans and bank loans, respectively. The production sectors' demand deposits, on the other hand, are influenced by the value of total output. Once the portfolio allocation is known, money demand is derived, and so is the amount of loanable funds (bank loans), after taking into account commercial banks' borrowing and reserve requirements.

There are five components of household incomes in the model (*YHH*): in the first bracket on the RHS of equation 1 is factor income *YF*; the second consists of transfers from the rest-of-the-world, inter-household transfers, and government transfers; in the third bracket is household income from after-tax corporate dividends; in the fourth is interest income from time deposits (*TDH* is the time deposit and *OTDH* indicates *TDH* at the initial period); and the last bracket captures the interest income from foreign currency-denominated time deposits.

$$
\begin{aligned}
YHH_{ihh} = & \left(\sum_f factoin_{ihh,f} \times YF_f \right) + \\
& \left[EXR \times ROWTRAN_{ihh} + \sum_{ihh} transihh_{ihh \times ihhh} \times YHH_{ihhh} \times (1-thh) + gtran_{ihh} \times GTRANTOT \right] \quad (1) \\
& + \left[compdist_{ihh} \times (1-ctax) \times YCORP \right] + \left(RT \times OTDH_{ihh} \right) + \left(RFLOAN \times EXR \times OTFH_{ihh} \right)
\end{aligned}
$$

where *factoin, transihh, gtran, compdist,* and *ctax* are all constant parameters indicating the factor income coefficient, inter-household transfer rate, proportion of government transfer to institutions, after-tax transfer rate from corporations to other institutions, and tax rate for corporate income, respectively. Subscripts *ihh* denote household category and *f* denotes factors of production. *EXR, ROWTRAN, GTRANTOT*, and *YCORP* are, respectively, nominal exchange rate, foreign transfer to households, government transfers to households, and corporate income. *RT* and *RLOAN* are interest rates on deposit and on foreign loans, respectively. *TFH* is household foreign time deposits and *OTFH* is *TFH* at the initial period.

Disposable income (*YCONS*) is given by the following equation:

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[4] As *EXPEXR* increases with the loss of market confidence due to deteriorating political conditions, household portfolios shift to foreign assets, including foreign time deposits *TFH* (an increase in *1-gh2*).

$$YCONS_{ihh} = YHH_{ihh} \times (1 - th_{ihh}) \times \left(1 - mps_{ihh} - \sum_{ihh} transihh_{ihh,ihhh}\right) \qquad (2)$$

where *th* and *mps* are household tax rate and marginal propensity to save, respectively. Note that if the interest rate *RT* is raised (as would be typical following a currency depreciation), the *YHH* of household category *ihh* who hold savings (*OTDH*) will also increase. Hence, those who own more time deposits will enjoy higher incomes. Household time deposits *TDH* is derived from household wealth *WEALTH* minus households' narrow money *MDH,* and household demand for foreign currency (*EXR* X *HHFR*, see equation 3; note that *gh* are parameters that correspond to the portfolio allocation depicted in Figure 1). Household wealth is determined by the following variables (equation 5): the sum of current household savings, *HHSAV,* defined as the marginal propensity to save a proportion of income after tax as in equation 4, wealth at the beginning of the period *OWEALTH*, and revaluation of assets due to exchange rate depreciation (affecting the rupiah value of foreign time deposit *OTFH*) and changes in the price of equity *PEQ* (affecting the value of household equity holding *OEQH*). Hence, the size of the time deposits is indirectly determined by incomes. Taken all together, therefore, with a certain time lag, incomes and time deposits are interdependent:

$$TDH_{ihh} = gh_{2ihh} \times gh_{1ihh} \times (WEALTH_{ihh} - MDH_{ihh} - EXR \times HHFR_{ihh}) \qquad (3)$$

$$HHSAV = \sum_{ihh} mps_{ihh} \times YHH_{ihh} \times (1 - th_{ihh}) \qquad (4)$$

$$WEALTH_{ihh} = mps_{ihh} \times YHH_{ihh} \times (1 - th_{ihh}) + OWEALTH_{ihh} + (EXR - EXR0) \times OTFH_{ihh}$$
$$+ (PEQ - PEQ0) \times OEQH \qquad (5)$$

As depicted in Figure 2, an exchange rate depreciation following capital outflows (further exacerbated by short-term foreign debts), will not only affect household income *YHH* through the standard price and factor income channels, i.e., labor income YF(LB) and capital income YF(CP), but also through the interest income of the foreign assets held by households (*TFH*). As the portion of this interest income increases, *YHH* of savers holding *TFH* also increases, causing the value of their savings to rise. When at the same time the deposit rate is raised, this would lead to a significant increase of their incomes, potentially worsening the relative income distribution.[5] Since household savings (*HHSAV*) is a function of income, and as described earlier forms *WEALTH*, by the setting in Figure 1 the time deposits *TD* are also determined by *YHH*. Hence, there is an interdependent link among income, savings, time deposits, and interest incomes (more on this later).

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[5] Note from Figure 2 that government transfers *GTRANTOT*, dividend related to corporate incomes *YCORP*, and transfers from the rest-of-the-world *ROWTRAN* jointly add to the process of income determination (see equation 1).

Figure 2. Potential Negative Impacts of Exchange Rate Depreciation on Income Distribution
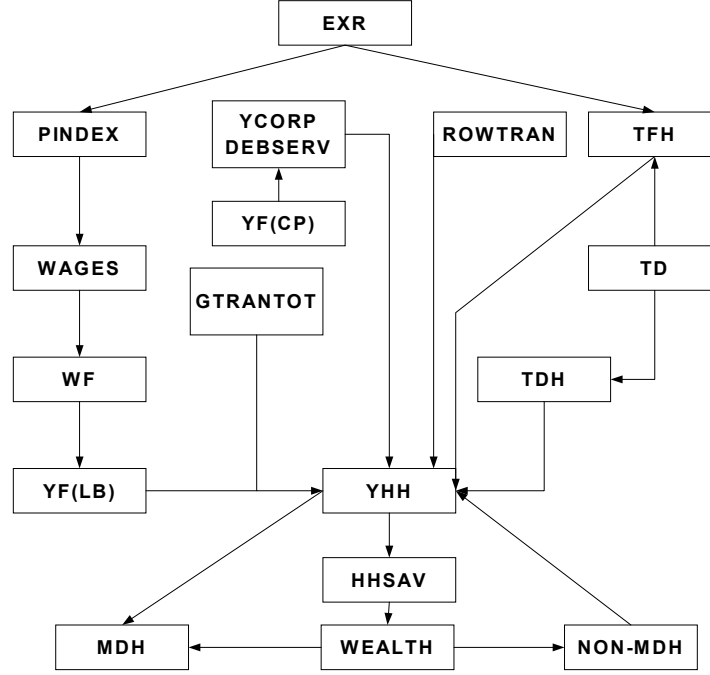
The second most important variable for the calculation of poverty measures is price. In the model, prices are specified through a set of equations that correspond to equilibrium prices. For example, equation 6 shows the equilibrium prices of the Armington goods, equating total supply and demand, in which the latter consists of domestic and import demand ($PD.D + PM.M$),

$$PQ_p = \frac{PD_p \times D_p + PM_p \times M_p}{Q_p} \tag{6}$$

where Q, D, and M refer to total supply of goods available, goods produced and sold domestically, and imported goods, respectively, and subscripts p denotes the economic sector (there are 16 in the current model). PQ, PD, and PM are the corresponding prices. A similar notion applies to the prices of domestic output X as shown in equation 7,

$$PX_p = \frac{PD_p \times D_p \times (1 - tdom_p - ttd_p) + PE_p \times E_p}{X_p} \tag{7}$$

where $tdom$ and ttd are indirect tax rates on domestic goods and trade and transport margin rate on domestic goods, respectively. Note that the above specification is based on a production structure that is modeled as a set of nested constant elasticity of substitution (CES) function. In the first stage, the production function (expressed as value-added) is determined, with primary inputs being the RHS variables in the

equation. Since in most emerging markets a considerable portion of intermediate inputs are usually imported, the composite intermediate inputs *INTM* are necessarily modeled as a CES function of domestic and imported inputs (*DOMINTM* and *FORINTM*). When necessary, one can alter the elasticity of substitution of some of these inputs. In the second stage, domestic output is specified as a CES function of value-added *VA* and composite intermediate inputs. The resulting price of value-added *PV* is:

$$PV_p = \frac{PX_p \times X_p - PINTM_p \times INTM_p}{VA_p}$$
(8)

where *PINTM* is the price of intermediate inputs. The unit price of imported and domestically produced intermediate inputs (*PDINTM* and *PFINTM*) are, respectively,

$$PDINTM_p = \sum_{pp} \{aad_{pp,p} \times PD_{pp}\}$$
(9)

$$PFINTM_p = \sum_{pp} \{aam_{pp,p} \times PM_{pp}\}$$
(10)

where *aad* and *aam* are the share parameters, and subscripts *p* and *pp* refer to the production sector. Given (9) and (10), the following equation for price of composite intermediate inputs is derived:

$$PINTM_p = \frac{PDINTM_p \times DOMINTM_p + PFINTM_p \times FORINTM_p}{INTM_p}$$
(11)

More relevant for poverty measures is the Consumer Price Index (CPI)-related price (*PINDEX*), which is the aggregate prices of Armington goods,

$$PINDEX = \sum_p wtq_p \times PQ_p$$
(12)

where *wtq* is the share parameter. To arrive at the prices of basic needs (prices presumably paid by the poor), the trend of any price index to be used should meet the following conditions: (1) differentiated between urban and rural, and (2) linked to the fluctuation of *PINDEX*. For example, if one uses the average domestic price *PD* (denoted by *PDAVG*), the fluctuation of such prices must be adjusted by *PINDEX* fluctuation. In order to distinguish the rural poverty line prices from the corresponding prices in urban areas, consumption patterns in the two areas have to be taken into account, such that the resulting poverty line prices reflect those actually paid by poor households in urban and rural areas. The different consumption patterns are reflected through the sectoral consumption parameter $\alpha_p^{r,u}$. Hence, the poverty line *PL* for both areas can be written:

$$PL^{r,u} = \left(\frac{PINDEX}{PDAVG}\right) \times \sum \alpha_p^{r,u} \times PD_p$$
(13)

Note that all variables in the above prices are derived endogenously, except for the consumption parameter $\alpha_p^{r,u}$. Once the incomes of different household groups and

the poverty line prices in urban and rural areas are determined, various poverty measures can be applied.

The starting point is to select a basket of Basic Needs (BN) reflecting the consumption pattern of the households around the presumed poverty line and yielding the threshold caloric requirements. Typically, food is by far the most important commodity in this BN basket. If we denote the basket of BN by π_{com}, then the poverty line is essentially $\Sigma_{com} \pi_{com} . P_{com}$, where P_{com} is the endogenously derived poverty line prices. The estimates of poverty incidence in each socioeconomic group can therefore be generated by using the respective poverty lines derived in equation 13.

Having completed income and price specifications, one can capture the impact of macroeconomic financial shocks (e.g., an exchange rate shock) on income distribution and poverty. There are at least two transmission mechanisms. The most direct one is through a decline in nominal incomes or wages, related to collapsed domestic demand (increased numbers of laid-off workers). Another mechanism is through rising prices, especially those of basic commodities, leading to an increase in the monetary poverty line.

Since prices are endogenously determined in the model, given a certain basket of Basic Needs made up of food and non-food commodities, a monetary poverty line is, in effect, also derived *endogenously* (see equation 13).

Before arriving at a poverty measure, one has to determine first the intra-group distributions corresponding to the characteristics of each group. One example of such a distribution, e.g., used in Decaluwe et al. (1999), is the Beta distribution function.[6] For a given household group,

$$f(YHH; p, q) = \frac{1}{B(p,q)} \times \frac{(y - \min)^{p-1} (\max - y)^{q-1}}{(\max - \min)^{p+q-2}} \tag{14}$$

where

$$B(p,q) = \int_{\min}^{\max} \frac{(y - \min)^{p-1} (\max - y)^{q-1}}{(\max - \min)^{p+q-2}} dy$$

, and $YHH \in [\min, \max]$. Parameters *min* and *max* are the minimum and maximum incomes within a household group, respectively, and *p* and *q* are parameters that shape the distribution (when *p* and *q* are larger than unity, if *p>q, p<q*, and *p=q*, the distribution is skewed to the left, skewed to the right, and symmetric, respectively).

Alternatively, one can also use the actual (parametric) distribution in each household category. Whichever distribution function is used, the resulting poverty measures such as headcount index and poverty severity can be determined through FGT specification (see below). For socioeconomic group ihh, the following applies:

$$P_\alpha^{ihh} = \int_0^z \left(\frac{PL - YHH_{ihh}}{PL} \right)^\alpha f^{ihh}(YHH_{ihh}; p_{ihh}, q_{ihh}) dYHH_{ihh} , \tag{15}$$

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[6] The advantage of using such a function is the flexibility it provides in constructing a distribution that corresponds to the unique characteristics of each group.

if Beta distribution is used. Alternatively, one can also use the actual distribution that gives:

$$P_\alpha^{ihh} = \int_0^z \left(\frac{PL - YHH_{ihh}}{PL} \right)^\alpha f^{ihh}(YHH_{ihh})dYHH_{ihh} \, , \tag{16}$$

where PL is the poverty line, distinguished between rural and urban, and α is the poverty-aversion parameter. Based on the above formula, one can calculate the headcount index (P_0), poverty depth (P_1), and poverty severity (P_2).[7] In this study, I use the actual (non-parametric) distributions.

If one were to conduct counterfactual policy experiments, two alternative policies are worth exploring (Azis [2001] simulated precisely these two policy scenarios): preventing interest rates from being raised excessively, and this in combination with partial debt resolution. In the model, the policy-based interest rate is *RSBI,* which is the rate of the Central Bank's certificate known as *Sertifikat Bank Indonesia* (SBI), and the debt service payments to be modified are labeled *DEBSERV.* The transmission mechanisms in such counterfactual scenarios are shown in Figure 3.

Figure 3. Impacts of Higher Interest Rates and Debt Resolution
(Counterfactual Policy Scenarios)

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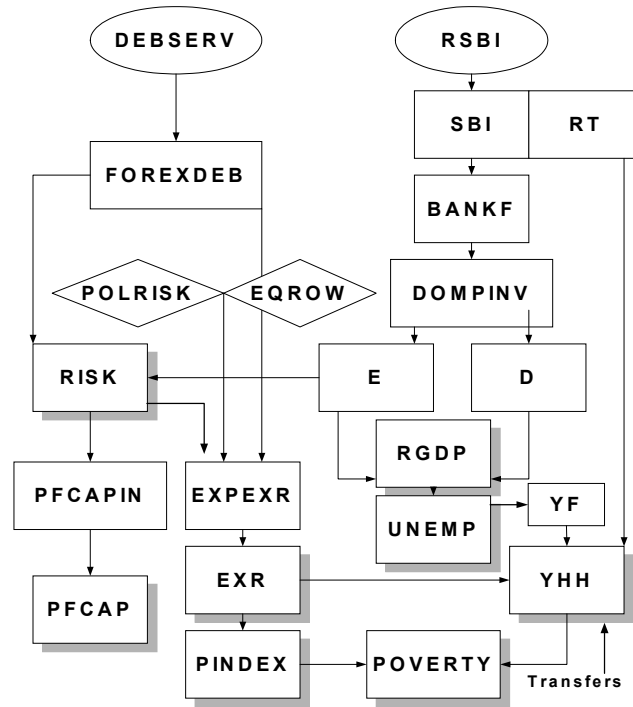
[7] As is well known, the *additively separable* nature of the P_α class of poverty measures permits one to measure poverty for each household group and then calculate *national (social) poverty* as the weighted sum of the group levels, $P_\alpha = \sum_j pop_j P_\alpha^j$, where pop_j is the share of group j in the national population.

