Modelling the Transition from Financial Crisis to Social Crisis

Iwan J. Azis

Cornell University

Using a price endogenous model, this paper elucidates the detailed transition of a financial shock to socio-economic conditions. The model departs from a standard CGE framework in that a number of equations are estimated independently, and some parameters are derived from econometric equations rather than calibrated. In the light of the Asian financial crisis, one such equation is on domestic investment constrained by the deteriorating balance sheet of many corporate sectors (following the Bernanke-Gertler-Krugman model). Hence, with a collapsed exchange rate, the effects of bankrupt firms and the absence of new investment could outweigh the direct effects on export competitiveness. While the resulting unemployment reduces total wage income, the subsequent transition from depressed real sector to household incomes is specified through a Tobin portfolio model by abandoning a perfect substitutability assumption in the household portfolio allocation. The model is general enough to be applied to any crisis country. Using the Indonesian case, the simulation shows that urban households are hardest hit, and the relative income distribution fluctuates from worsening to slightly improving. The model can be used to analyse a number of counterfactuals. In experimenting with a non-IMF style policy (no interest rate increase with partial debt resolution), the model simulation clearly yields better than actual outcomes in terms of GDP growth, prices, and, surprisingly, also exchange rate. More importantly, the income distribution would have been also more favourable.

I. Introduction

East Asian economic achievements have been in many ways remarkable, but the 1997/1998 crisis shows that the policy framework underlying them was not vigorous enough to sustain robust economic growth and improvements in the socio-economic front. Even three years after the crisis, the economy remains fragile, despite showing some signs of recovery in 1999. Most attention has been directed towards short-term recovery; yet, some socio-economic damage that has accumulated since the crisis began may require longer-term based policies.

Despite the obvious deterioration of some socio-economic variables after the crisis, how and to what extent the financial shock has affected social conditions has not been well understood. Practically all analyses on this subject have used

socio-economic indicators 'before and after', and conclude that any deterioration detected is due to the financial crisis. Such an approach could cloud understanding of the real impact of financial crisis, or, simply put, it is methodologically inaccurate. While attempts to improve social conditions are always necessary, regardless of whether or not there is a crisis, it is equally important to disentangle the real causes of the damage. This is particularly so, when policies to counter the crisis-driven damages have to be designed under limited resources, which is a usual condition in a crisis situation.

Moving from a 'before and after' approach to a 'with and without' one would call for the use of some sort of model. The model should be capable of mapping out the mechanism through which various shocks in the financial variables are transmitted to selected socio-economic indicators, by taking into account the direct, indirect and feedback effects.

The primary goal of this study is to provide such a model, and to show how this model can capture the important events (shocks) during the crisis, and disentangle the impacts of different shocks. Obviously, the model should contain a fairly detailed specification of the financial sector. The crisis in Indonesia is used as a case study.

In Section II I use an economy-wide model of the *structural path analysis* type to measure the total effects of the falling production in selected sectors due to the crisis. A more comprehensive model featuring endogenous price system is constructed in Section III and used to evaluate the sequence of the crisis episode in Indonesia. The model mechanism is discussed in Section IV. Sequential simulations in Section V use the model to explain aspects of the crisis while Section VI uses it to explore some counterfactual scenarios (departing from IMF-style policies). Closing remarks are made in Section VII. The ultimate purpose of the study is to analyse the impact of the crisis on selected socio-economic variables, and to explore the outcomes of some policy alternatives.[1]

II. General Equilibrium Impacts of Production Shocks

The contraction of economic production caused by the crisis could result in severe retrenchment of demand for factors, causing unemployment to increase. In addition, the collapsed demand for a certain type of labour affects the income and welfare of various households groups differently. Through feedback effects, the resulting income distribution will eventually affect the production structure. Hence, a circular causation between production, factor income and household income is created.

As the primary interest of this study is to come up with a model that can be used to evaluate the various impacts of the crisis on social indicators, this section

1. At this stage of research, the endogenous socio-economic variables are limited to unemployment, labour income, and household income distribution. Attempts to include other impact variables, e.g., poverty conditions, are still underway.

takes up only a subset of the problems. More particularly, the question to be raised is: which category of socio-economic group is hardest hit, and, through what path is the transmission of influence likely to take place?

The general equilibrium model adopted in this section falls under the category of *structural path analysis* (SPA), drawing most information from an extensive data system known as *social accounting matrix* (SAM). Since I have discussed SPA elsewhere (Azis, 2000; see also Defourny and Thorbecke, 1984), the following discussions are devoted to only the results of simulations.

The first task is to determine in which sectors the shock should be introduced. Indonesia's national income data suggest that only three sectors registered a positive growth during 1997–1998, i.e., agriculture, mining and electricity. Of these three, only the agricultural and electricity sectors managed to maintain positive growth in 1998–1999. Obviously, there has been a massive contraction in most other sectors, causing a major recession with a more-than 13% drop in real GDP in 1998. The four hardest hit sectors are construction (labelled **PConst** in Figure 1A), trade (**PTrade**), finance (**PBank**) and manufacturing.

The set of simulations in the following analysis is made consistent with such a pattern. For the manufacturing sector, the simulations are done separately, since there are a number of sub-sectors within the industry.

A series of graphs in Figure 1 display the most relevant paths explaining the transmission of sectoral contraction to different households and other institutions. The latter are listed in descending order based on the size of *global influence* (GI) or SAM multiplier. [Note: these graphs are drawn on the basis of SPA results, the complete table is available upon request.]

Figure 1a SPA Results of a Shock in the Construction Sector

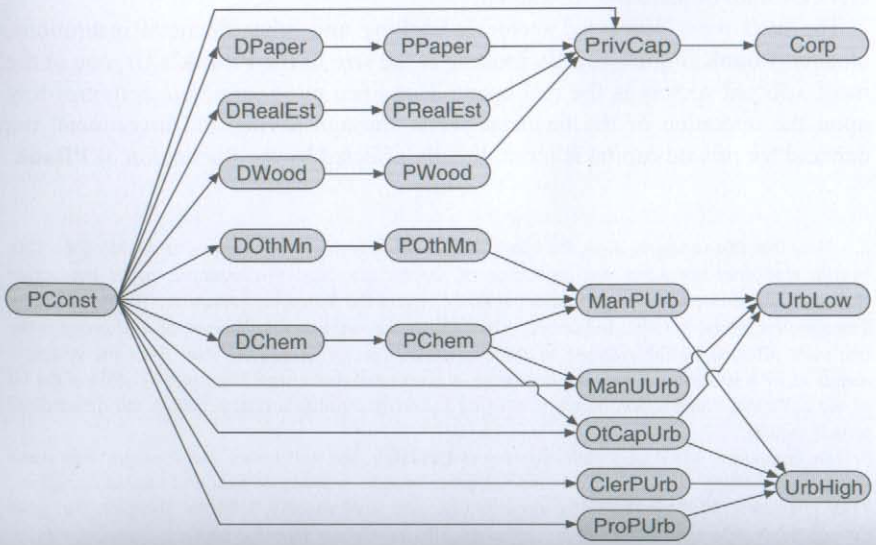


Figure 1b SPA Results of a Shock in the Trade Sector

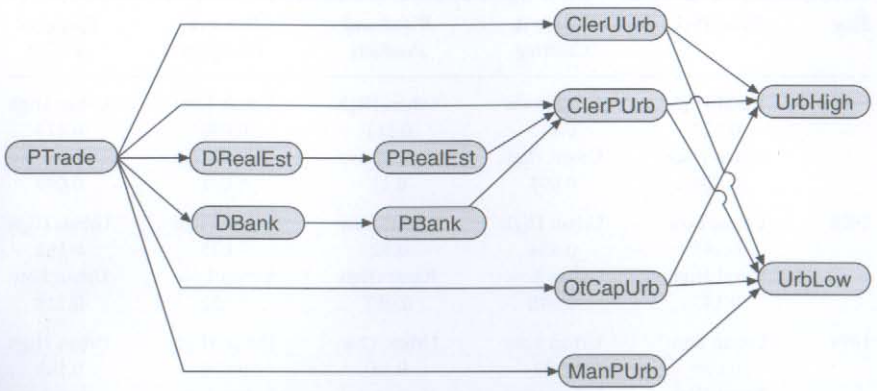
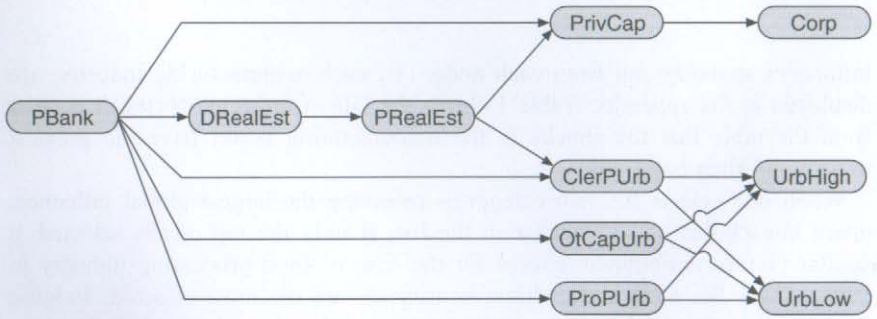


Figure 1c SPA Results of a Shock in the Banking Sector



(with TI/GI = 78.2%), and only 3% of the total multiplier is generated through a collapsed demand for the real estate sector. At any rate, in both cases the financial position of corporate sector (**Corp**) is eventually damaged.[4]

Which household groups are most seriously affected by the banking sector's depression? Once again, it is the urban household of high and low-income category. This is primarily because a banking sector collapse has a significant impact (reduction) on the demand for urban clerical and professional workers.

Next to be considered is the case of a collapse in the manufacturing sector. There are five manufacturing industries to be evaluated. The size and types of

4. With the opening up of the economy since 1980s, the country's banking and other financial sectors have also played an instrumental role in channelling foreign capital to the domestic business sector. From the complete set of simulations, the collapse of the banking sector also affects the demand for foreign capital (**ForCap**), before finally hitting corporate income (**Corp**).

According to Figure 1a, beside the income of corporate institution (**Corp**), the hardest hit groups under the scenario of a collapsed construction sector are the low and high-income categories (**UrbLow** and **UrbHigh**) of the urban household.

Two relevant paths arrive at **Corp**: first, the one that travels through various sectors, i.e., paper industry (**DPaper** and **Ppaper**), real estate (**DRealEs** and **PRealEs**) and wood manufacturing (**DWood** and **PWood**), then to private capital (**PrivCap**); second, the one that goes straight to **PrivCap**, before eventually arrives at the corporate income (**Corp**).[2]

Another important path travels through urban workers, i.e., manual workers, both paid and unpaid (**ManPUrb** and **ManUUrb**), and unincorporated urban capital (**OtCapUrb**). There are also two prior paths passing through **ManPUrb**, i.e., via domestic and total production of other mining (**DOthMn** and **POthMn**) and chemical industries (**DChem** and **PChem**). Eventually, all of these paths arrive at urban low-income households (**UrbLow**). But the urban high-income households (**UrbHigh**) will also get the pinch, as shown by the paths traveling through urban clerical (**ClerPUrb**) and urban professional paid workers (**ProPUrb**). Hence, among household categories, clearly those in the urban area are the hardest hit by a severe contraction in the construction sector.

As in the above case, the paths linking the trade sector and household income show that urban household is the most severely affected by shrinking trade activities (Figure 1b). Although there are actually three relevant paths linking **PTrade** and **ClerPUrb**, the one that goes straight to **ClerPUrb** has the highest ratio of *total influence* and *global influence* (TI/GI equals 67.2%), suggesting that a large part of the trade sector's GI is exercised directly through the reduction in demand for urban clerical paid workers.[3] Nonetheless, the collapse of the trade sector creates a more devastating impact on demand for workers (urban clerical) than on demand for capital.

The next most depressed sector is banking and other financial institutions, labelled **Pbank** (Figure 1c). By looking at the size of the **PBank**'s GI, one of the most affected sectors is the real estate. But since most economic activities rely upon the operation of the financial sector through saving and investment, the demand for private capital is more directly affected by the fluctuation of **PBank**,

2. Note that due to aggregation, the classification of industries in the Indonesian SAM of the 106-by-106 size does not allow the separation of several activities. For example, paper production (**Ppaper**) and domestic paper (**Dpaper**) actually covers the following industries: 'Paper, Printing, Transportion, Metal & Other Industries'. Thus, Figure 1a suggests that, this sector *as a group* is the one most affected by the collapse of the construction sector. Also note that, from the complete results of SPA simulations (not reported here), it is revealed that a significant part (47.6%) of the GI of the collapsed construction sector is exercised *directly* through a contraction in the demand for private capital.

3. By comparing TI/GI of 3 paths arriving at **UrbHigh**, one will notice that the significant paths are those travelling via reduced demand for urban clerical workers of paid and unpaid categories. They contribute 29.3% and 27.1%, respectively, compared to only 8.4% for the path that goes through unincorporated urban capital (based on SPA results not reported here).

Table 1 Largest Global Influence (Multipliers) of Manufacturing on Household Incomes

Year	*Food Proc*	*Textile & Clothing*	*Wood and Products*	*Paper & Transport*	*Chemical & Fert*
1995	Rural High 0.127	Urban Low 0.117	Urban High 0.111	Urban Low 0.098	Urban High 0.124
	Urban High 0.124	Urban High 0.091	Rural Low 0.11	Urban High 0.091	Urban Low 0.099
1998	Urban Low 0.147	Urban High 0.054	Urban Low 0.12	Urban High 0.035	Urban High 0.162
	Rural High 0.147	Urban Low 0.048	Rural High 0.087	Urban Low 0.022	Urban Low 0.118
1999	Urban Low 0.096	Urban Low 0.09	Urban Low 0.14	Urban High 0.079	Urban High 0.143
	Rural High 0.081	Urban High 0.064	Rural Low 0.107	Urban Low 0.077	Urban Low 0.095

Source: Author's calculation based on SPA of SAM 1995, 1998 and 1999.

influences spanning out from each node, i.e., each manufacturing industry, are displayed in the appendix. Table 1 shows the GIs of those industries. It is clear from the table that the shocks in the manufacturing sector have the greatest impact an urban households.

When one selects the two categories receiving the largest global influence, urban households always appear in the list. If only the top one is selected, a similar picture is obtained, except for the case of food processing industry in 1995, where the rural high-income households are the most affected. Judging from the fact that during 1995–1998 the largest drop in value-added occurs in textile, woods and chemical industries, it is unmistakable that the households of urban high- and urban low-income types are potentially the hardest hit.[5]

The above analysis is important, particularly for designing social safety net programmes with group targeting in mind. Yet, SPA and multiplier analysis suffer from a number of drawbacks. First of all, there is an assumption of excess capacity in the system. Secondly, it fails to distinguish impacts caused by the crisis from those due to some other events unrelated to the crisis. Hence, the collapse of the manufacturing sector is taken exogenously without disentangling the portions

5. At the outset, it looks as if the path with highest total influence (TI) will have the lowest path multiplier, as is the example of collapsed construction sector has shown. However, such a pattern is by no means a rule. The case of the impact of food processing industry on the demand for rural agricultural unpaid workers, for example, indicates a different pattern. While the TI is highest if the path travels through the demand for the agricultural food production, its path multiplier is also higher compared to the case in which the path goes through the non-food agricultural sector (1.58 versus 1.57).

that are caused by the financial shock and those due to other factors. Agriculture-related industry such as food processing, for example, is clearly dependent on the supply of agricultural products, which in turn is affected by weather conditions in 1997–1998, i.e., El-Nino related phenomenon. In such a case, the financial crisis has little effect on the fluctuation. A more important drawback relates to the absence of price dynamics and substitutions. No non-linear system is allowed in SPA, yet, they are extremely important in the analysis of financial crisis.