Along with the (exogenous) rising political risk *POLRISK* and increased capital outflows *EQROW*, a surge in debt service *DEBSERV* would affect the expected and actual exchange rate (*EXPEXR* and *EXR*), and in turn raise the price index *PINDEX*. Following the aforementioned processes to arrive at the price of poverty line, changes in *PINDEX* will eventually affect poverty indicators (equation 13). On the income side, the household income *YHH* is affected by both the rising interest rate (through savers' interest incomes) and the exchange rate depreciation (through surging local currency values of dollar savings). This is in addition to factor incomes and various types of transfers.

In a crisis situation, the severity of poverty is usually far more important to observe than simply the headcount index. In this context, I will apply the FGT method for the poverty measures (explained below).[8] But like in most SAM-based economy-wide models, the number of households in the SAM classification is usually limited, making the resulting income distribution less meaningful, since it only depicts the distribution between SAM-listed household categories. Therefore, one ought to measure the intra-category (intra-household) distribution of income to yield a poverty estimate. Once done, a comparison between the pre- and post-crisis intra-category distributions can be made. Such a comparison is subsequently confronted with the endogenously derived poverty line in order to generate the evolution of endogenous poverty measures.

Next are the specifications of labor market. A sector's demand for different labor categories (eight in the model) is derived from the first order condition for firms' profit maximization. Thus, sectoral labor demand will depend on its product price, wages, and the prices of intermediate inputs. A composite labor demand function for each sector is postulated as a function of the various labor categories. This is the composite labor input, which appears as an argument in the sectoral domestic output functions. In turn, it has been empirically determined over an extended period in the context of Indonesia that sectoral wage rates are strongly influenced by prices of value-added (*PV*), labor productivity growth, and the inflation rate. Hence, sectoral wage rates are endogenously derived in the present model (see Thorbecke et al., 1992):

$$WAGES_p = PINDEX^{vp} \times \left(\frac{PV_p}{PV0_p} \right)^{(1-vp)} \times \left(\frac{X_p / \sum_p FACDEM_{p,fl}}{PDL0_p} \right)^{\pi p} \tag{17}$$

where *FACDEM* and *PDL*0 are, respectively, factor (labor) demand and labor productivity at the initial period. A key implication that underlies the form of the wage equation is the prevalence of labor market segmentation with wages being strongly sector-specific.

The average wage rates for each labor category are arrived at on the basis of the sectoral wage rates, *WAGES$_p$*, and the wage shares of each type of labor in each sector (*wshare$_{p,fl}$*):

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[8] FGT stands for Foster-Greer-Thorbecke. It is a poverty measure that can be used to estimate not only the incidence of poverty but also its severity (see Foster, Greer, and Thorbecke, 1984). Incidentally, because of its advantageous features, FGT has been adopted as the standard poverty measure in developing countries such as Mexico, as stipulated in Chapter V Article 34 of its Constitution.

$$WF_{fl} = WF0_{fl} \times \sum_p WAGES_p \times wshare_{p,fl} \qquad (18)$$

In a standard model, the labor supply of each category is usually assumed to be fixed in the base year. In the current model, it is assumed that some labor slack prevails (in the form of unemployment or underemployment), and rural-urban migration factors play a role.

In a crisis setting, it is expected that labor would migrate from urban to rural areas (a reverse migration), especially when the urban sector is hardest hit. This is particularly true in Indonesia as the labor market is flexible and most urban dwellers have close ties with their extended families in rural areas. As will be shown subsequently, there is indeed evidence of a major reverse migration. During the crisis, real wages in the rural non-farm sector declined less than in urban activities. This factor, combined with the reverse migration, mitigated partially the potential unemployment consequences of a 14 percent drop in real gross domestic product (GDP) in 1998. The decline in real wages in the farm sector was largely because of the excess supply induced by the urban-rural migration. It is revealing that, largely due to the agricultural sector's role in absorbing these reverse migrants, even during the crisis the employment rate continued to increase, albeit at a slower pace.

The massive urban-rural migration (Table 1) did change the rural-urban composition of the labor supply, causing the spatial unemployment as well as incomes to change.

Table 1. Number of Households and Populations, 1995-1999

	Household Category	1995		1998		1999	
		# Household	# Pop	# Household	# Pop	# Household	# Pop
1.	Agricultural Workers	5,064,667	20,794,316	5,893,304	24,196,504	7,099,082	30,608,337
2.	Small Farmers (land < 0.5 ha)	8,024,174	32,990,982	8,358,655	34,366,184	10,097,924	40,009,288
3.	Medium Farmers (land 0.501 - 1 ha)	3,076,379	13,796,229	3,204,615	14,371,313	2,915,904	13,694,954
4.	Large Farmers (land > 1 ha)	2,190,677	10,697,076	2,281,994	11,142,975	2,379,946	10,618,552
5.	Rural Low (Non-Farm)	6,843,656	28,701,887	7,180,472	30,114,475	7,309,818	29,933,080
6.	Non Labor Force (Rural)	2,795,633	9,097,513	2,933,223	9,545,255	3,051,457	9,877,266
7.	Rural High (Non-Farm)	3,263,466	15,267,947	2,909,464	13,611,768	3,201,555	13,805,324
8.	Low Urban	7,708,983	33,835,022	8,418,047	36,947,134	7,386,730	30,856,354
9.	Non-Labor Force (Urban)	2,660,015	10,197,213	2,904,680	11,135,142	4,130,884	10,131,141

Source: CBS, based on SAM tables.

11

In most standard migration specifications, the Todaro model is normally used, in which labor movements are determined by the growths of earning differentials and employment opportunity. Despite its widespread use, however, such a specification does not necessarily fit well with the actual migration pattern in a country such as Indonesia. In particular, either due to imperfect information or other peculiarities, wage differentials do not always explain the observed labor movements. As shown in Azis (1997), this has indeed been the case in Indonesia. The fact that considerable numbers of people moved from urban to rural areas in 1999 does not seem to match with the trend in wage differentials, e.g., wages in the agricultural sector remained much lower than in urban-related activities, even after the crisis.

It is likely that the bulk of the reverse migration consists of temporary migrants who decided to move for reasons other than wage differentials, e.g., loss of jobs, disappearance of income-generating opportunities, and in some cases the flight to safety due to increased crime rates and deteriorating security conditions in urban areas, especially after the riots of May 1998. The latter may have been the more compelling explanation. On the basis of this argument, I model the migration by making use of the changes in labor demand, *DFL,* to represent labor opportunity, as the explanatory variable:

$$MIG = LS0 \times \{\tau \times \left(\frac{DFL_y / DFL0_y}{DFL_x / DFL0_x} \right)^{\tau L} -1\} \tag{19}$$

where *DFL*0 is the labor demand at the initial period. As shown in the above equation, the labor demand probability is measured by the growth ratio of labor demand in category "y" to labor demand in category "x," where "y" is the expected migration-destination category and "x" is the expected migration-origin category.
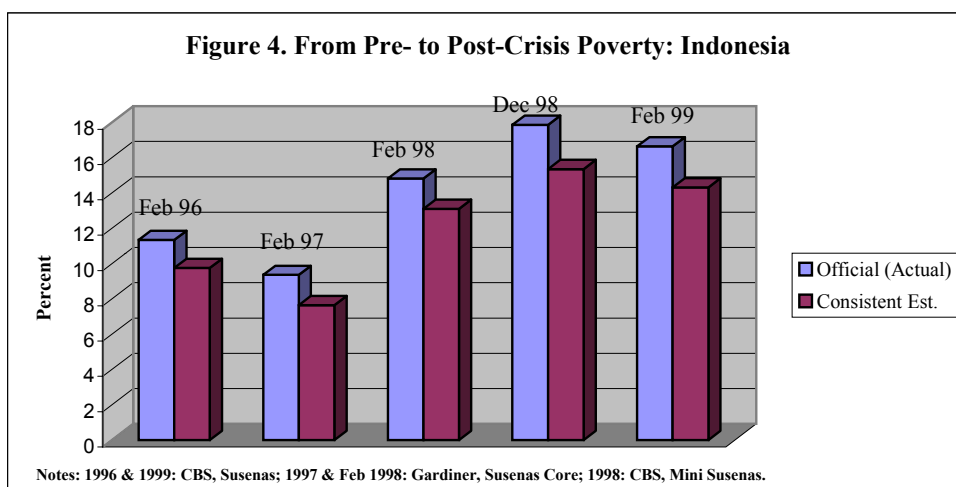
The model specified above is used to simulate the benchmark (actual) scenario and some counterfactual experiments. Before discussing the results of model simulations, let me first discuss some poverty trends and related policies in Indonesia.

3. Evolution of Poverty During the Crisis

There have been several studies attempting to produce consistent estimates of poverty in Indonesia. A methodologically consistent measure implies that the poverty basket is calculated using the same procedure each time, whereas a welfare consistent approach means that an individual is at the same material standard of living in any two periods. By comparing poverty measures based on the two approaches, Suryahadi et al. (2000) claim that the welfare-consistent approach is preferable.

Figure 4 shows the comparative trends of poverty in Indonesia using official numbers and welfare-consistent estimates.[9] Although the size of poverty incidence at any time is different for the two estimates, the trend is similar, i.e., rising poverty from February 1997 (9.4 percent) to February 1998 (14.8 percent), peaking in December 1998 (17.9 percent), before declining in February 1999 (16.6 percent).

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[9] I do not include the methodologically-consistent estimates in Figure 4. It is important to note that, while the welfare-consistent estimates may be preferred because the price index share being used represents the actual consumption pattern of (some of) the poor, as argued by Suryahadi et al. (2000), the fact that it ignores the substitution effects still tends to result in an overestimation of poverty incidence.

Figure 4. From Pre- to Post-Crisis Poverty: Indonesia

Notes: 1996 & 1999: CBS, Susenas; 1997 & Feb 1998: Gardiner, Susenas Core; 1998: CBS, Mini Susenas.

Comparing data collected during different periods of the survey is not valid. Arguably, therefore, one should use a consistent time (month) of the year. This is the reason why February is consistently used in Figure 4. The number for December 1998 is presented in the figure only to indicate the peak poverty rate.[10]

A dramatic surge in inflation, especially if the food component has the largest weight in the bundle, can raise the poverty line significantly. This holds true even if there is no decline, or there is a nominal increase, in consumption expenditures. After enjoying a long period of single-digit inflation, Indonesia's CPI jumped by 78 percent in 1998. More important, as shown in Figure 5, the rate fluctuated sharply. The highest monthly rate was recorded during June-August. Comparing the composition of the official poverty line and the components of inflation, food has indeed the largest weight, and its inflation was continuously highest among all components during August-September 1998. The tragedy of May 1998 that led to the downfall of Suharto caused prices of many basic goods to go up sharply. This raised the poverty line (in current prices) significantly, i.e., its annual growth during 1993-1996 and 1996-1998 jumped from 16 to 41 percent in urban areas, and from 13 to 39 percent in rural areas (see Figure 6). Between 1998 and 1999, the overall poverty line changed slightly (the increase was due to a small upward trend in rural areas). This is also confirmed by Figure 7, showing the evolution of the poverty line across subnational regions.

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[10] It is important to note, however, that the December 1998 data were obtained from the 100 villages survey (mini SUSENAS), suggesting that they are not exactly comparable to other poverty figures.

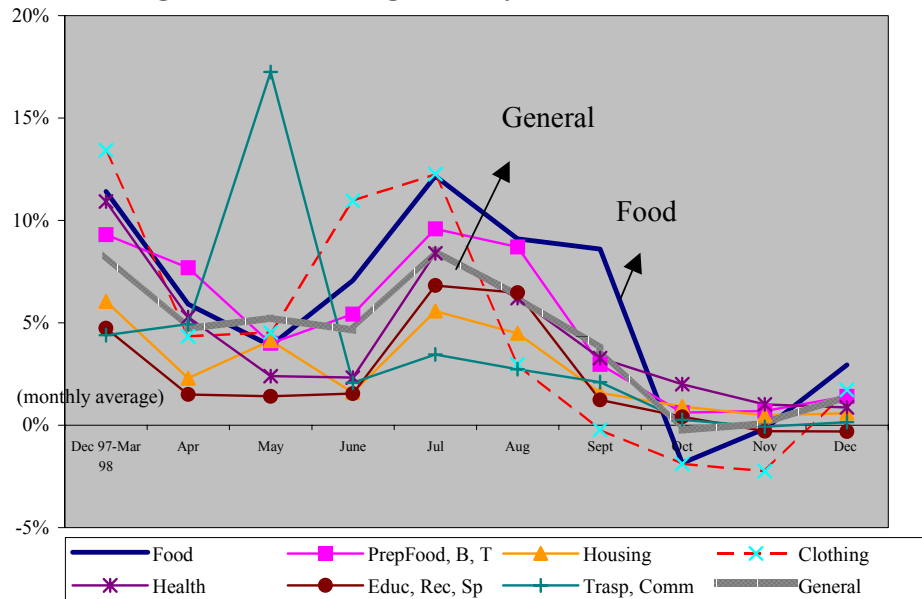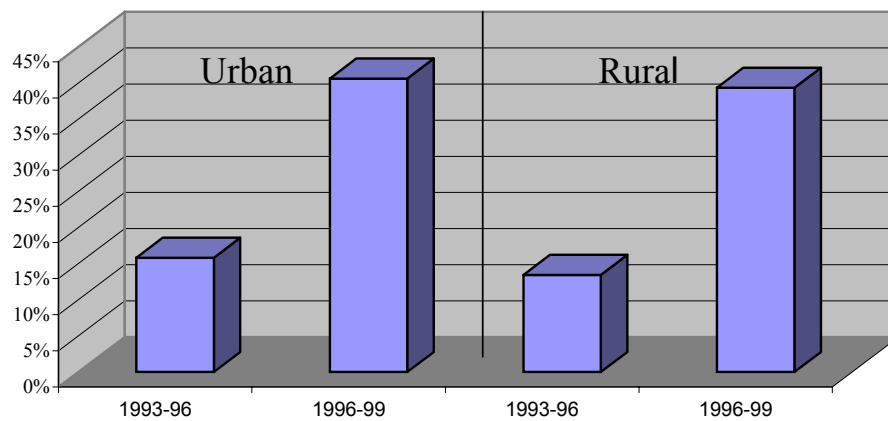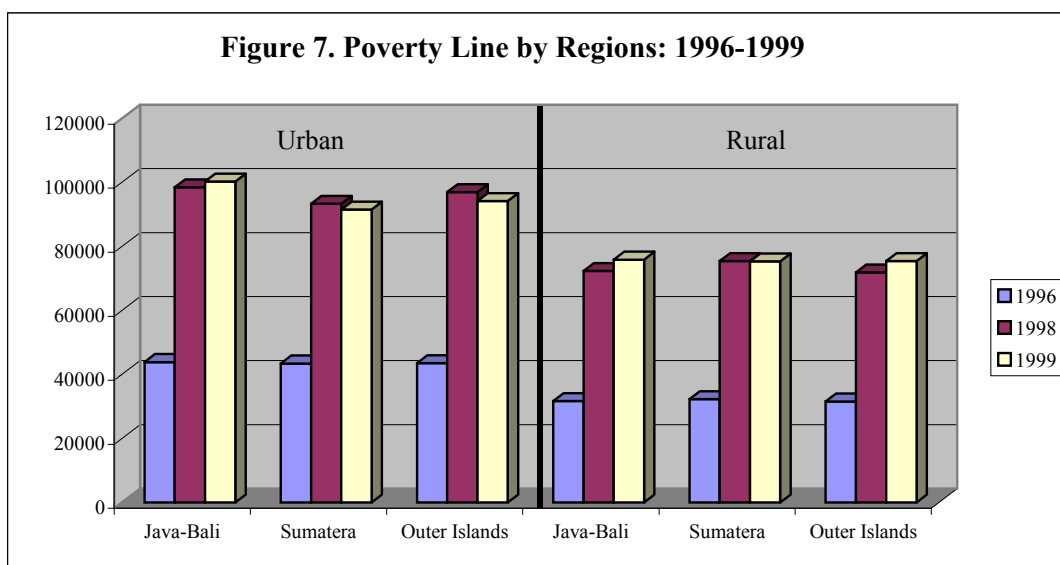**Figure 5. Fluctuating Monthly Inflation Rate in 1998**