III. A Non-Linear Model With Endogenous Prices

In order to incorporate excess capacity, endogenous prices, substitutions, and non-linearity, one needs an alternative model with different specifications. The non-linearity and endogenous price features of the alternative model would allow the system to have negative multipliers. A drop in the demand for, say, the output of the food processing industry during the crisis will have a negative impact on some agricultural products (i.e., a positive multiplier). On the other hand, increased demand for agricultural products may have further detrimental effects upon food processing and other light industries, because it drives up prices in this forward industry's input market (negative multiplier). Hence, the corresponding Jacobian multiplier matrix would show a mixture of pluses and minuses, different from the all-positive multipliers in SAM and SPA. Needless to say, this very point is critical in a crisis episode.

Another important feature that should be included in the alternative model is a detailed specification of the financial sector.[6] The following discussions concentrate on the major components of the financial block and the mechanism through which the socio-economic impacts can be inspected. The model, particularly the financial block of it, is a fairly major departure from the one previously developed by the author (Azis, 2000).

III.1 Financial sector

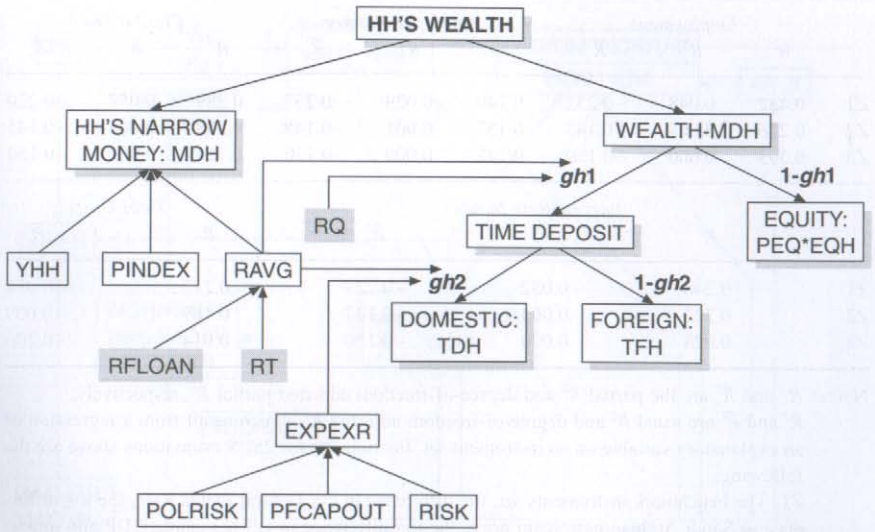
At the first stage, capital inflows are specified as a function of interest-rate differentials and country risks (labelled **RISK**), the latter being measured in terms of debt exposure **FOREXDEB**. This is primarily determined by the service-debt ratio:

$$\mathbf{PFCAPIN} = \sigma_0 + degree \cdot \sigma_1 \cdot (\mathbf{RLOAN} - \mathbf{RFLOAN} - \mathbf{RISK}) \quad (1)$$

$$\mathbf{RISK} = \alpha_0 + \alpha_1 \cdot (\mathbf{FOREXDEB}/\Sigma_p \mathbf{E}_p \cdot pwe_p) \quad (2)$$

6. The model consists of the following blocks: financial/monetary, capital flow, real sector, price, trade, labour market and investment-saving. The financial block plays a pivotal role since the model is designed specifically to capture the financial crisis episode. Given the financial balance sheets of six institutions in the economy, i.e., central bank, commercial banks, foreign sector, government sector, households and production sector, the behaviour of each is specified separately.

Figure 2 Household Portfolio Allocation Decision



The specific allocation is determined by household's preferences/tastes. In the model, the preferences for time deposit and equity are reflected through parameter **gh1**, which is influenced by the expected returns to those assets. The choice of holding domestic or foreign time deposits is also determined by preferences via parameter **gh2**, which is influenced by returns to time deposits **RAVG**, and the expected depreciation **EXPEXR** (see Figure 2). In this way, the portfolio selection is also affected by the country's political conditions in addition to the standard economic risks.

What about the portfolio allocation of the non-household sector? 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 sector's demand deposit, on the other hand, is influenced by the value of total output. Once the portfolio allocation is known, money demand is derived (narrow money and time deposit), and so is the amount of loanable funds (bank loans), after taking into account the commercial bank's borrowing and the reserve requirement.

The money supply is modelled through a money multiplier and high powered money (reserve money), the size of which is determined by the difference between the central bank's loans plus reserves (NDA plus NFA) and the central bank's wealth plus non-interest bearing government deposits and the central bank's certificate (*Sertifikat Bank Indonesia* or *SBI*). The money multiplier fluctuates rather sharply during the crisis episode, because household behaviour changes considerably. Therefore, money multipliers are allowed to change freely,

where **PFCAPIN** and **FOREXDEB** are the gross capital flows and the size of foreign debts, respectively, *degree* indicates the intensity of capital openness, the size of which is calibrated from the SAM, and *pwe* is the world price of exports.

Theoretically, the interest rate performs as an equilibrating factor in securing the saving-investment balance. However, during the crisis the interest rate is treated as a policy variable, hence exogenously determined. On the other hand, the rupiah/dollar rate was allowed to float in August 1997. In this sense, the exchange rate will play an important role in the saving-investment balance.

The phenomenon of capital outflows, particularly those made by foreign investors, is widespread during the early part of the crisis. This is shown through a shrinking equity asset **EQROW** in the foreign sector's balance sheet, that will eventually contribute to the rising outflows, **PFCAPOUT**:

$$\mathbf{PFCAPOUT} = \mu_o \cdot (\mathbf{PEQ} \cdot \mathbf{EQROW}/\mathbf{EXR})^{\mu 1} \qquad (3)$$

Next are the exchange rate determination and the role of non-economic factors. Since a testable *uncovered interest parity* (UIP) model requires a rational expectation (ratex) assumption, the corresponding risk premia lumped together with expectational errors (ξ) would have a rather loose economic interpretation. The usual assumption that ξ is orthogonal to the interest rate differential (hence the slope parameter should be close to unity) is nothing more than a statistical assumption. No wonder a clear consensus is hardly reached by most empirical tests using a UIP model (e.g., Froot, 1990; MacDonald and Taylor, 1992; Meredith and Chinn, 1998).[7] Due to this fact, several interpretations can be suggested.

Since political variables played a prominent part in the whole crisis episode (Azis, 1998; 2000), the interest-parity condition in the model is tailored through Equation (4), in which the risk premia are replaced by a variable reflecting the country's political condition; the more unstable the political condition, the lower the value of **POL**:

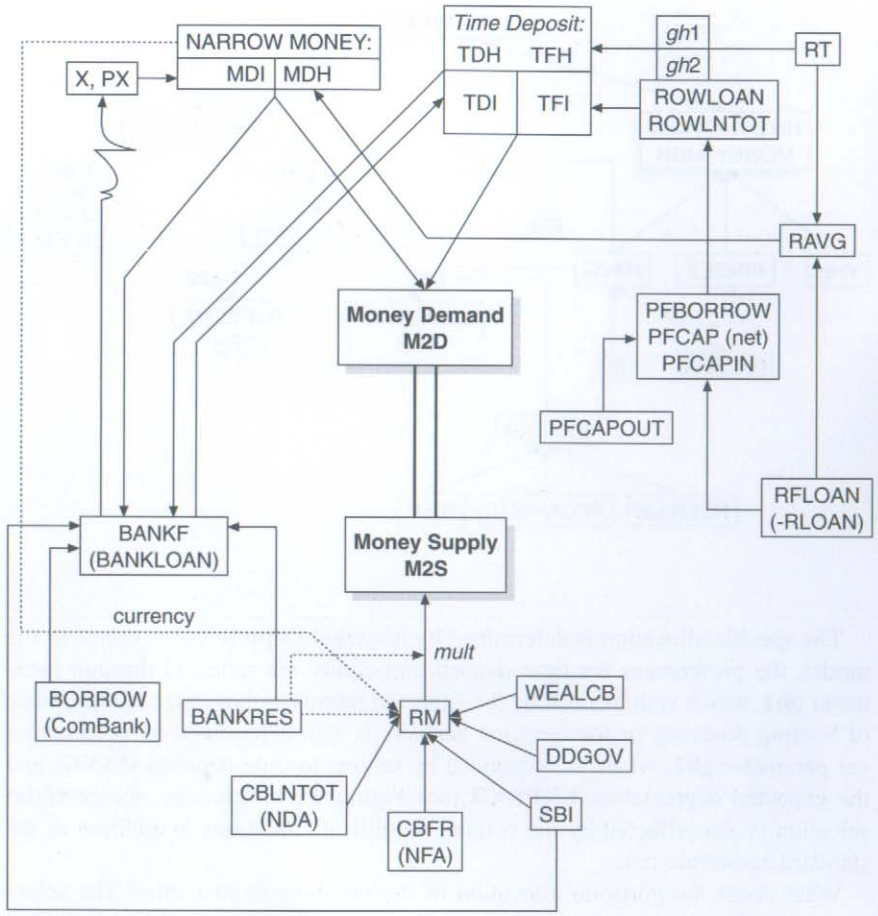
$$\mathbf{RLOAN} = \mathbf{RFLOAN} + (\mathbf{EXPEXR}/\mathbf{EXR} - 1) + \mathbf{POL} \qquad (4)$$

One of the most dynamic components in the financial block during the crisis is the portfolio allocation made by agents. More importantly, in order to translate a financial shock to welfare indicators one needs to specify agents' behaviour in determining their wealth, based upon which the stream of incomes (earnings) to different agents could be determined.

Following James Tobin (1970), Brunner and Meltzer (1972), Bernanke and Blinder (1988), I choose to abandon the perfect substitutability assumption in the portfolio allocation. More specifically, households' wealth is allocated between liquid assets (narrow money) and other assets. Other assets are further allocated between time-deposit and equity holdings. Hence, there are four assets in the model: narrow money, domestic time deposit, foreign time deposit and equity.

7. Most studies imply, however, that it is not true that exchange rate movements are best characterized as a random walk, as suggested by Meese and Rogoff (1983).

Figure 3 Monetary Block



influenced among others by government's policy such as reserve requirements (see Harberger (2000) for the discussions of flexible multipliers during a crisis). The summarized mechanism of the monetary block is shown in Figure 3.

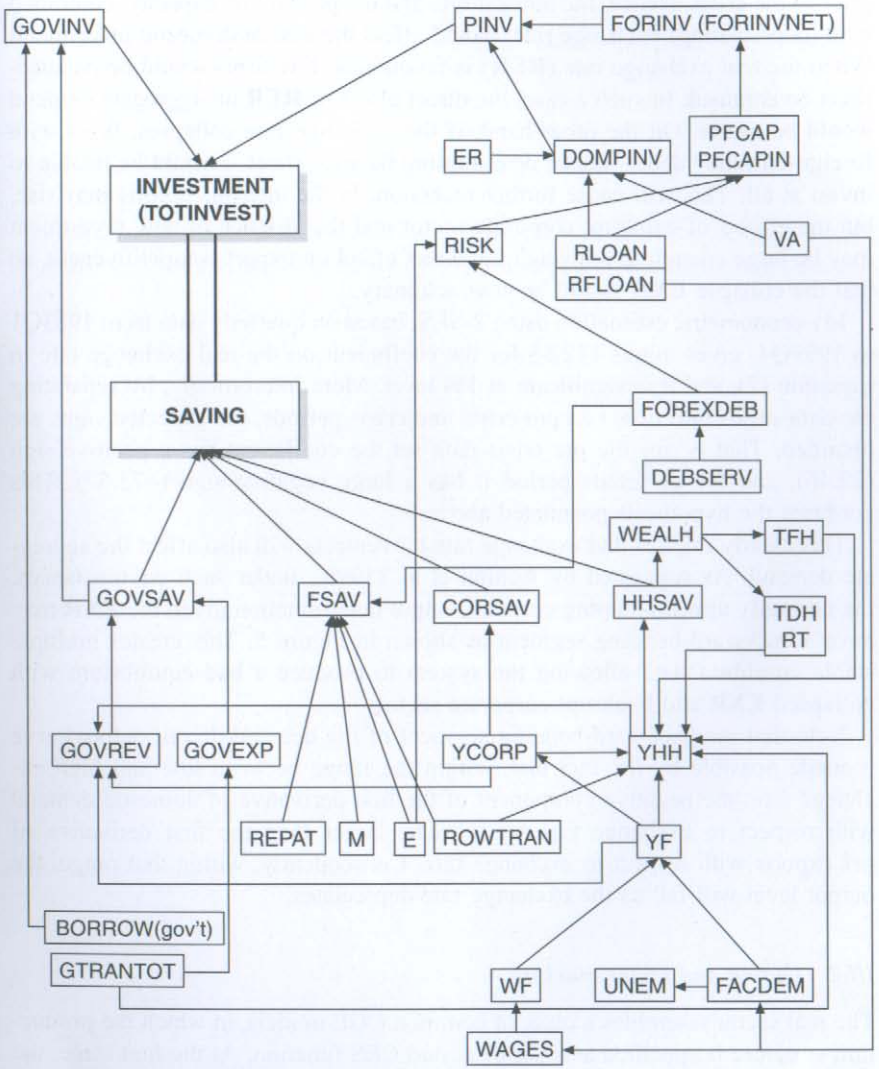
The saving-investment closure described in Figure 4, departs drastically from a neoclassical specification. The private domestic investment in sector **p**, $\mathbf{DOMPINV}_p$, and capital inflows **FCAP**, that set the size of foreign investment **FORINVNET**, are determined through independent functions as in Equation (7):

$$\mathbf{FORINVNET} = \mathbf{FCAP} - \Sigma_{inl}\ \mathbf{BORROW}_{inl} \tag{5}$$

$$\mathbf{FCAP} = \mathbf{PFCAPIN} - \mathbf{PFCAPOUT} + \mathbf{BORROW}_{govt} \tag{6}$$

$$\mathbf{DOMPINV}_p = \lambda_p \cdot \mathbf{VA}_p^{\lambda 1p} \cdot (1 + \mathbf{RLOAN})^{\lambda 2p} \cdot (\mathbf{EXR}/\mathbf{PINDEX})^{\lambda 3} \tag{7}$$

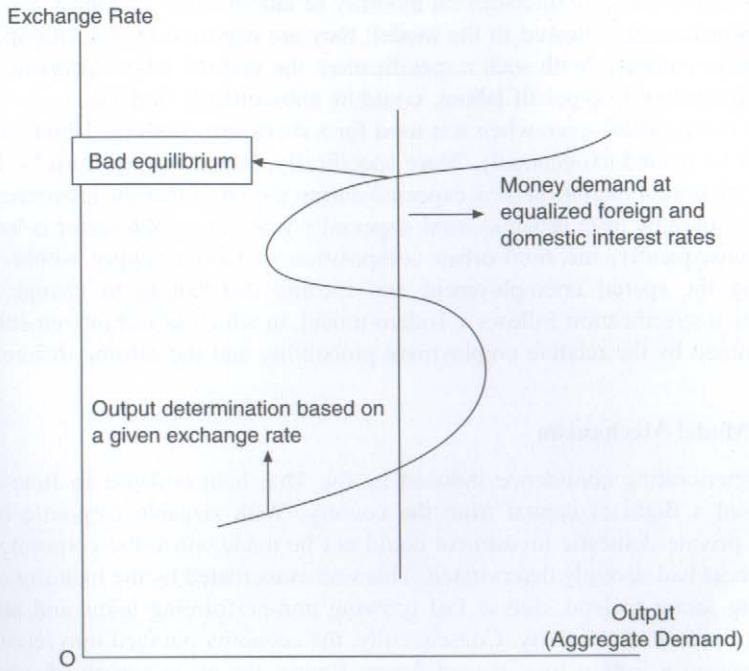
Figure 4 Investment-Saving and Income Block



where $\mathbf{BORROW}_{inl}$ is total foreign borrowing by *inl* institutions (government, private companies including banks and SOEs), $\mathbf{VA}_p$ is the value added of sector *p*, **RLOAN** and **EXR** are interest rate and nominal exchange rate, respectively, and **PINDEX** is the price index.