**Figure 6. Annual Growth of Poverty Line: Urban and Rural**

Source: LPEM-UI, "*Menghitung Kembali Tingkat kemiskinan di Indonesia, 1990-1999 ,*" final report 2000

Figure 7. Poverty Line by Regions: 1996-1999

The surge of inflation (78 percent) and poverty line (more than 40 percent) would have been enough to increase the poverty incidence in 1998, even with rising nominal income and consumption. In terms of wage income, nominal wages increased by 17 percent during 1997-1998, but real wages in both tradable and non-tradable sectors plummeted by 34 percent. The largest drop occurred in the manufacturing sector (more than 38 percent, see Figure 8). Combined with the fact that the change in employment remained positive even after the crisis (growing by 2.7 percent in 1997-1998), and the unemployment rate increased by "only" less than 1 percentage point (around 0.8 percent according to the Labor Force Survey, *Sakernas*), this suggests that there has been a fairly high degree of flexibility in the labor markets, something that was not entirely expected by most observers, given the country's stage of development and industrialization.[11]

In terms of consumption, the growth of nominal consumption of the lowest two quintiles was as high as 115-120 percent, but in real terms it dropped 6-9 percent. The increase in the nominal consumption of the middle and upper income groups (the remaining three quintiles) was lower, ranging from 102 to 110 percent, and their real consumption also declined more sharply, i.e., between 11 and 14 percent. In turn, real consumption of the top quintile fell by an impressive 24 percent. This has prompted the well-known conclusion that the hardest hit group during the crisis was the country's urban middle class, most of which are on the main island of Java (Azis, 1998 and 2000b).

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[11] The positive growth of employment is almost entirely due to the increase of employment in the agricultural sector. For all other sectors, employment has actually declined. Meanwhile, the increase in unemployment rate (0.8 percent) is clearly lower than that in Thailand and the Republic of Korea, i.e., from 2.3 to 4.8 percent, and from 2.6 to 6.8 percent, respectively (World Bank, 2000).

Figure 8. Annual Growth of Nominal and Real Wages
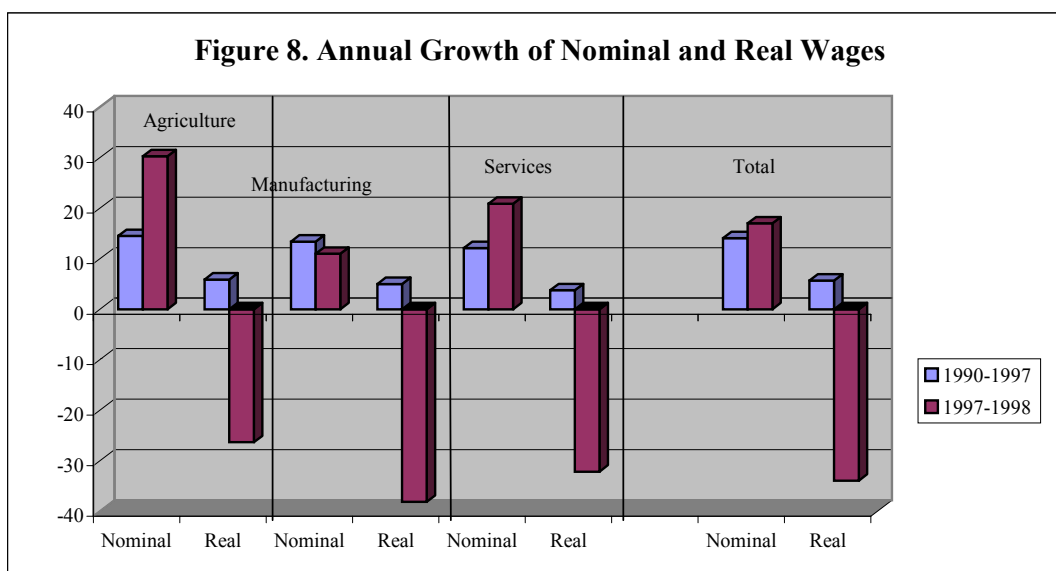
This is also consistent with the finding that, although all FGT poverty indicators (particularly P_2) were significantly higher in rural than in urban areas, these indicators increased significantly more in the latter during the crisis. The amount of resources needed to alleviate poverty, as estimated through the poverty gap measure P_1, would also be larger. This is consistent with the greater downward trend of real wages in essentially urban activities (manufacturing and services) compared to agriculture, as observed in Figure 8, and the trend of reverse migration discussed earlier.

At the same time, the facts that a large number of rice workers reside in Java and the decline of real wages in this region was sharper than in non-Java (Papanek and Handoko, 1999) suggest that poverty conditions in Java must have deteriorated relatively more.[12] Unlike farmers in export-oriented agricultural products, the sharp depreciation of the rupiah created compounded difficulties for rice farmers who depend heavily on imported vital inputs such as quality seeds and fertilizer. This prompted a doubling of rice prices in 1998. Although the incidence of poverty might have gone up relatively less in many regions outside Java, especially in the eastern part of the country, e.g., East Timor, Irian Jaya, Maluku, and East Nusa Tenggara, the actual depth and severity of poverty in these regions have been much greater than in Java.

Another important explanation for a sharp increase in poverty is the large concentration of population whose income is just marginally above the poverty line (the "near poor"). This is particularly true in Indonesia. At the onset of the crisis, the situation was such that with only a 20 percent increase in the poverty line, the number of poor would easily double (Azis, 1998). This re-emphasizes the critical role of poverty

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[12] Indeed, the FGT measure of poverty severity from 1996 to 1998 shows that P_2 in Java's rural areas increased considerably, i.e., from lower to above unity, except in West Java. But even in the latter, the increase was significant, i.e., from 0.26 to 0.66. Changes in poverty severity in Java's urban areas were even more dramatic, e.g., in Central Java and Yogyakarta, P_2 went up from between 0.4 and 0.5 to 2.4 (see Irawan and Romdiati, 2000).

line selection and anti-inflation policies on the one hand, and efforts to keep incomes (consumption) of the "near poor" from falling, on the other.

It can be hypothesized that an important "built-in stabilizer" that might have acted to alleviate an even worse poverty outcome during the crisis is the flexibility of labor markets. An important manifestation of labor mobility is the change in population size in rural and urban areas (reverse migration) during 1996-1999, as discussed earlier. The number of people in urban areas (the last three categories in Table 1) declined by more than six million between 1998 and 1999. On the other hand, the population size of the first two rural groups ("Agricultural Workers" and "Small Farmers"), who happen to be the poorest income groups, increased by 12 million. Even after natural growth is accounted for, this trend suggests that there was a massive urban-rural migration during the period.[13]

As discussed in the preceding section, before arriving at the poverty estimates, one should analyze the income distribution within each SAM-based household category. In this context, I use large-scale data from the nationwide socioeconomic survey known as SUSENAS (*survei sosial ekonomi nasional*). More particularly, the 1996 core SUSENAS survey is used to reflect pre-crisis conditions and compare them with the actual 1999 post-crisis conditions. The SUSENAS sample size is large (at more than 200,000 households). In order to compare the two sets of distributions and make poverty inferences, the 1999 data have to be deflated by an appropriate price deflator.[14]

Figure 9. Cumulative Density Function, 1996 and 1999
(at constant 1996 prices)

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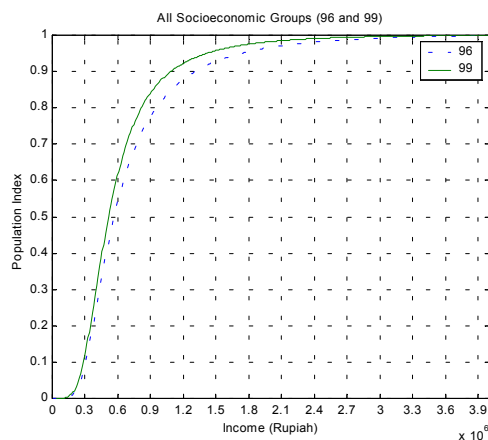
[13] Most observers failed to notice this migration trend primarily because their post-crisis analysis was based on 1998 data, which, as indicated above, did not seem to show the presence of massive urban-rural migration.

[14] Any poverty comparison is highly sensitive to the choice of deflator. In the absence of group-specific or even urban versus rural consumption price deflators, we used the GDP deflator and expressed all distributions in constant 1996 prices. The GDP deflator is quite conservative and likely to underestimate the rise in poverty incidence during the crisis, since food prices rose much more than non-food prices and most poor and near-poor spend a large part of their budget on food.

Figure 10. Parametric Income Distribution for Indonesian Household Groups, 1996 (top figure) versus 1999 (at constant 1996 prices based on GDP Deflator)
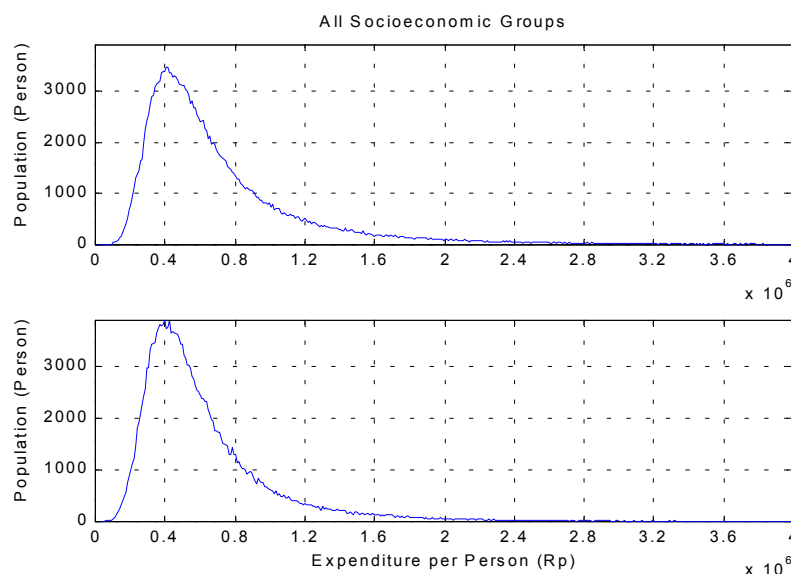

Figure 9 shows the cumulative density functions for the whole of Indonesia for both years. It reveals first order stochastic dominance in 1996, indicating that poverty unambiguously increased after the crisis regardless of where the poverty line is set (Figures 1a-1j in the Appendix reveal the same dominance for each and every household group).

The actual non-parametric expenditure distributions in 1996 and 1999 for all households are shown in Figure 10, and for each of the household categories are shown in Figures 2a-2f in the Appendix. Although an analysis of variance revealed that the total variance of the national distribution increased slightly and that the proportion of within-group variance (eight groups) to total variance increased from 86 percent in 1996 to 94 percent in 1999, what is surprising is that the shape of most intra-group distributions remained similar after the crisis, as can be seen in Figures 2a-2f in the Appendix. Hence, based on such findings, one could use and justify the assumption of constant intra-group distributions in order to calculate post-crisis poverty estimates (roughly for 1999).

4. Policy Environment

As far as policy is concerned, there were various factors behind Indonesia's positive progress in poverty alleviation until the onset of the crisis. These ranged from government emphasis on education and the health sector, a pricing policy for basic consumption goods (such as rice), massive government investment in infrastructure and agricultural technologies, to a fairly successful family planning program. In addition, the country's flexible labor markets also helped to mitigate unemployment problems.

The sudden reversal due to the crisis forced the Indonesian Government to review existing social policies and take emergency measures. As inflation surges

contribute to poverty fluctuations, an anti-inflation strategy had to be designed. Although pursued with various degrees of intensity and not always carried out with full consistency, the Indonesian Government, supported by the International Monetary Fund (IMF), carried out standard macroeconomic policies such as tightening monetary and budget retrenchment policies, although the latter was later relaxed. In addition, some supply-side policies were also undertaken.

The design of a new strategy was difficult since inflation varied among sectors and household groups. Even in the same sector, say, agriculture, some may have to bear the brunt of the crisis due to price increases (e.g., landless farm workers who are net consumers of food), while others may benefit from such increases (e.g., export-oriented plantation farmers). Hence, a more target-oriented measure is needed.

There were three target-oriented programs under the heading of Social Safety Net (SSN) (*Jaringan Pengaman Sosial*): (a) food security: the provision and distribution of nine basic commodities (*sembako*), (b) the provision of basic health services, and (c) temporary job creation through labor-intensive public works programs. The effectiveness of these programs is not easy to evaluate. However, a look at selected data provides some indications.

In health, one of the important indicators is morbidity rate (MR) (feeling of illness). As shown in Table 2, in 1995-1999, all income groups experienced a decrease in morbidity. The poorer quintiles benefited the least from the morbidity decrease 1997 and suffered the most from the increase in 1998. The decrease has been larger for the richer quintiles (Pradhan and Sparrow, 2000b).[15]

Table 2. Morbidity by Consumption Quintile (percent)

Consumption quintile	1995	1997	1998	1999
1 (poor)	23.0	22.3	23.7	22.5
2	24.2	23.5	24.6	23.8
3	25.7	24.8	25.7	24.8
4	26.7	25.7	26.8	25.6
5 (rich)	27.3	25.8	26.6	26.3

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[15] An explanation for the higher morbidity rate among the rich relates to the fact that prior to the crisis, the rich tended to report higher morbidity than the poor. This is because morbidity is self-reported and richer people in Indonesia tend to report themselves sick more often.