The above specification of domestic investment reflects the financing behaviour (i.e., bank-dependent) of agents, and the emerging constraints on the corporate balance sheet following the exchange rate collapse (Bernanke and Gertler, 1989;

Figure 5 Backward Bending Curve For Multiple Equilibria Case



On the supply side, exports are assumed to be differentiated from domestically sold products in each sector, output (domestic sales). Domestic output is allocated between exports and domestic sales using a constant elasticity of transformation (CET). This suggests that substituting exports with domestic goods is not costless; lower elasticity implies greater cost (more obstacles). Furthermore, the domestic market price will be different from the export price (determined by the world price and the exchange rate). Thus, in the revenue-maximization programme, the producers' behaviour is captured through equations that express the ratio of exports to domestic sales as a function of the relative prices.

Following Armington (1969), aggregate demand is a CES composite of imports and domestically produced products. Minimizing the cost of acquiring composite goods gives the first-order condition where the ratio of imports to domestic sales is determined by their price ratio. The demand for imports is assumed infinitely elastic with fixed world prices (small country assumption). Along with the exchange rate, import tax and trade and transport margin, the world price will determine the domestic price of imports.

The labour market is specified by making use of an independent function for wages, in which changes in the price of value-added, labour productivity, and the general price level, are the RHS variables in the equation. The wage factor

Krugman, 1999). This fits very well with the prevailing conditions in Indonesia prior to the crisis. Hence, the interest rate and the production capacity, combined with (depreciating) exchange rate, would affect the size of domestic investment. When the real exchange rate (**RER**) is favourable, few firms would be balance-sheet constrained. In such a case, the direct effect of **RER** on aggregate demand would be minor. On the other hand, if the exchange rate collapses, firms with foreign-currency debt – hence deteriorating balance sheet – would be unable to invest at all. This will cause further recession. In the interim, exports may rise, but the effects of bankrupt corporate sector and the absence of new investment may be large enough to outweigh the direct effect on export competitiveness, so that the collapse **EXR** would be contractionary.

My econometric estimation using 2-SLS, based on quarterly data from 1983Q1 to 1999Q4, gives minus 112.88 for the coefficient on the real exchange rate in Equation (7), and it is significant at 1% level. More interestingly, by separating the data series into two, i.e., pre-crisis and crisis periods, the expected signs are obtained. That is, for the pre-crisis data set the coefficient has a positive sign (22.46), and for the crisis period it has a large negative sign (–73.57). This confirms the hypothesis postulated above.[8]

This clearly implies that exchange rate movements will also affect the aggregate demand. As suggested by Aghion et al. (1999), under such circumstances, the normally upward-sloping curve of output determination given the **EXR** may have a backward-bending segment as shown in Figure 5. This creates multiple stable equilibria, i.e., allowing the system to produce a bad equilibrium with collapsed **EXR** and bankrupt corporate sector.

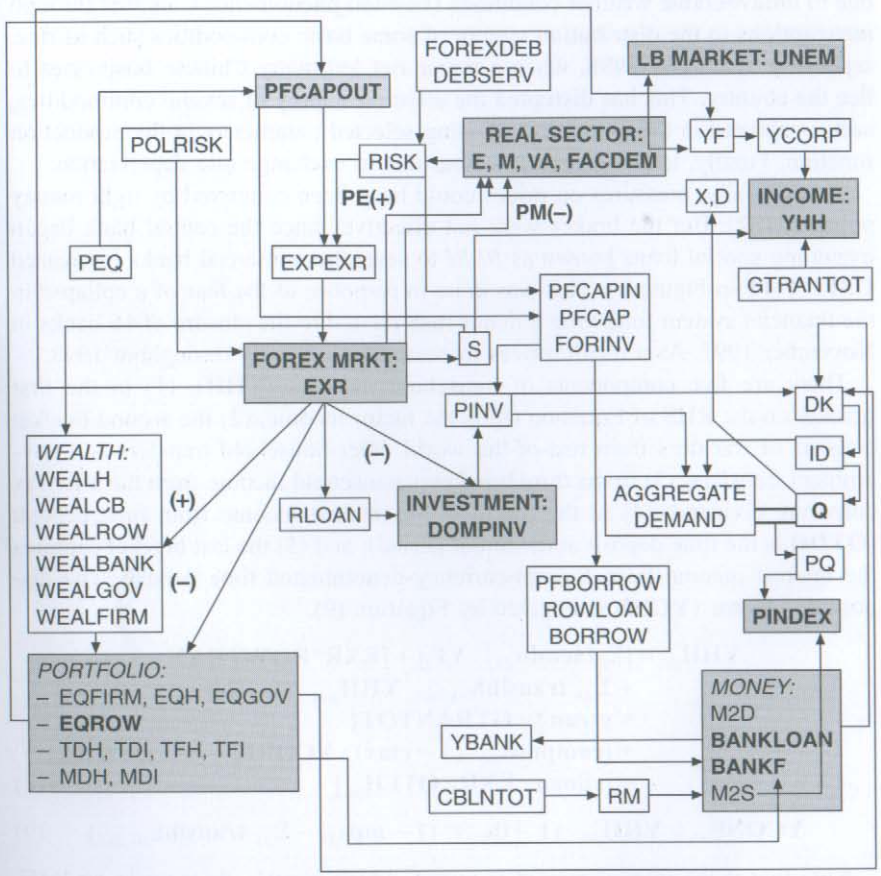
Note that the backward-bending segment of the demand-driven output curve is made possible by the fact that, within the range between low and high exchange rate, the negative component of the first derivative of domestic demand with respect to exchange rate tends to be larger than the first derivative of net exports with respect to exchange rate. Consequently, within that range, the output level will fall as the exchange rate depreciates.

III.2 Output and factor markets

The real sector resembles a class of common CGE models, in which the production structure is specified as a set of nested CES function. At the first stage, the production function of value-added is determined, with primary inputs being the RHS variables in the equation. As in most emerging markets, Indonesia's structure of production and trade is such that many intermediate inputs are still imported. Therefore, the composite intermediate inputs are necessarily modelled as a CES function of domestic and imported inputs. In the second stage, domestic output is specified as a CES function of value-added and composite intermediate inputs.

8. 2-SLS is used because the estimated equation is part of the author's macro econometric model consisting of a system of simultaneous equations.

Figure 7 Impacts of Capital Outflows on Financial and Real Sectors



decreasing foreign equity **EQROW**, leading to rising capital outflows (**PFCAPOUT**). The most direct impact is on the shift in devaluation expectation reflected through the change in **EXPEXR**. With additional pressures from **RISK** factor, the actual (nominal) exchange rate **EXR** collapses.

Four subsequent repercussions are to be expected: (1) standard push on net-exports, **E-M**, via more competitive export prices, **PE**; (2) increased values of foreign saving that will affect household incomes, **YHH**, (3) increased domestic value of foreign investment, (**FORINV**), and (4) declining domestic investment, **DOMPINV**, via both, increased interest rate (**RLOAN**) and direct impact of deteriorated firm balance sheets due to rising values of foreign liabilities. As a result, total supply (**Q**) drops and so does the aggregate demand.

The resulting inflation (**PINDEX**) is determined by the interaction between aggregate demand and total supply. In the Indonesian case, however, we need to

income is set to be proportional to wages. Since in reality wage rates differ across sectors, despite intersectoral mobility of labour some stickiness and market distortions are allowed in the model; they are captured by a sector-specific parameter (**wfdist**). With such a specification, the sectoral labour demand, classified according to types of labour, could be subsequently derived.

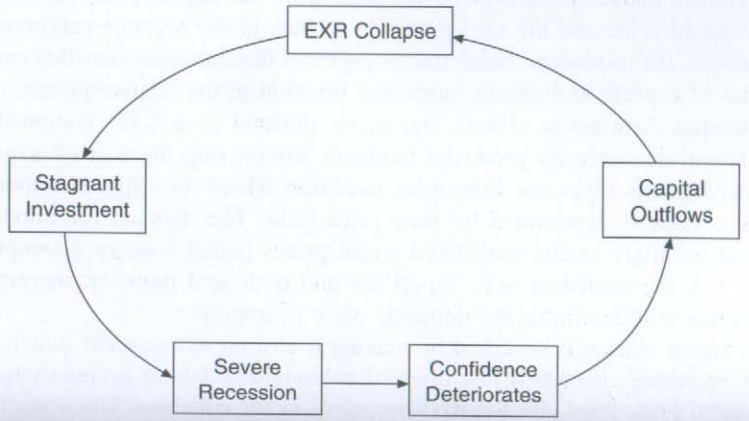
In a crisis model, even when it is used for a short-term analysis, labour supply cannot be treated exogenously. More specifically, labour supply must be influenced by spatial migration. It is expected during the crisis that the movements of labour would be from urban to rural, especially when the urban sector is hardest hit. Consequently, the rural-urban composition of labour supply would alter, causing the spatial unemployment and income distribution to change. The migration specification follows a Todaro model, in which labour movements are determined by the relative employment probability and the earning differential.

IV. Model Mechanism

The deteriorating confidence induced by the Thai baht collapse in June 1997 triggered a flight of capital from the country. With sizeable corporate sector debts, private domestic investment could not be made, since the corporate balance sheet had severely deteriorated. This was exacerbated by the inability of the banking sector to lend, due to fast growing non-performing loans and attenuation of investment activity. Consequently, the economy plunged into recession. This caused a further loss of confidence. Hence, the cycle continued, and the circular causality in Figure 6 intensified.

Figure 7 displays the detailed mechanism of the CGE model related to the above circular causality (the shaded areas contains the relevant variables in the illustration). With the collapse of confidence, capital began to leave the country;

Figure 6 Circular Causality, Mulitiple Equilibria and Policy Choices



add several cost-push sources of inflation, one through a drop in food production due to unfavourable weather conditions (El-Nino phenomenon), another through interruptions in the distribution system of some basic commodities such as rice, especially after May 1998, when a major riot led many Chinese businesses to flee the country. This has disrupted the effective supply of several commodities, and is captured in the model by adjusting selected parameters in the production function. Finally, import prices also soar due to exchange rate depreciation.

Theoretically, pressures on prices could have been countered by tight money policy (**MS2**). But the brakes were not effective, since the central bank began extending special loans known as *BLBI* to several commercial banks (increased **CBLNTOT** in Figure 3). This was done in response to the fear of a collapse in the financial system following a major rush related to the closure of 16 banks in November 1997. As a result, prices increased significantly throughout 1998.

There are five components of household incomes (**YHH**): (1) in the first bracket on the RHS of Equation (8) is the factor income; (2) the second bracket consists of transfers from rest-of-the world, inter-household transfers and government transfers; (3) in the third bracket is household income from the after-tax corporate dividend; (4) in the fourth is the interest income from time deposit (**OTDH** is the time deposit at the initial period); and (5) the last bracket captures the interest income from foreign-currency-denominated time deposit. The disposable income (**YCONS**) is given by Equation (9).

$$\begin{aligned}\mathbf{YHH}_{ihh} = {} & [\Sigma_f\ \mathbf{factoin}_{ihh,f} \cdot \mathbf{YF}_f] + [\mathbf{EXR{*}ROWTRAN}_{ihh} \\ & + \Sigma_{ihh}\ \mathbf{transihh}_{ihh,ihhh} \cdot \mathbf{YHH}_{ihhh} \cdot (\mathbf{1} - \mathbf{thh}_{ihhh}) \\ & + \mathbf{gtran}_{ihh} \cdot \mathbf{GTRANTOT}] \\ & + [\mathbf{compdist}_{ihh} \cdot (\mathbf{1} - \mathbf{ctax}) \cdot \mathbf{YCORP}] + [\mathbf{rt} \cdot \mathbf{OTDH}_{ihh}] \\ & + [\mathbf{rfloan} \cdot \mathbf{EXR} \cdot \mathbf{OTFH}_{ihh}] \end{aligned} \quad (8)$$

$$\mathbf{YCONS}_{ihh} = \mathbf{YHH}_{ihh.} \cdot (\mathbf{1} - \mathbf{th}_{ihh}) \cdot (\mathbf{1} - \mathbf{mps}_{ihh} - \Sigma_{ihh}\ \mathbf{transihh}_{ihh,ihhh}) \quad (9)$$

Note that if the interest rate **rt** is raised, which is often the case in an IMF-sponsored policy response to a crisis, the **YHH** of household **ihh** who hold saving (**OTDH**) will also increase. Hence, given the interest rate, those holding more on time deposit will have higher incomes through interest revenues. The household time deposit **TDH** will be affected by the size of household wealth (**WEALH** in Equation (10)), the latter being determined by household saving, **HHSAV**, defined as the **mps** proportion (marginal propensity to consume) of **YHH** after tax-Equations (11) and (12). Hence, the size of time deposit is determined by incomes. Taken all together, therefore, with a certain time lag, incomes and time deposit are actually interdependent (see again Figure 3):

$$\mathbf{TDH}_{ihh} = \mathbf{gh}_{2ihh} \cdot \mathbf{gh}_{1ihh} \cdot (\mathbf{WEALH}_{ihh} - \mathbf{MDH}_{ihh} - \mathbf{EXR} \cdot \mathbf{HHFR}_{ihh}) \quad (10)$$

$$\mathbf{HHSAV} = \Sigma_{ihh}\ \mathbf{mps}_{ihh} \cdot \mathbf{YHH}_{ihh} \cdot (\mathbf{1} - \mathbf{th}_{ihh}) \quad (11)$$

$$\begin{aligned}\mathbf{WEALH}_{ihh} = {} & \mathbf{mps}_{ihh} \cdot \mathbf{YHH}_{ihh} \cdot (\mathbf{1} - \mathbf{th}_{ihh}) + \mathbf{OWEALH}_{ihh} + (\mathbf{EXR} - \mathbf{EXR0}) \\ & \cdot \mathbf{OTFH}_{ihh} + (\mathbf{PEQ} - \mathbf{PEQ0}) \cdot \mathbf{OEQH} \end{aligned} \quad (12)$$

Finally, the sequential dynamics of the model are expressed through the following motion equations for the aggregate capital stock **K**:

$$\mathbf{K}_{t,p} = \mathbf{K}_{t-1,p}(1 - \Delta_p) + \Psi\ \mathbf{DK}_{t,p} \quad (13)$$

where Δ is depreciation rate, and Ψ is the absorption rate.

V. Sequential Simulations

In response to the early pressure on exchange rate, following the Thai baht depreciation in July 1998, the government widened the exchange rate band to 12%. At the same time, driven by the jitteriness among foreign investors, some capital began to leave the country. This outflow, reflected in the model through **EQROW** and **FCAPOUT**, continued in the following month (August 14), despite the fact that the interest rate (on CB certificate SBI) was raised. Unable to defend the exchange rate further, the government floated the rupiah that month. In the model simulation, these two events (in July and August) are captured sequentially.