Figure 11. Gross Enrollment in Urban and Rural Areas
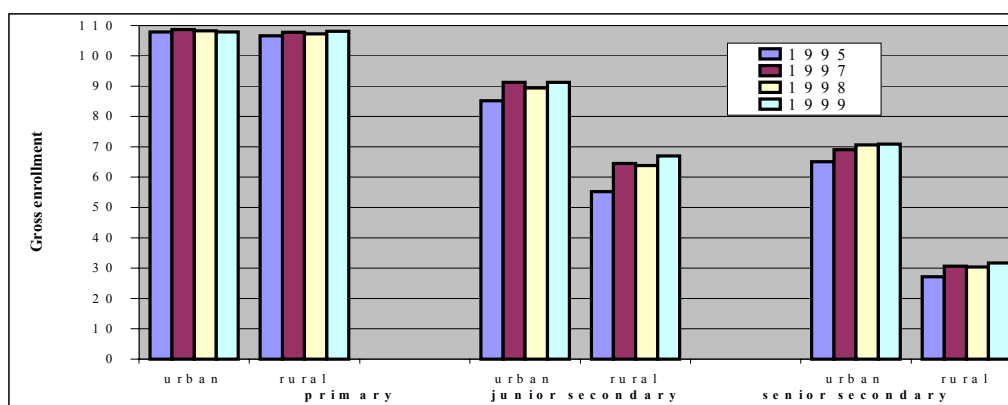
Another important policy, albeit only indirectly related to immediate poverty alleviation, is the provision of scholarships to four million schoolchildren.[16] As depicted in Figure 11, the student enrollment rates did not drop during and after the crisis, suggesting that this program seems to work fairly effectively. More important, early reports show that the main beneficiaries of this scholarship program, covering 6, 17, and 10 percent of, respectively, primary, junior secondary, and senior secondary school students, were largely children from genuinely poor families.[17]

In general, while rather sharp fluctuations can be detected in consumption-based poverty (see Figure 4), the indicators representing deprivation of basic capabilities did not change much during the crisis. Those that were bleak before, remained so after the crisis. In other cases, some indicators show an improvement after the crisis, as in the case of the morbidity rate cited above.

Further data on social conditions also confirm such an assertion. In 1995, a third of Indonesian children under the age of five were malnourished (Dhanani and Islam, 2000), and only around a third of the population aged 10 and above had an educational attainment of junior secondary school. The figure is 70 percent for primary school. Some 13 to 14 percent of this cohort was illiterate. As for housing conditions, in 1996 about a third of households in Indonesia did not have access to safe drinking water. What is important to note is these grim statistics did not change much after the crisis.[18] Hence, the "capability deprivation" indicators (Sen, 1999) tend to be more stable compared to the evolution of consumption-based poverty.

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[16] There was actually another program to support small and medium enterprises (SMEs). However, given the prevailing political economy at the time, it was not entirely clear whether this program (costing some Rp20 trillion plus Rp17 trillion in the 1998/99 budget) would have been in place even in the absence of crisis.

[17] Interestingly, however, this is different from what is revealed in Suryahadi and Sumarto (2001), i.e., only 5 percent of poor students reported receiving the scholarship. The period of coverage and the method of assessing the coverage may have caused the different conclusion.

[18] For example, the number of households without safe drinking water declined to only around 26 percent in 1998 and 1999, while the illiteracy rate also dropped to 10 percent. Incidentally, the United Nations Development Programme (UNDP)-based "human poverty index" (HPI) has remained relatively unchanged, slightly declining from 24 and 25 in 1996/97 to 23 in 1998.

It would be misguided, however, to single out the Government's SSN program. Probably, SSN programs helped prevent income poverty from deteriorating further, especially through the provision of food and temporary jobs. But one ought to take account of the fact that households also tried to cope themselves by either adjusting their consumption or using up their savings. The strong economic growth seen during the previous decades helped boost savings in many households.

There are also problems with the implementation of many SSN programs. Reports indicate that many government-sponsored programs, probably with the exception of the scholarship policy and food distribution, were poorly coordinated and conducted on an ad hoc basis. Empowerment of the poor was not improved and local implementers did not take advantage of local resources. In cases where programs were carried out with some degrees of success, evidence shows that program effectiveness has been uneven and varied from location to location. This is unlike most poverty-alleviation programs conducted by nongovernment organizations (NGOs). The latter put much more emphasis on shared benefits and responsibilities among program recipients and on the readiness of the target group. One of the reasons the NGO programs were more effective is that their scale and coverage were usually more limited.[19]

Another important policy lesson from the crisis is the inadequacy of the more structured and long-term social safety net systems. Indeed, throughout East Asia, social security systems have been lacking, relying almost entirely on fully-funded mandatory savings-based systems. In the Indonesian case, the formal social security system covers less than one fifth of the 90 million labor force, with the following breakdown: 9.1 million in the mandatory provident fund (Jamsotek), which is managed by P.T. Astek; four million in the civil servant pension system (Taspen); five million in the military pension fund (Asabri); and some three million in the voluntary employer-sponsored pension plans (1995/96 data, see Leechor, 1996, and Asher, 2000). It is noteworthy that some workers in the formal sector are excluded from those programs, but more seriously, that informal sector workers are not covered.

Another problem is the poor management of these existing social security systems. The investment management of the funds, amounting to roughly Rp21.1 trillion (5.6 percent of GDP) was constrained by various factors, ranging from poor management skills, lack of investment opportunities, and rigid—yet non-systematized—regulations. Most pension funds were invested in bank deposits and short-term government paper. In the absence of diversification, mismatch is widespread (mostly short term, while pension liabilities are long term). Only a small portion has been invested in equities and entrusted to professionals. Practically none is invested in foreign assets (prohibited by law). The investments' rate-of-return has been roughly 7 percent for the employer-sponsored plans and less than 2 percent in the Astek and Taspen managed funds.

The economic crisis has prompted much debate and discussion about the provision of formal social safety net programs. It also provided a catalyst to reform provident fund investment policies.

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[19] There are, however, some NGO programs that did not work well and were tainted with corruption. But most of such cases were related to either the extension of government programs (not genuine NGO programs), or those that were managed and conducted by "instant" NGOs that simply tried to take advantage of aids and loans from either government or private donors (local and foreign).

As discussed earlier, there has been a fairly high degree of flexibility in Indonesia's labor markets during the crisis, more particularly in the period 1998-1999, mitigating the otherwise unprecedented increase of unemployment. However, beginning in 1999, the Government vigorously pursued a minimum wage policy that could change the trend, i.e., lead to an acceleration in unemployment. In 1996, the mode of the wage distribution was still higher than the minimum wage, but by 1999 and 2000 they were already equal. The results of a recent survey show that the elasticity of total employment to minimum wage is –0.11. The categories that suffer most are females and youths, and less educated workers, with the following elasticity figures: –0.3 and –0.2, respectively. On the contrary, the elasticity for white-collar workers is +1.0 (SMERU, 2001), suggesting that firms tend to have a relatively high elasticity of substitution when they face the choice of employing skilled (white-collar) versus unskilled (blue-collar) workers. Even though the survey is limited in coverage, it is not unlikely that the overall trend would point to the same direction.[20] This suggests that a more vigorous minimum wage policy pursued during difficult times tends to raise unemployment in unskilled labor, forcing many to go into inferior jobs in the informal sector. From the poverty reduction standpoint, such a policy is far from helpful.[21]

5. Model Simulations

In Azis (2001), I have described the sequence of events and shocks during the crisis in Indonesia based on the complete version of the model. It was shown how the transmission mechanisms of the financial shock to the real sector work from Stage 1 (July 1997) to Stage 8 (March 1999). In this section, I will report the income distribution and poverty implications of such a trend. The estimates under alternative policy scenarios are also discussed.

The most immediate impact of the severe economic disruption in 1998 was on real wages. Figure 12 shows the resulting estimates of labor real incomes by labor types. Judging by the index in Stages 6 and 7, the steepest fall appears to occur among the "Clerical Urban," "Professional Urban," "Manual Urban," and "Manual Rural." Despite the recovery in Stage 8, real wages in all categories remain below their baseline levels.

More relevant to equity and poverty is the trend in per capita real incomes of households. Figure 13 shows that urban households, i.e., "Urban High" and "Urban Low," are among the worst hit in terms of the steepness in income fall. Another group receiving a severe blow is the "Rural Low" category. Note that these income figures are obtained after the resulting reverse migration has been taken into consideration; they would have been different if there were no migration. The precise level of income of each household category would depend on the assumptions regarding what happens with the incomes of the migrants. In the current simulation, I assume that the reverse labor migrants will bring their incomes to the new (rural) destination.[22] In some cases,

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[20] The survey covers just 200 workers employed in more than 40 firms in the Jabotabek and Bandung area only.

[21] With the recent decentralization policy, the decision regarding minimum wages is largely transferred to local governments. It remains to be seen whether or not this will accelerate the increase in minimum wages.

[22] In applying such an assumption, labor classification ought to be matched with the household categories used in the model. In particular, I assume that labor migrants from manual urban ("Man-Urb") and

this could potentially raise the per capita incomes of rural-based (e.g., "Agemp") and reduce the incomes of urban-based households (e.g., "Urbanlow"). In other cases, the reverse may be true. As shown in Figure 13, the model simulation suggests that virtually all categories suffer from declining real incomes. Combined with the sharp rise in the poverty price index, this made a major contribution to raising the poverty incidence.

Figure 12. Labor Real Income

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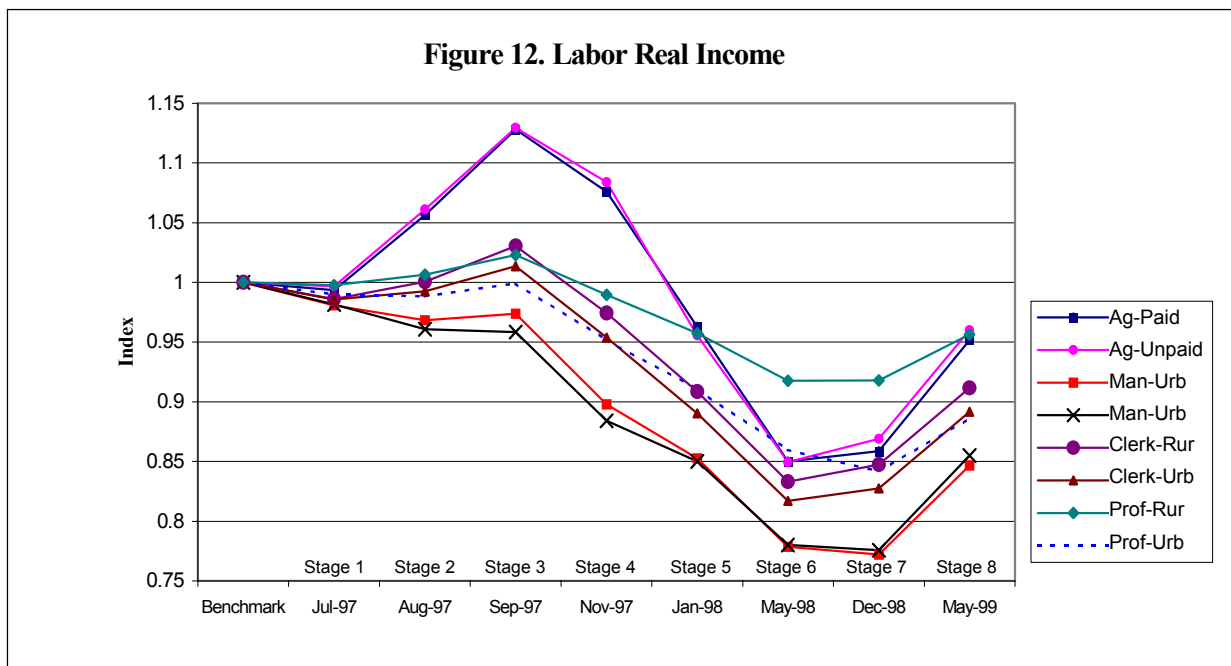
clerical urban ("Clerk-Urb") categories to agricultural workers ("Agemp") will bring their *labor incomes* to their new (rural) destination by adding the *household income* of the "Agemp" category with per-labor income of "Man-Urb" and "Clerk-Urb" times the number of migrants from these two labor categories to the paid agriculture workers ("Ag-Paid"). To arrive at the per capita household income, the aforementioned income is divided by the number of population in "Agemp," including the additional number due to natural growth and migration.

Figure 13. Household Real Income
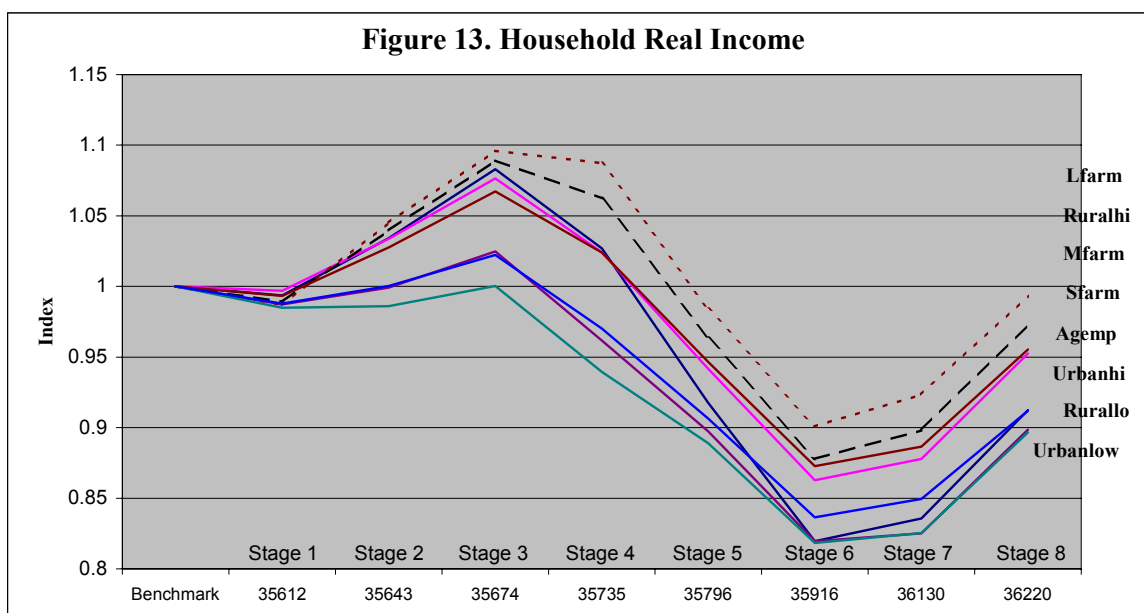
The dynamics of household real income are important to observe since not all incomes are derived from wage earnings. Various forms of transfers are received by low-income groups during the crisis, either through the Government's social safety net and anti-poverty programs, or prompted by a mutual-help process (e.g., *gotong royong*, which is an important institution among rural communities). But from the perspectives of model specification, the most important additional source of earnings is the interest income received by savers, who expectedly belong to the "Urban High" group. Their incomes rise along with an increased interest rate and depreciated exchange rate.