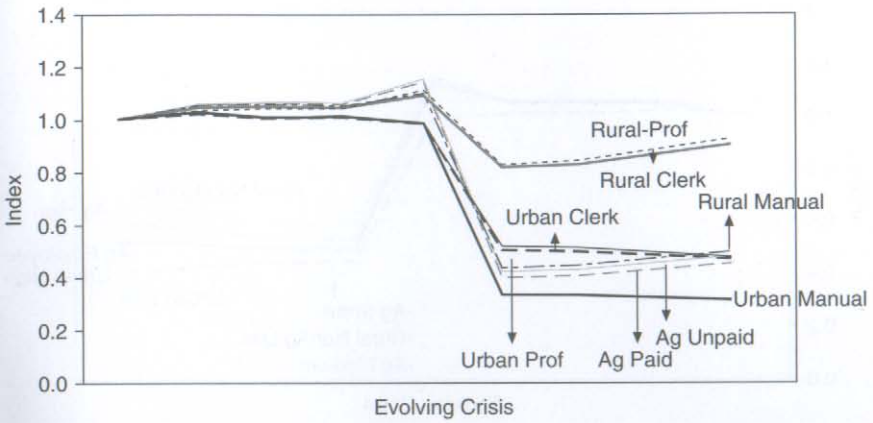
The third and fourth stages of simulation are basically a continuation of the previous two, except that at these stages the central bank tried to intervene in the forex market by releasing some of its foreign reserves, and the SBI rate was slightly reduced. But the outflow **EQROW** continued, prompting the government finally to invite the IMF to rescue. With no deep understanding of what caused the crisis, the IMF demanded its standard prescription, i.e., keeping the interest rate high and closing some banks, despite the fact that the country had virtually no deposit insurance system. The resulting outcome was obvious: a bank run.

When the interest rate was kept high but capital outflows and the rupiah depreciation also persisted (partly because of the IMF's neglect on dealing with mounting corporate foreign debts), things got worse. The country's financial sector went haywire, and the entire economy fell into a deep recession. The stock market plunged and the rupiah hit an 'insane' level of over 11,000 per US dollar. Pandemonium set in when on 8 and 9 January 1998 people went on a buying spree to hoard foodstuffs.[9]

In the model specification, the collapse of the exchange rate could cause the corporate balance sheet to deteriorate with large negative net-worth (related to unpaid foreign debt). Consequently, no investment could be made, prolonging the recession (see again Equation (7)). As shown in Figure 7, a deep recession

9. The author observed the IMF's lack of touch with these chronological events, when in a private conversation with the IMF economists in Jakarta in March 2000 he was told that there was no food hoarding and rioting in January 1998 that caused prices of some basic goods, including rice, to soar. The fact is, there was hoarding and occasional riots, and the inflation rate rose by 13% from December 1997 to January 1998. The IMF remained convinced that the resulting inflation was a demand phenomenon, hence to be solved by aggregate demand management, i.e., by continuing to raise the interest rate.

Figure 9 Crisis Impact on Labour's Real Income: Results of Model Simulation



of the simulation period, real wages of the last two are close to those of agricultural paid and unpaid workers. The difference is, while real wages of agricultural workers show a slightly upward trend from simulations 6 to 8, real wages of all urban workers decline persistently.

The trend of household real income is even more important, since in reality not all incomes are derived from wage earnings. Furthermore, various forms of transfer were received by low-income groups during the crisis, either through the government's social-safety net and anti-poverty programmes, or prompted by a mutual-help process, which is an important traditional institution existing among rural communities (*gotong royong*). But from the perspective of model specification, the most important additional source of income is the interest income received by savers (time deposit holders), who mostly come into the category of 'urban high' in Figure 10. The relatively better position of this group, compared to the 'urban low' category, is precisely due to this additional source of income.

Nonetheless, judging from the household income, the urban areas once again are generally the hardest hit. Both urban low and urban high categories suffered the largest drops in real incomes. Like wages, household incomes move persistently downward, while for other categories, there is an increasing trend. Obviously, rising inflation related to a sharp increase in food prices during 1998 contributes significantly to such a decline.

The simulation clearly indicates that unemployment increases considerably with an annual rate of roughly 10%. This estimate is close to what the CBS data indicate. According to SAKERNAS, based on the official definition of 'employment' (i.e., those who worked at least 1 hour per-week) open unemployment increased from 4.3 to 5.1 million from 1996 to 1998. Of the 5.1 million unemployed, 3.1 million are in urban (representing a 9.3% urban unemployment rate), and 2.0 million are in rural (3.3%). Using a different definition of unemployment,

damaged investors' confidence further, causing capital to continue leaving the country (increased **EQROW**). Furthermore, for the first time the political factors (**POL** in equation (4)) began to play a significant role in the system, as the Suharto government no longer received public support. These shocks are applied in simulations 5 and 6.

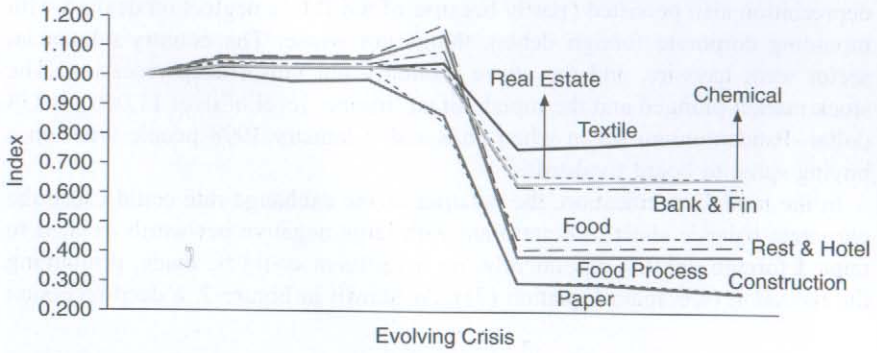
Under the Habibie government, various uncertainties could not be removed, causing market confidence to remain lacking. This is detected by, and captured through, the continued outflows of capital and increased political risks. Such a trend is applied in simulations 7 and 8.

By selecting the relevant exogenous variables and adjusting the size of the respective changes based on the above stages, a set of sequential simulations (from stage 1 to stage 8) is conducted.

Figure 8 displays the collapse of value-added in various sectors. Clearly, the construction, real estate and banking and financial sectors are among the hardest hit during the crisis. Within industries, the largest drop occurred in the food processing and paper-manufacturing sectors. The least affected is textile manufacturing. All categories of manufacturing, represented by solid lines, suffer from a significant downfall (Note that the X-axis represents the eight stages of events described earlier). This is consistent with the recently released national account data that show all industries decline, and that the largest drop of value-added in nominal terms is in the food processing and paper industries.[10]

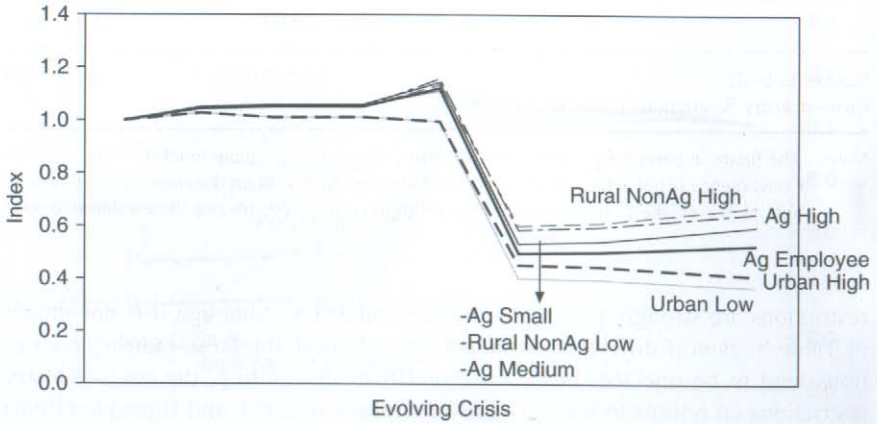
The most immediate impact of the economic downfall is on the real income of labors. Figure 9 indicates that the steepest fall of real wages occurred in urban workers of all categories, i.e., manual, professional and clerical types. At the end

Figure 8 Sectoral Value-Added: Results of Model Simulation



10. To be comparable with the SAM data used in the model, one needs to make the comparison by using nominal – not constant – prices. A different conclusion can be obtained when constant prices are used, e.g., the value-added of the two industries increases, not decreases. Also, in making the comparison, one needs to take into account the fact that there are some discrepancies in the classification and coverage of manufacturing sector between those in the national account and in the SAM.