The relatively better position of this group at an early stage of the crisis worsens the overall inequality (Figure 14).[23] Indeed, published data on income distribution also points in this direction. In the subsequent stages, inequality improves. Interestingly, increased (reduced) inequality occurs when the interest rates move upward (downward). The income distribution worsens in Stage 6 (May 1998), when the interest rates are sharply raised in response to massive pressures on the rupiah. At a later stage (Stage 8), the inequality index declines again as the interest rates begin to drop.[24] Hence, there appears to be a fluctuation in inequality, consistent with the Gini coefficient calculated from the SAM 1999.

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[23] The index denotes the income ratio of high-income groups ("FarmLargeLand," "Rural High," and "Urban High") and lower-income households ("FarmWorkers," "FarmSmallLand," and "Rural Low").

[24] The simulation sets the interest rates on SBI to increase dramatically from Stage 5 (January 1998) to Stage 6 (May 1998), and to decline from Stage 7 (December 1998) to Stage 8 (March 1999). This pattern follows the actual trend of SBI rates.

Figure 14. Income Distribution
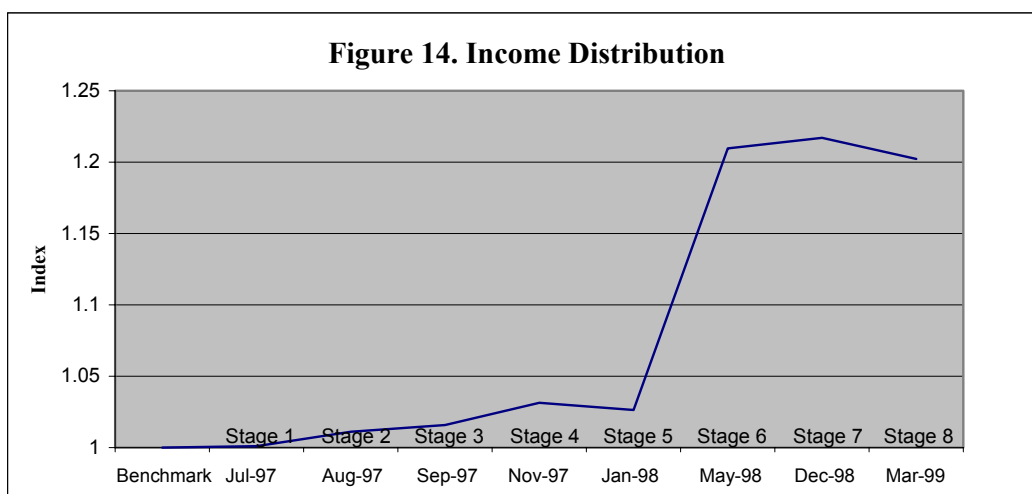
Results from the simulation also indicate that the unemployment rate increases considerably. Yet, the allowance of wage decline and labor mobility (from urban to rural areas, and from the formal to informal sector), which is a prominent sign of a flexible labor market, prevented an even bigger catastrophe from occurring. While during the crisis' peak the unemployment rate may have increased significantly, towards the end of the simulation the recorded unemployment rate shows only a slight increase from the pre-crisis level (1.79%, see Table 3 shown later). Indeed, from the recorded data, the increase in unemployment is surprisingly small, i.e., less than 1 percentage point, according to *Sakernas* data.[25]

Nonetheless, the combined forces of unemployment, declining real wages (incomes), and a surging poverty price could potentially raise the poverty incidence. There is, however, some evidence of consumption smoothing that could lead to a poverty incidence lower than originally predicted.[26] Also, as the poverty price and the CPI dropped in the later stage (Stage 8), the poverty line should have declined as well. The detailed results of poverty measures are discussed below.

As stated earlier, information about intra-group distribution is needed before arriving at poverty measures. In this particular instance, I use a parametric measure of distribution to estimate the poverty incidence, in which the intra-group distribution is directly generated from the SUSENAS-core data with a 206,597 sample size.[27]

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[25] Note that the quoted unemployment figures are not exactly comparable, since the figures under the "End of Simulation" column in Table 3 refer only to Stage 8 (roughly March 1999) of the simulation.

[26] Many households have either changed their food menu (e.g., eating rice once a day, using other less desirable foods the rest of the time), switched to lower priced food (e.g., from imported to domestic produce), or used their accumulated savings to purchase food (dis-saving). There is widespread evidence showing that a smoothing process also takes place in non-food consumption. But the impact on poverty, more particularly on diets, is less serious compared to the case when the smoothing is in food consumption (especially among the poor). It is also important to note that the economic crisis was not the only culprit. During 1997/98, Indonesia also suffered from crop failures due to the fickle global weather (El-Niño) and a massive haze problem. Subsistence farming areas were the worst affected.

[27] Note that since the SUSENAS-core does not distinguish between farmers according to different land sizes (small, medium, and large land owners are lumped together), we have to use only six, instead of eight, household categories in the analysis: four in the rural areas, i.e., agricultural employee ("Agemp"),

Based on the limited number of economic sectors in SAM, in the model simulation the BN basket is limited to only four commodities, i.e., food (rice), other food, textiles, and social services. After approximating the consumption share of each of these goods in the base year's BN consumption for both urban and rural areas (the share of food in the rural BN basket is higher than in the urban BN basket; the share parameters are denoted by $\alpha_p^{r,u}$ in equation 13), I apply equation 13 to generate the price of poverty line *PL*.

The Indonesian statistical office (BPS) provides urban and rural poverty lines based on two extensive baskets of commodities and services (comprising more than 50 items) consumed by the poor. I adopted these BPS urban and rural poverty lines for the base year 1996 (rather than the more limited SAM-based BN basket) and multiplied it by the above derived price indices to obtain the 1999 (post-crisis) poverty lines that are used in the simulation experiments. Recall from earlier discussions that the poverty line is essentially $\Sigma_{com}\ \pi_{com}\ .\ P_{com}$, where π_{com} is a basket of quantities of commodities reflecting basic needs. In the above calculation, the π_{com} used to obtain the price deflator consisted of only four commodities, whereas the π_{com} used to derive the actual poverty line in 1996 is based on more than 50 items.

With the above specifications, the fluctuations of monetary poverty lines in urban and rural areas are commensurate with the movements in the poverty line prices endogenously determined within the model. Subsequently, the changing poverty incidence in each of the socioeconomic household groups can be estimated by applying the respective poverty lines.

As indicated in Section 3, based on SUSENAS core data in 1996 and 1999, the intra-group distributions in both years for each group appear quite similar, suggesting that the distribution in each of the household categories can be assumed to be unchanged. Each group distribution is then adjusted by the change in the mean income of that household group generated in the simulation. Hence, if the mean income of a specific group were to rise by 100 percent in nominal terms, each individual's income within the same group is assumed to increase, likewise, by 100 percent. Therefore, both the poverty line and the household income are derived endogenously in the model.

Table 3 shows the resulting poverty trend (FGT measures) along with the income distribution index, unemployment rates, and selected macroeconomic indicators. Note that the "End of Simulation" column refers to Stage 8 of the simulation, representing roughly March 1999 (see Azis, 2001).

It is clear that as the crisis evolves, the extent of the deterioration of poverty conditions is larger in urban than in rural areas.[28] While the head-count poverty among farmers owning land increases from 21 to 26 percent, and among rural non-farm

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farmers with land ("Farm"), non-farm rural low income household ("Rurallo"), non-farm rural high income household ("Ruralhi"), and two in the urban areas, i.e., low income urban household ("Urbanlo"), and high income urban household ("Urbanhi"). Also, it is important to note that the SUSENAS survey reflects the conditions at around March of the respective year.

[28] Note that the headcount ratio ($\alpha=0$) increases from 14.85 to 19.65 percent, while the actual data based on SUSENAS point to 9.4 and 14.8 percent in February 1997 and February 1998, respectively, and 16.6 percent in February 1999 (see again Figure 4). While the trend of the simulation results is fairly comparable with these data, the discrepancy is due to the fact that I use the core SUSENAS with 200,000-plus sample data, while the official data shown in Figure 4 are based on the SUSENAS module with only 60,000-plus sample data.

households the increase is from 11 to 20 percent (for low income rural) and from 9 to 12 percent (for high income rural), the poverty incidence within the category of agricultural workers drops from 18 to 14 percent. The latter can be explained by the fact that most agricultural workers are employed in the plantation export sector, which benefited from the currency depreciation. In contrast, in the two categories of urban households, the head-count poverty incidence increases, most dramatically among the urban low income, i.e., from 16 to 25 percent. Similar trends are observed for the poverty gap and the severity of poverty indicators. Overall, urban poverty appeared to rise from 12 percent in 1996 to 19 percent in 1999, and rural poverty from 16 to 20 percent. All these trends occur as the macroeconomic conditions deteriorate along with the imposition of a high interest rate policy, i.e., real GDP drops, the exchange rate collapses (by as much as 240 percent) and the country suffers from hyperinflation.

Compared to other Asian crisis countries, the political factor played a much more compelling role in Indonesia. The political uncertainty and deteriorating economic conditions sparked riots, causing serious disruptions in the distribution of major food commodities. This, along with a tremendous amount of funds injected by the monetary authority to prevent the banking sector from collapsing (causing the base money to surge, despite high interest rates), resulted in hyperinflation in 1998. The CPI increased by more than 70 percent, close to what the model estimates, i.e., 74.96 percent (see Table 3). The rising poverty line price index (more-than 70 percent) eventually caused the poverty incidence to increase.

When available resources needed to help alleviate poverty are limited, as is usually the case following a major financial crisis, policymakers should adopt a new priority. In this context, the FGT measures could provide a useful policy guide. The direct policy implications of the P_2 ($\alpha = 2$) is that it is a distributionally sensitive measure. P_0 (*head-count* measure) is totally insensitive to distribution, although this is easier to calculate (and hence more widely used). P_1, known as *poverty gap*, is a measure of shortfall from the poverty line. In P_0, a person who is Rp1 below the poverty line is counted exactly the same way as someone who is Rp1,000 below the poverty line. In contrast, under P_1, each poor person contributes to overall poverty according to their distance (shortfall) from the poverty line.

Table 3. Impacts of High Interest Rate on GDP, Prices, Employment, Income Distribution, and Poverty

	Baseline	End of Simulation	Change
Interest Rate (RSBI)	14.50%	25.00%	10.50%
Real GDP	520615	491341	-5.62%
Exhange Rate	2249	5523	245.58%
Price Index	1	1.7496	74.96%
Poverty Line Price	1	1.7065	70.65%
Income Distribution	1.2081	1.4525	20.23%
Unemployment Rate	7.20%	8.99%	1.79%
Employment	72486	72215	-0.37%
Poverty Measures			
1. Head-count (α =0)			
Agemp	0.1783	0.1417	-3.66%
Farm	0.2096	0.2569	4.73%
Rurallo	0.1136	0.1981	8.45%
Ruralhi	0.0885	0.1212	3.27%
RURAL	*0.1612*	*0.2006*	*3.94%*
Urbanlo	0.1588	0.2520	9.32%
Urbanhi	0.0803	0.1156	3.53%
URBAN	*0.1222*	*0.1863*	*6.41%*
TOTAL	*0.1485*	*0.1965*	*4.80%*
2. Poverty Gap (α =1)			
Agemp	0.0299	0.0227	-0.72%
Farm	0.0421	0.0541	1.20%
Rurallo	0.0183	0.0362	1.79%
Ruralhi	0.0151	0.0219	0.68%
RURAL	*0.0300*	*0.0392*	*0.93%*
Urbanlo	0.0308	0.0561	2.53%
Urbanhi	0.0149	0.0232	0.83%
URBAN	*0.0234*	*0.0403*	*1.69%*
TOTAL	*0.0278*	*0.0395*	*1.17%*
3. Poverty Severity (α =2)			
Agemp	0.0078	0.0057	-0.21%
Farm	0.0132	0.0174	0.42%
Rurallo	0.0048	0.0102	0.54%
Ruralhi	0.0042	0.0063	0.21%
RURAL	*0.0088*	*0.0119*	*0.31%*
Urbanlo	0.0091	0.0183	0.92%
Urbanhi	0.0044	0.0071	0.27%
URBAN	*0.0069*	*0.0129*	*0.60%*
TOTAL	*0.0082*	*0.0122*	*0.40%*

The policy implication is that the poverty gap is the total amount of funds needed to eliminate poverty if perfect targeting were possible (each poor person would receive subsidies equal to their shortfalls). But a case can be made that the poor should be given a weight greater than simply their shortfalls. P_2 gives them a weight equal to the square of these shortfalls. Hence, a person that can afford to consume only food that is 1,000 calories short of daily requirements might be four times more vulnerable to diseases than a person with a 500 calorie shortfall (not twice as would be the case if P_1 had been adopted).

A policymaker who is concerned about achieving a more equal income distribution should adopt P_2 as his/her poverty measure to be minimized.[29] At the other extreme, a policymaker who is totally indifferent to distributional objectives would use P_0. The poverty conditions worsen more in urban than in rural areas, i.e., 6.41 versus 3.94 percentage point, 1.69 versus 0.93, and .60 versus 0.31 according to, respectively, head-count ratio, poverty gap, and poverty severity. Given the limited resources available for poverty alleviation following the crisis, and the urgency to mitigate the impact upon the severity of poverty, the results shown in Table 3 should be of value for, say, targeting purposes.

From the analysis of the poverty trend, therefore, one can surmise that the crisis has hit urban households more negatively than rural households. This result is the combined outcome of two forces, a lower increase in households' nominal income and a faster increase in poverty line prices in urban areas than in rural areas.

Figure 15. Macroeconomic and Social Indicators: Simulation Results
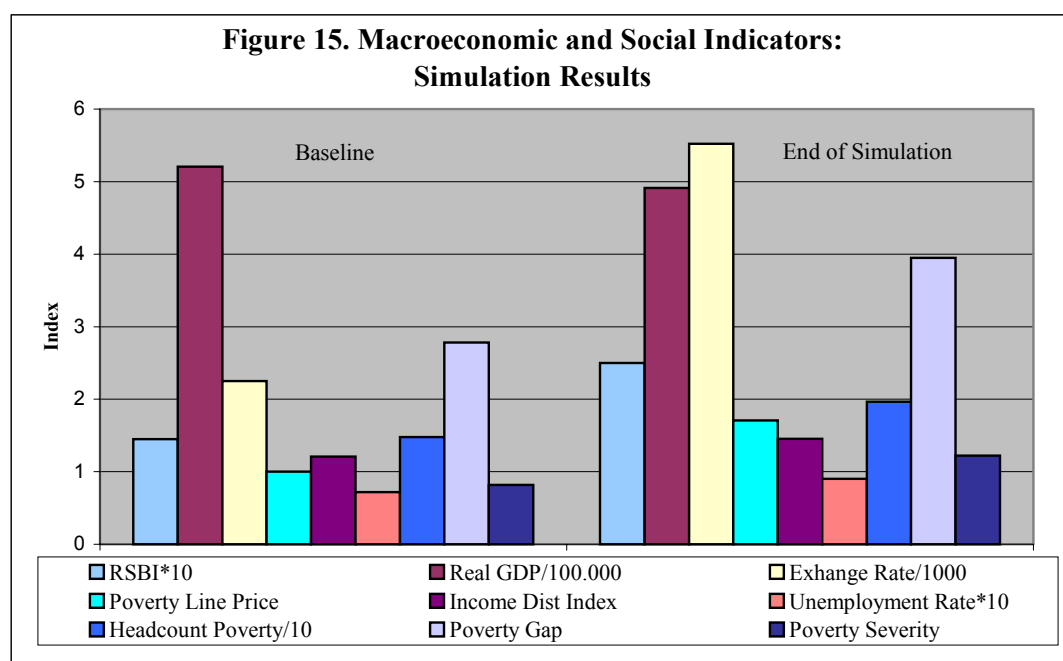
Figure 15 (summarizing Table 3) clearly exemplifies that the macroeconomic policy response during the crisis could not prevent macroeconomic conditions from deteriorating and produced worsening social conditions. Despite the tightening policy (high interest rates), the exchange rate collapsed. The economy fell into recession (falling GDP), although the resulting increase in unemployment was relatively small due to the flexibility of the country's labor market. While the relative income distribution particularly between urban and rural areas could potentially improve due to more severe impacts on urban areas, the high interest rate policy and continued

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[29] For example, the Mexican Constitution mandates that health, education, and other welfare public expenditures among regions be allocated so as to minimize P_2.

depreciation of the rupiah disrupted the process by creating a windfall for large savers (mostly urban), causing the income distribution to worsen.

In Azis (2001), I have shown the macroeconomic results of counterfactual tests by experimenting with two sets of policy response to the crisis, i.e., less-tight monetary policy, labeled "Less tight" and a combination of such a policy with partial debt resolution (labeled "Less tight & debt"). All these alternative policies are imposed at the time of the IMF arrival in October/November 1997 (Stage 4). The results of these alternative policies are subsequently contrasted with the results discussed above, which are based on the estimated actual trend, hereafter "Benchmark (IMF)."

The generated income distribution from the exercise is rather interesting. Up to Stage 5, all scenarios produce an improvement, but in the subsequent stages, there is clearly a worsening trend of inequality (Figure 16). The resulting difference between "Less tight" and "Less tight & debt" is small and almost overlapping on the figure, but still favoring the latter. It is revealing that there is a close correlation between the worsening (improving) trend of income distribution and the increasing (lowering) interest rate. Surely, the interest incomes and the windfall from foreign asset holdings (e.g., time deposits in foreign currency) in an environment of super-high interest rates and a severe collapse of the exchange rate have contributed to such a relation.

Figure 16. Income Distribution: Benchmark & Counterfactuals
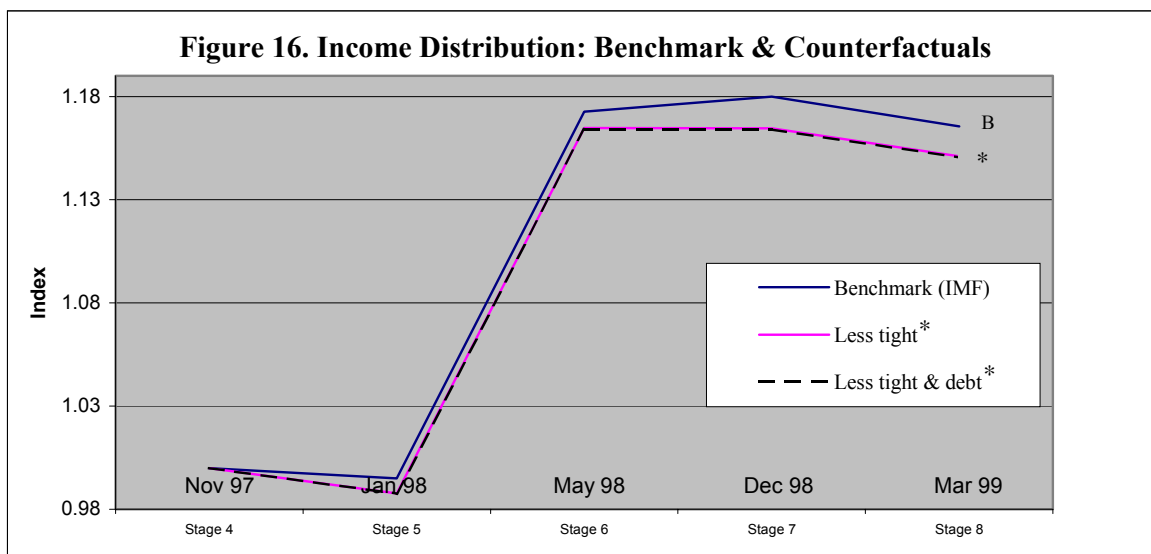
∗ N.B. Lines almost overlapping

Nevertheless, the relative income distribution under the "Benchmark (IMF)" is clearly the least preferred one; the outcome is persistently worst among the three scenarios.[30]

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[30] Note that the inequality measure used in this study is derived from the mean incomes of the SAM-based eight household groups. Each intra-group distribution is assumed to remain the same as in the base (1995/6) period. Yet, in the present context, this is a defensible assumption, as a comparison of the actual pre- and post-crisis group distributions in Appendix Figs.2a-2i suggest.

The numerical effects of the scenarios on prices show that up to Stage 7 the "Benchmark (IMF)" produces the highest price index. The gap is largest in Stage 6, though prices are converging in the remaining stages. In fact, in Stage 8 both the price and the poverty line price levels under the "Benchmark (IMF)" are slightly lower than under the "Less tight" scenario (Figures 17 and 18). Nonetheless, for the entire period, the poverty line price level is still highest under the "Benchmark (IMF)" experiment.

Figure 17. Prices: Benchmark & Counterfactuals

Figure 18. Prices for Poverty Line: Benchmark & Counterfactuals
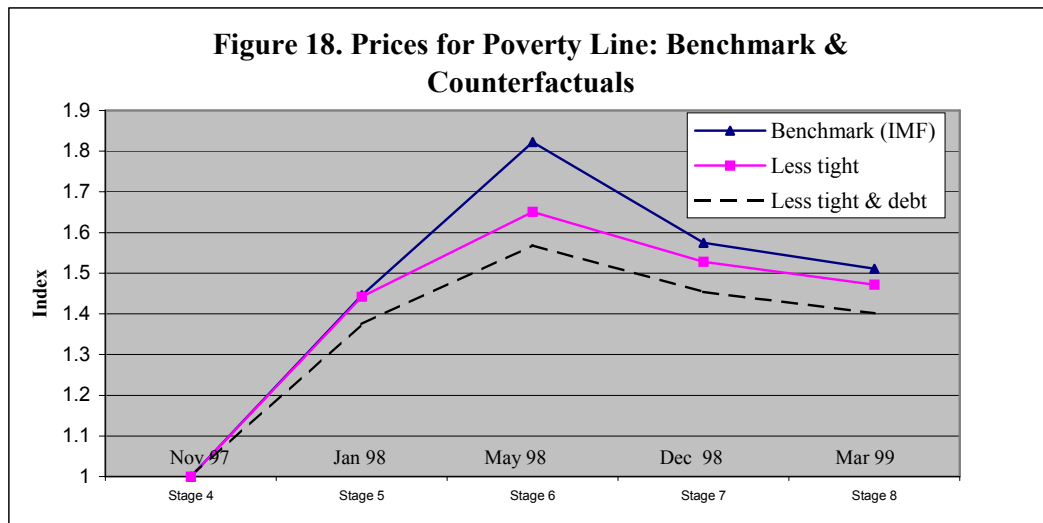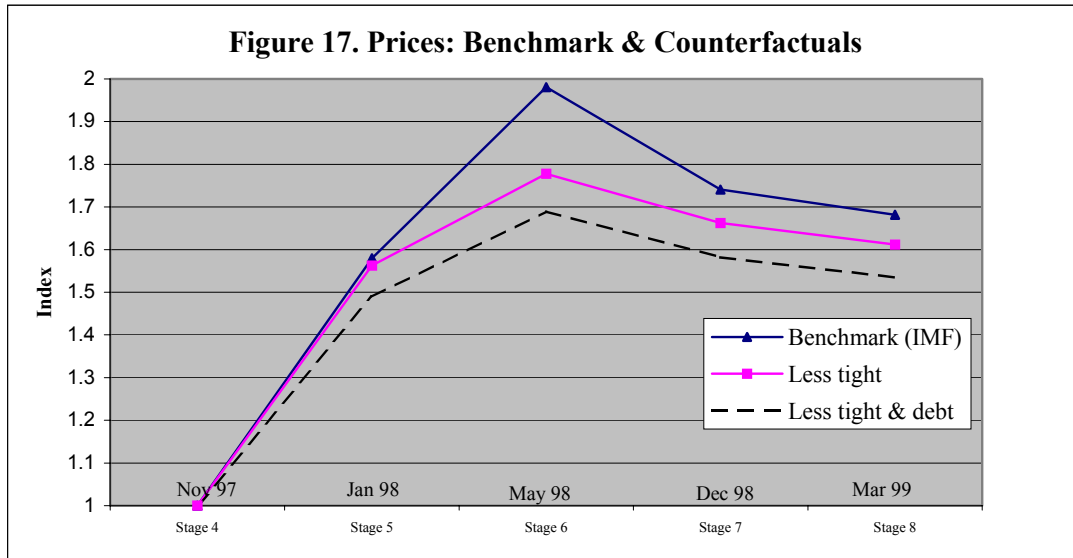
With such a trend of poverty line prices, the FGT poverty measures can be derived endogenously. Table 4 shows the results. The headcount poverty measure clearly indicates that the "Less tight" scenario produces lower poverty incidence, 15.4 compared to 19.6 percent. In all household categories, the poverty incidence is lower. Comparing the "Less tight & debt" with "Less tight," however, yields an interesting outcome. While a joint-policy of avoiding high interest rates and resolving some of the debts produces a slightly higher poverty incidence for "Farm" and "Ruralhi," causing the increase of rural poverty to be higher, for all other categories the policy produces a lower headcount ratio. In urban areas, for example, the ratios for both types of household, i.e., "Urbanlo" and "Urbanhi" are smaller, i.e., 20.17 versus 20.30 percent, and 9.33 versus 9.40 percent, respectively. Overall, the headcount ratios under the two counterfactual scenarios are almost the same; under "Less tight & debt," the ratio would have been only slightly lower.

A different pattern is observed in terms of poverty gap ($\alpha=1$) and poverty severity ($\alpha=2$). Due to the greater weight of rural poverty for these two measures, the "Less tight & debt" scenario produces greater increases in the overall (total) poverty gap and severity compared to what the "Less tight" experiment yields.

Although the difference in the ratios does not seem to be large, and they remain higher for urban compared to rural areas, the resource allocation for poverty alleviation could be slightly different between the two. Relatively speaking, had policymakers followed the FGT formula, the amount of resources allocated to rural areas should have been larger in "Less tight & debt" than in "Less tight," although the amount would have still been smaller compared to those allocated to urban areas.

If policymakers are also concerned with the issues of distribution among the poor, they should be aware of the fact that the increase in the rural poverty severity in "Less tight" is less than in the "Less tight & debt" scenario. On the other hand, the increase of poverty severity in urban areas under the former is larger than that under the latter.

It is therefore clear that not only the macroeconomic indicators but also the poverty conditions would have been better if Indonesia had not stuck too rigidly with the IMF-style policy (for more detailed macroeconomic impacts, see Azis [2001 and 2002]; for broad discussions on the policy response to the crisis, see Hill [1999]). These counterfactual experiments demonstrate that the policy scenario of not raising interest rates would have created potential benefits in terms of poverty and income distribution. Further, the combination of non-high interest rate and partial debt resolution at the early stages of the crisis appear to be the most preferred scenario from the perspective of these social indicators.

Table 4. Endogenous Poverty Measures: Benchmark and Counterfactual Simulations

Benchmark	Baseline			End of Simulation		
("Benchmark & IMF")	α=0	α=1	α=2	α=0	α=1	α=2
Agemp	0.17830	0.02990	0.00780	0.14170	0.02270	0.00570
Farm	0.20960	0.04210	0.01320	0.25690	0.05410	0.01740
Rurallo	0.11360	0.01830	0.00480	0.19810	0.03620	0.01020
Ruralhi	0.08850	0.01510	0.00420	0.12120	0.02190	0.00630
RURAL	*0.16120*	*0.02996*	*0.00884*	*0.20064*	*0.03924*	*0.01192*
Urbanlo	0.15880	0.03080	0.00910	0.25200	0.05610	0.01830
Urbanhi	0.08030	0.01490	0.00440	0.11560	0.02320	0.00710
URBAN	*0.12219*	*0.02338*	*0.00691*	*0.18632*	*0.04026*	*0.01291*
TOTAL	*0.14850*	*0.02782*	*0.00821*	*0.19649*	*0.03954*	*0.01220*
Non-high Interest Rate	Baseline			End of Simulation		
("Less tight")	α=0	α=1	α=2	α=0	α=1	α=2
Agemp	0.17830	0.02990	0.00780	0.11730	0.01780	0.00430
Farm	0.20960	0.04210	0.01320	0.19560	0.03890	0.01200
Rurallo	0.11360	0.01830	0.00480	0.15040	0.02570	0.00690
Ruralhi	0.08850	0.01510	0.00420	0.09690	0.01680	0.00470
RURAL	*0.16120*	*0.02996*	*0.00884*	*0.15502*	*0.02858*	*0.00831*
Urbanlo	0.15880	0.03080	0.00910	0.20300	0.04250	0.01320
Urbanhi	0.08030	0.01490	0.00440	0.09400	0.01790	0.00530
URBAN	*0.12219*	*0.02338*	*0.00691*	*0.15052*	*0.03065*	*0.00940*
TOTAL	*0.14850*	*0.02782*	*0.00821*	*0.15371*	*0.02918*	*0.00863*
Non-high Interest Rate &	Baseline			End of Simulation		
Partial Debt Resolution	α=0	α=1	α=2	α=0	α=1	α=2
("Less tight & debt")						
Agemp	0.17830	0.02990	0.00780	0.11500	0.01750	0.00430
Farm	0.20960	0.04210	0.01320	0.19750	0.03940	0.01220
Rurallo	0.11360	0.01830	0.00480	0.14980	0.02550	0.00690
Ruralhi	0.08850	0.01510	0.00420	0.09710	0.01690	0.00470
RURAL	*0.16120*	*0.02996*	*0.00884*	*0.15539*	*0.02872*	*0.00840*
Urbanlo	0.15880	0.03080	0.00910	0.20170	0.04220	0.01310
Urbanhi	0.08030	0.01490	0.00440	0.09330	0.01770	0.00530
URBAN	*0.12220*	*0.02338*	*0.00691*	*0.14950*	*0.03040*	*0.00934*

6. Concluding Remarks

As the title suggests, this study attempts to model the link between a macroeconomic (financial) shock (i.e., the 1997 Asian financial crisis) and household incomes, prices, and poverty measures using a new approach. This is based on a fairly complex macroeconomic model in which poverty measures are derived endogenously. With the constructed model, I analyze various channels and transmission mechanisms through which financial and macroeconomic perturbations, combined with political instability and other exogenous changes, could affect the socioeconomic system.

I use Indonesia as a case study, since among the Asian crisis countries, it has suffered the most in terms of output downfall, exchange rate depreciation, hyperinflation, and deteriorating social conditions. The strong coexistence of economic and political crises in Indonesia also made the country more interesting to study.

The model has two major components: (1) the macroeconomic and financial sector, and (2) social indicators such as household incomes, prices, and poverty measures. The macroeconomic part details the relations among macroeconomic variables, e.g., outputs, inputs, general prices including exchange rate, exports, imports, capital flows, interest rates, government budget, and the labor market. The general social indicators include unemployment, income distribution, and poverty. The latter is measured particularly by the headcount ratio, poverty gap, and poverty severity (FGT measure). The main thrust of the study is how to link (1) and (2).

It is shown that, given a particular shock in the system, be it financial, political, other exogenous changes, or a combination of them, the model is capable of estimating the repercussions on macroeconomic variables, income distribution, and poverty measures, such that they replicate closely the actual trend and data. The benchmark simulations show that the generated income distribution tends to fluctuate, i.e., worsening towards Stage 6 (May 1998) and Stage 7 (December 1998), and improving at the end of the simulation period (Stage 8, March 1999). It is revealing that there is a close correlation between worsening (improving) income distribution and the trend of increased (decreased) interest rates. Surely, interest incomes and the windfall from foreign asset holdings in an environment of super-high interest rates and exchange rate collapse have produced a not insignificant effect.

As far as the poverty impact is concerned, the main channel of transmission is through endogenous price changes (affecting the poverty line) and household incomes (affecting the level and patterns of consumption). Compared to other Asian crisis countries, political factors played a much more compelling role in Indonesia. The political uncertainty and deteriorating economic conditions sparked riots, causing serious disruptions in the distribution of major food commodities. This, along with massive amounts of liquidity supports injected into the banking sector (BLBI) caused hyperinflation in 1998. The resulting increase of the poverty line price (by more than 70 percent) eventually caused the poverty incidence to increase.

The benchmark simulation shows that the worsening poverty is more pronounced in urban than in rural areas. The poverty incidence in some rural households, i.e., agricultural workers, even drops, mainly because many of them were employed in the plantation export sector, which benefited from the currency depreciation. Similar trends are also observed for poverty gap and severity of poverty indicators.

Elsewhere, I have exposed the macroeconomic results of counterfactual tests by experimenting with two sets of policy response to the crisis, i.e., less tight monetary policy and a combination of such a policy with a partial debt resolution. The results, contrasted with those of the benchmark, demonstrate that the general macroeconomic outcomes would have been better.

In the current study, the counterfactual experiments show that, overall, the alternative policies would have produced a lower poverty line. But the per capita household incomes would have been also lower under the policy mix of less tight and partial debt resolution; they are higher only under the less tight monetary policy. When the poverty line is lower and per capita incomes decline, poverty incidence is

indeterminate. In the Indonesian case, however, the results clearly indicate that both counterfactual policies would have produced a lower poverty incidence than in the benchmark case, suggesting that the impacts of prices on poverty are far more significant than the impacts of income changes during the crisis. From this standpoint, it would have been important for the Indonesian government to mitigate political instability by avoiding drastic measures such as removing subsidies at once, and to avoid injecting funds into the banking sector that caused the base money to surge (despite high interest rates).

From policy perspectives, a case can be made that the poor should be given a weight greater than simply their shortfalls. A person that can afford to consume only food that is 1,000 calories short of daily requirements might be 16 times more vulnerable to diseases than a person with a 250-calorie shortfall (not four times as would be the case if the poverty gap measure had been adopted). Should policymakers be concerned with such distributional issues, they must pay more attention to the measure of poverty severity. If indeed resources for health, education, and other welfare public expenditures are to be allocated so as to minimize the impact of the financial crisis on poverty severity, the allocation rule should follow the resulting trend of P_2 for different household categories in different regions. In this context, the model simulation shows that in the Indonesian case, the increase of poverty severity has been higher in urban than in rural areas. Such a trend is fairly robust, valid for the benchmark, as well as the two counterfactual experiments.

While the focus of this study is income or consumption poverty, it is widely recognized that a better definition should include such factors as health status, literacy, etc. I have discussed some of these variables in Section 3, confirming that they generally tend to be more stable during a crisis. Although Indonesian data indicate that some conditions have actually improved, it is too simplistic to associate the improvements with the success of the Government's SSN programs. Many households have tried to cope themselves by either adjusting their consumption, or using up their savings, a situation made possible by the strong economic growth during the past decades that helped boost their savings. The implementation of SSN programs has been far from satisfactory. Reports show that many government-sponsored programs, probably with the exception of the scholarship policy and food distribution, were poorly coordinated and conducted on an ad hoc basis. More important, empowerment of the poor was not enhanced, and local implementers did not take advantage of local resources. This brings up another important dimension of poverty that should embrace risk, vulnerability, participation, and voice, close to Amartya Sen's concept of "capability deprivation" (Sen, 1999).

Exploring a more apt definition of poverty is not merely academic, but could also help in designing proper strategies. The way in which poverty is defined drives the strategy for dealing with it. Clearly, it is important to analyze interactions among all the aforementioned aspects of poverty, although this is far from easy. Then there are also the interactions among policies that could affect poverty in a major way (e.g., an appropriate package of policies would have a greater impact than the sum of their parts). Understanding different dimensions of poverty is imperative, but understanding policy interactions to deal with it is equally important, if not more so.

References

Asher, M. (2000), *The Future of Retirement Protection in Southeast Asia, The International Social Security Review, 51.*

Azis, Iwan J. (1997), *The Increasing Role of the Urban Non-Formal Sector in Indonesia: Employment Analysis within a Multisectoral Framework*, in Gavin W. Jones and Pravin Visaria (eds), *Urbanization in Large Developing Countries: China, Indonesia, Brazil and India*, Clarendon Press, Oxford.

_____ (1998), *Transition from Financial Crisis to Social Crisis, Social Implications of the Asian Financial Crisis,* jointly published by UNDP and the Korean Development Institute, Seoul.

_____ (2000a), *Simulating Economy-wide Models to Capture the Transition from Financial Crisis to Social Crisis, The Annals of Regional Science*, Springer-Verlag, Vol. 34:1-28.

_____ (2000b), *Non-Linear General Equilibrium Impacts of Financial Crisis and Manufacturing Downfall, The Developing Economies*, Vol. XXXVIII, No. 4, December, Tokyo.

_____ (2001), *Modeling Crisis Evolution and Counterfactual Policy Simulations: A Country Case Study* [*Indonesia 1997-1999*], *ADB Institute Working Paper* No. 23, Tokyo, Available on: www.adbi.org/PDF/wp/WP23.pdf

_____ (forthcoming), *What Would Have Happened in Indonesia if Different Economic Policies had been Implemented When the Crisis Started? The Asian Economic Papers,* MIT Press.

Azis, Iwan J., Erina E. Azis, and Erik Thorbecke (2001), *Modeling the Socio-Economic Impact of the Financial Crisis: The Case of Indonesia"* research report for the International Food Policy Research Institute and the World Bank, Washington, DC, February.

Bernanke, Ben S., and Alan S. Blinder (1988), *Credit, Money and Aggregate Demand, American Economic Review,* 78(2), pp. 435-439.

Bernanke, B., and M. Gertler (1989), *Agency Costs, Net Worth, and Economic Fluctuations, American Economic Review* 79, 14-31.

Bouguignon, F., W.H. Branson, and J. De Melo (1989), *Adjustment and Income Distribution, Working Paper*, World Bank, May, Washington, DC.

Brunner, Karl, and Alan H. Meltzer (1972), *Money, Debt, and Economic Activity, Journal of Political Economy,* 80, pp. 951-977.

Central Bureau of Statistics (1998), *Survey on Crisis Impacts on Cost of Production and Informal Sector.*

_____, *SAKERNAS,* various volumes.

_____, *SUSENAS,* various volumes.

Decaluwe, B., A. Patry., L. Savard, and E. Thorbecke (1999), *General Equilibrium Approach for Poverty Analysis*, Mimeo, Department of Economics, Laval University.

Defourny, J., and E. Thorbecke (1984), *Structural Path Analysis and Multiplier Decomposition within a Social Accounting Matrix Framework, Economic Journal*, 94, pp. 111-136.

Dhanani, S., and I. Islam (2000), *Poverty, Inequality and Social Protection in a Period of Economic Crisis: The Case of Indonesia*, unpublished paper for the United Nations Support Facility for Indonesian Recovery.

Dollar, David, and Art Kray (2000), *Growth is Good for the Poor*, Development Research Group, World Bank, March.

Foster, J., J. Greer, and E. Thorbecke (1984), *A Class of Decomposable Poverty Measures*, *Econometrica* 52.

Hill, Hal (1999), *The Indonesian Economy in Crisis: Causes, Consequences and Lessons*, St. Martin's Press, New York.

Irawan, P., and H. Romdiati (1999), *The Impacts of Crisis on Poverty and Its Implications for Development Strategies*, paper presented at the National Workshop on Food and Nutrition VII, Jakarta, 10-12 May.

Kanbur, Ravi (2001), *Economic Policy, Distribution and Poverty: The Nature of Disagreements*, *World Development*, 29:6, June, pp. 1,083-1,094.

Kanbur, Ravi, and Lyn Squire (2001), *The Evolution of Thinking About Poverty: Exploring the Interactions*, in Gerald Meier and Joseph Stiglitz (eds), *Frontiers of Development Economics: The Future in Perspective*, Oxford University Press.

Leechor, C. (1996), *Reforming Indonesia's Pension System*, *World Bank Policy Research Working Paper,* No. 1,677.

Manning, C. (2000), *Labour Market Adjustment to Indonesia's Economic Crisis: Context, Trends and Implications*, *Bulletin of Indonesian Economic Studies*, Vol. 36, No. 1, April.

Papanek, G., and B.S. Handoko (1999), *The Impact on the Poor of Growth and Crisis Evidence from Real Wage Data*, paper presented at the conference on "The Economic Issues Facing the New Government," Jakarta, August.

Pradhan, M., and R. Sparrow (2000a), *Basic Education Outcomes During Crisis: An Analysis Using the 1995, 1997, 1998 and 1999 SUSENAS*, mimeo, Cornell University, 15 February.

_____ (2000b), *Indonesia Health Sector Analysis—Changes in Health Indicators Collected in the 1995, 1997, 1998 and 1999 SUSENAS Household Surveys*, mimeo, Cornell University, 9 February.

Quibria, M.G. (2002), *Growth and Poverty: Lessons from the East Asian Miracle Revisited, ADB Institute Research Paper No.33*, Tokyo,
Available on: www.adbi.org/PDF/wp/rp33.pdf

Sen, A.K. (1999), *Development as Freedom*, New York: Alfred Knof.

SMERU (2001), *Wage and Employment Effects of Minimum Wage Policy in the Indonesian Urban Labor Market*, *SMERU Research Report*, October, SMERU Research Institute, Jakarta.

Srinivasan, T.N. (2001), *Growth and Poverty Alleviation: Lessons from Development Experience, ADB Institute Working Paper* No. 17, Tokyo,
Available on: www.adbi.org/PDF/wp/WP17.pdf

Suryahadi, A., and S. Sumarto (2001), *Principles and Approaches to Targeting: With Reference to the Indonesian Social Safety Net Programs*, *SMERU Working Paper*, SMERU Research Institute, Jakarta, July.

Suryahadi, A., S. Sumarto, Y. Suharso, and Lan Pritchett (2000), *The Evolution of Poverty During the Crisis in Indonesia, 1996 to 1999*, unpublished paper for SMERU.

Sutanto, A., P.B. Irawan, and A. Said (1999), *Poverty Measurement: Problems and Development*, paper presented at International Conference on Methodologies of Poverty Calculation in Indonesia, 1999, Jakarta, November.

Thorbecke, E., et al. (1992), *Adjustment and Equity in Indonesia*, Development Center Studies, Paris, Organisation for Economic Co-operation and Development.

Tobin, J. (1970), *A General Equilibrium Approach to Monetary Theory*, *Journal of Money, Credit and Banking*, November, 2, 461-72.

World Bank (2000), *East Asia Brief: East Asia's Recovery, Gathering Force*, East Asia and Pacific Region, World Bank, presented in Tokyo, 18 September.

Appendix

Cumulative Density Functions for Different Household Groups, 1996 and 1999 at Constant 1996 Prices
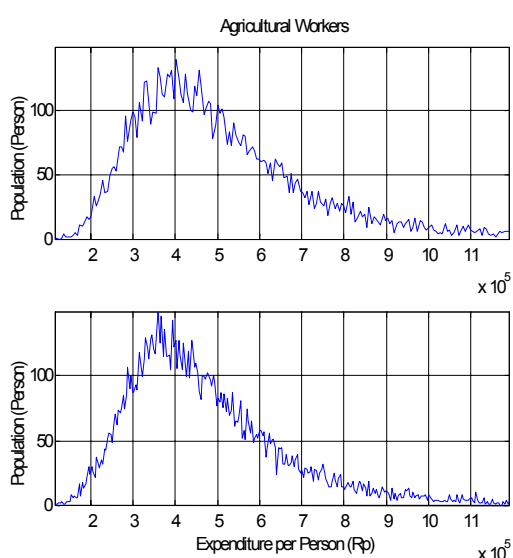
Figure 1a: Agricultural Workers
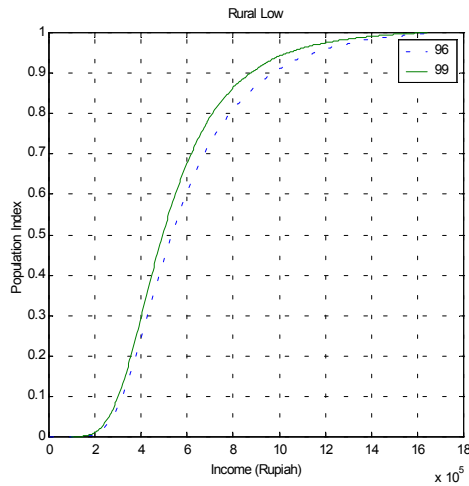
Figure 1b: Farmers with Land
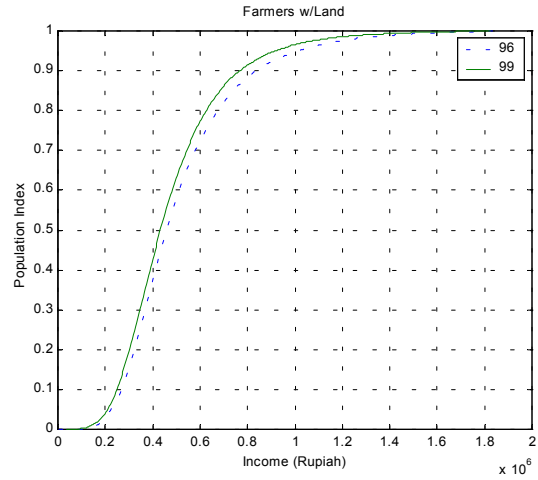
**Figure 1c: Rural Low**
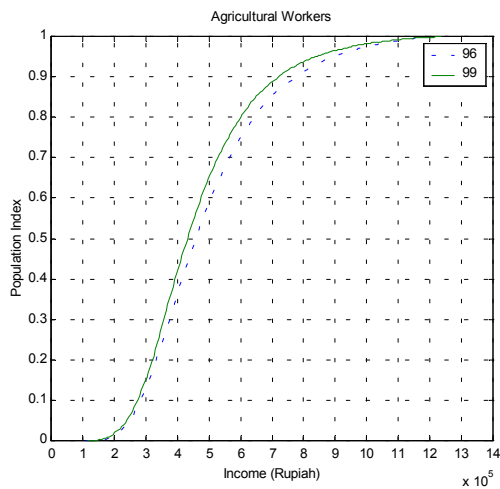
Figure 1d: Rural Non-Labor Force
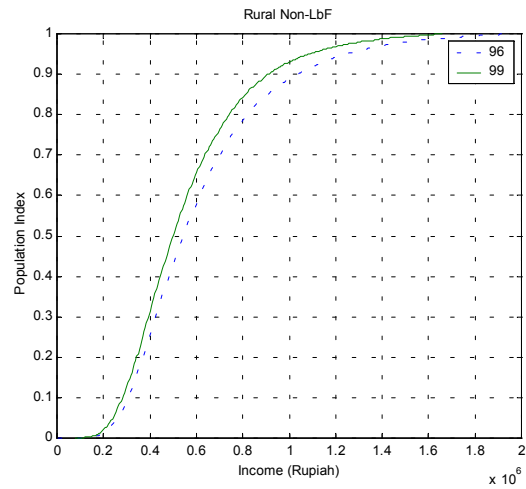
Figure 1e: Rural High

Rural High
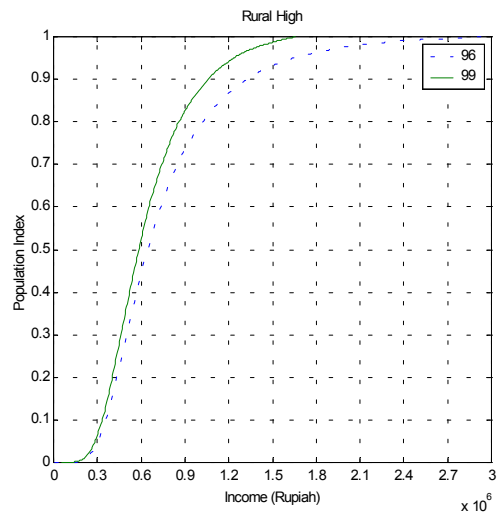
Figure 1f: Urban Low

Urban Low
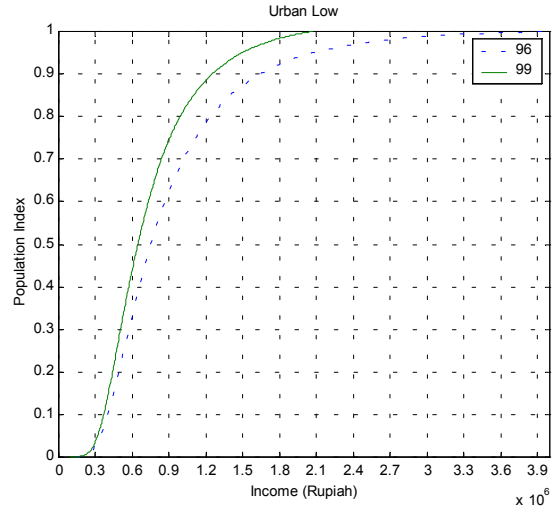
Figure 1g: Urban Non-Labor Force

Urban Non-LbF
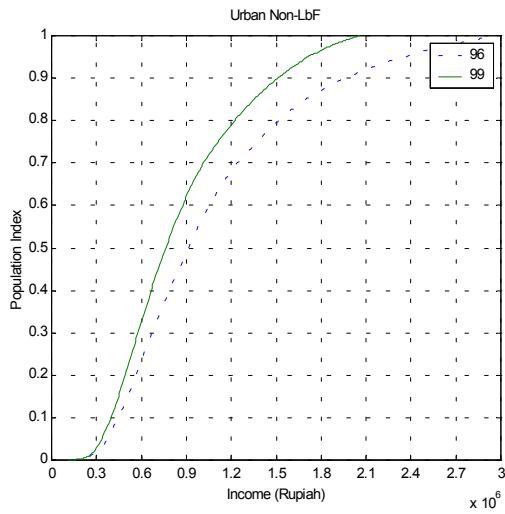
Figure 1h: Urban High

Urban High
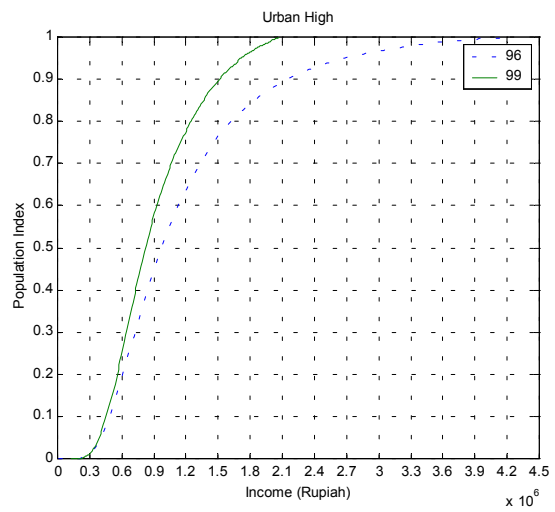
Figure 1i: Rural Groups

Figure 1j: Urban Groups

Rural Groups
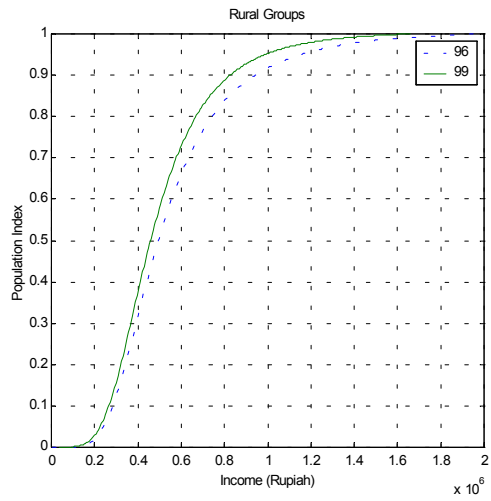
Urban Groups
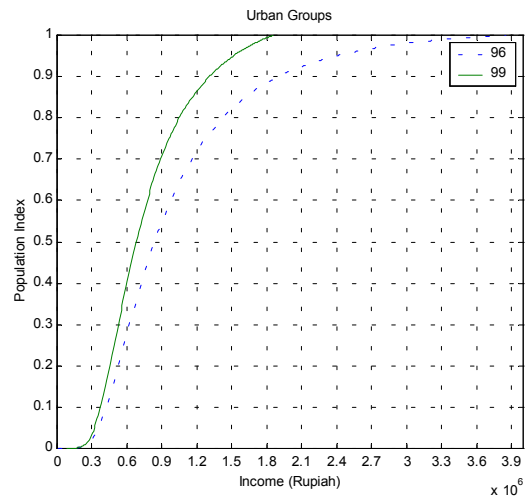
Intra-Group Distributions, 1996 and 1999 at Constant 1996 Prices

Note that the inequality measure used in this study is derived from the mean incomes of the SAM-based eight household groups. Each intra-group distribution is assumed to remain the same as in the base (1995/96) period. Yet, in the present context, this is a defensible assumption, as a comparison of the actual pre- and post-crisis group distributions in Figs.2a-2i suggest. For each pair, the top figure is for 1996 and the bottom figure is for 1999.

Figure 2a: Agricultural Workers **Figure 2b: Farmers with Land**
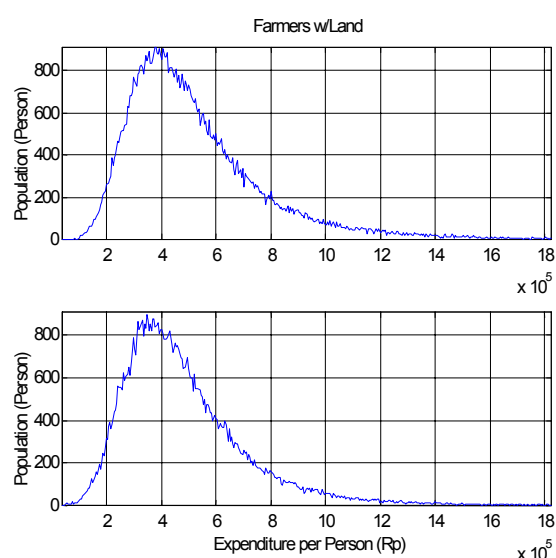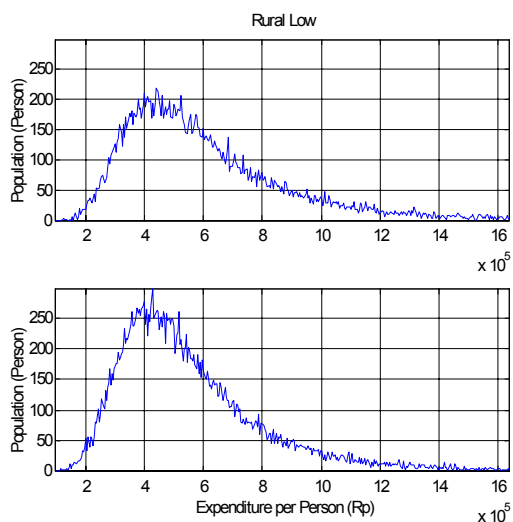
Figure 2c: Rural Low **Figure 2d: Rural Non-Labor Force**

42
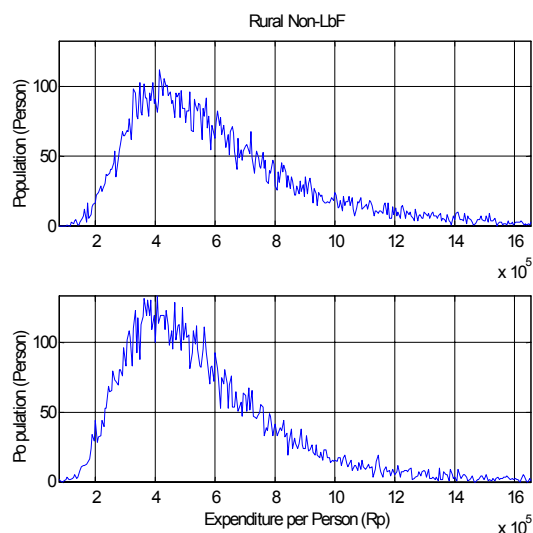
Figure 2e: Rural High

Rural High
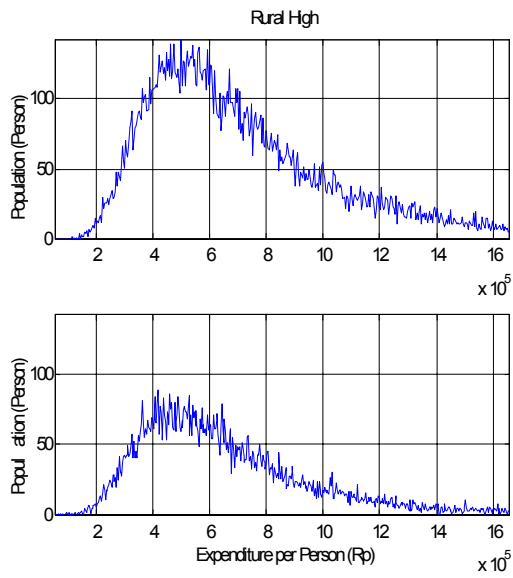
Figure 2f: Urban Low

Urban Low
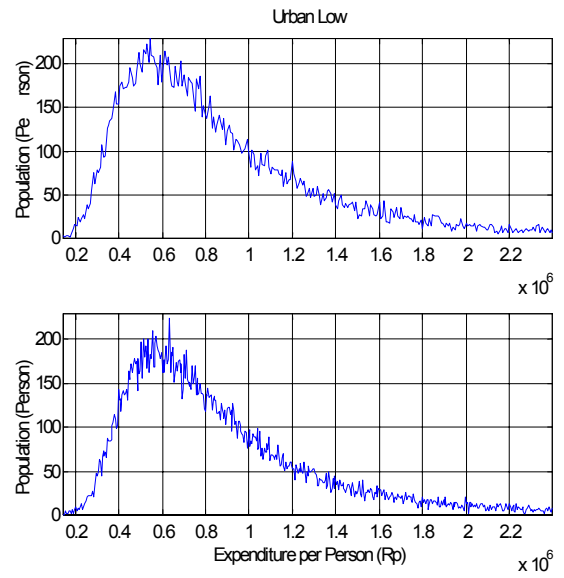
Figure 2g: Urban Non-Labor Force

Urban Non-LbF
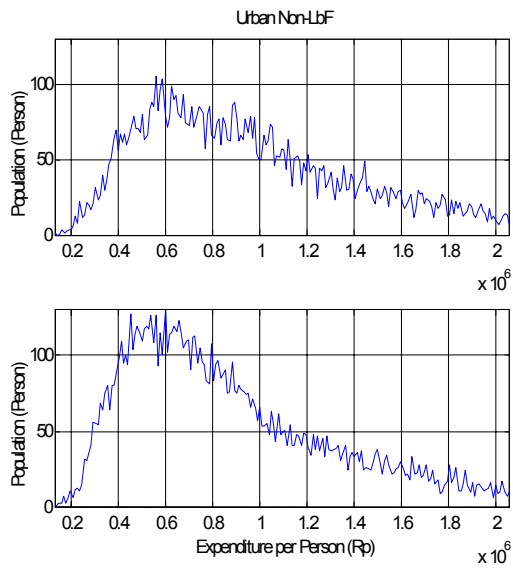
Figure 2h: Urban High

Urban High
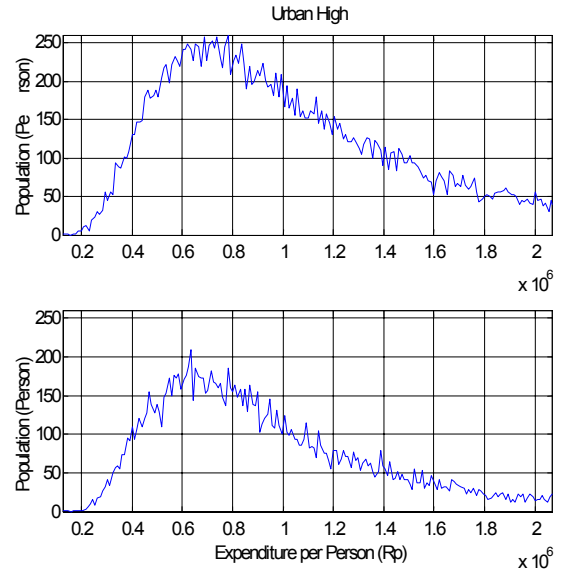
Figure 2i: Rural Groups　　　　　　Figure 2j: Urban Groups
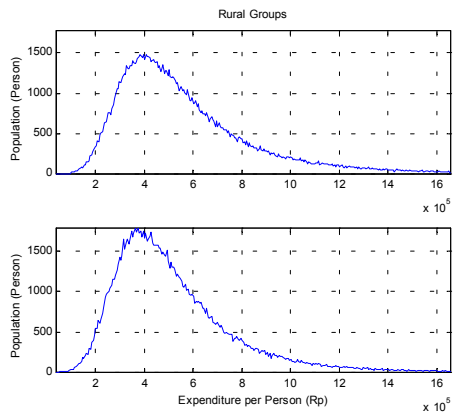
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