Figure 10 Crisis Impact on Household Real Income: Results of Model Simulation



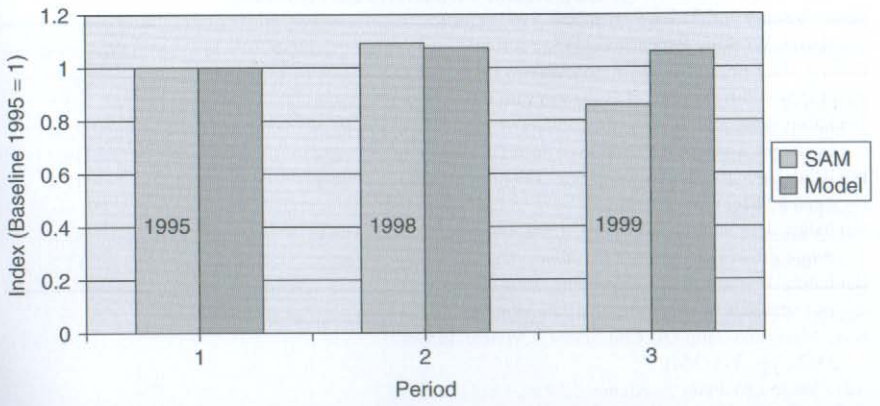
the Ministry of Labour predicted that the number of unemployed had reached 36 million in early 2000.

At this stage of the modelling, the unemployment rate is broken down neither by sector nor by labour category. Yet, it is important to make such a breakdown. For example, while the downturn in the construction sector is likely to hurt male workers more than female workers, within the manufacturing sector different activities will have varying effects on female and male workers. In the machinery sector, for instance, male workers are the most affected, while downsizing in textile and electronic industries may disproportionately affect female workers (I am currently working on disaggregating labour further in order to have a fuller picture).

The combined effect of declining real wages (and incomes) and increasing unemployment could potentially raise poverty dramatically. The process is activated through a downfall in consumption levels. If real consumption dropped as much as the rate of price increases, the impact on poverty would be devastating. Rather fortunately, there was a process of consumption smoothing. Many households have either changed their eating habits (e.g., eating rice once a day, using other less desirable foods the rest of the time), switched to lower price food (e.g., from imported to domestic produce), or used their accumulated savings to purchase food (dis-saving). Also, as the price of rice and CPI dropped from their 1998 levels, the poverty line in 1999 went down, causing the head-count poverty index to decline. However, within the poor group the conditions may have been more severe, as measured by the Foster–Greer–Thorbecke (FGT) index of poverty.

There is widespread evidence that a smoothing process also takes place in non-food consumption. However, the impact on poverty, more particularly on diet, is less serious than is the case when the smoothing is in food consumption (especially among the poor). However, the economic crisis was not the only culprit. During 1997/98, Indonesia also suffered from crop failures due to the

Figure 11 Gini Index: SAM Data and Model Simulation



fickle global weather (El-Niño) phenomenon. Subsistence farming areas were the worst affected. Hence, the economic and political crises only aggravated the situation.

Since income can be derived from the model, one could estimate the relative income distribution resulting from the sequential shocks. Figure 11 shows the trend of estimated Gini index. It is clear from the figure that the relative income distribution tends to fluctuate, i.e., worsening in the early stage, and slightly improving towards the end of the simulation period. Using the income data from SAM 1995, 1998 and 1999, the Gini index also shows a fluctuation, with the following trend: 0.31 (1995), 0.34 (1998) and 0.29 (1999).

Two reasons can be offered to explain why there was a period of worsening income distribution. First of all, as the model suggests, a depreciating exchange rate contributes to rising exports (see again Figure 7). This has occurred largely in the export-oriented primary sector. However, as prices of basic necessities and inputs – including imported inputs – began to rise, farmers' relative position tends to worsen.[11] Secondly, the hardest hit group has been the urban households, including the high-income group. This should have improved the relative income distribution. But, as specified in Equation (8), when the interest rate is persistently high, the middle and higher income groups who hold bank savings will eventually benefit from their increased interest incomes. Hence, during the high-interest period, the income (consumption) distribution tends to worsen. As the interest rate began to drop and the inflation rate subsided in 1999, the relative position of the low income groups also improved.

It should be noted, however, that the precise condition of relative income distribution at a certain point in time is highly sensitive to the date of data collection. Results of a survey carried out during the pre-harvest period tend to

11. Data on farmer's terms-of-trade also indicate an improvement in certain major areas during mid-1997 to mid-1998, then it deteriorates during mid-1998 to mid-1999 (CBS, *Buletin Ringkas*).

Table 2 Percentage of Respondents Ever Experiencing Lay-off and Bankruptcy By Employment Characteristics, 1997–1998

Employment Characteristics/Problems	*Ever Laid-Off*	*Ever Bankrupt*
Employed	40.2	62.1
Formal Sector	21.7	22.4
Informal Sector	18.5	39.7
Unemployed	59.8	37.9
Changes in Jobs		
1–2 times	59.8	82.8
>2 times	40.2	17.2

Source: Central Bureau of Statistics (1998) as quoted in Irawan et al. (1999)

differ from data collected during or after the harvest season. The model simulation, on the other hand, does not take into account such seasonal adjustments. This explains why the income distribution index generated by the model is rather different from what the SAM data suggest, although the two produce the same direction of change (see again Figure 11).

Some argued that the collapse of many formal sectors in urban areas forced most workers either to go back to rural areas or to accept informal jobs. It turns out that a majority (about 60%) of the laid-off workers remained jobless, even after they attempted to change jobs once or twice (see Table 2). Furthermore, SAKERNAS data also point to 9.4 and 14.4% increases in urban self-employed and unpaid family workers, respectively, whereas the number of employees dropped from 55 to 52%.

As also argued in Azis (2000), urban recession eventually affected the rural non-farm sector. Those in urban areas who were still lucky enough to remain on the job must face the possibility of working fewer hours. Indeed, urban workers who worked less than 15 and 35 hours increased by, respectively, 15.5% and 19.5% (Table 3). Obviously, their money incomes were also less.

A CBS survey in 1998 revealed that the average monthly income from main jobs for all income brackets, with the exception of those whose income was greater than Rp400,000, had fallen. The largest percentage fall, i.e., 22.1%, was for the low-income earners (less-than Rp200,000), followed by the informal sector (20.5%). Combined with the sharp increase in inflation (over 90% during 1996–98), the drop in nominal wages could be translated into collapsed real wages. Indeed, across all sectors real wages had declined (Table 4).

One estimate reveals that the drop of urban per-capita real income was larger than in rural area (30% versus 6.5%), and the sharpest decline in the two areas occurred among the low-income group, i.e., 37.1% and 22.7%, respectively (Irawan et al., 1999).

But the above arguments do not necessarily mean that there was no urban-rural migration. It is important to note that the selection of the post-crisis year

Table 3 Distribution and Percentage Change of Employment by Region and Working Hours

Region/ Working Hours	*1997*		*1998*		
	Number (000)	*% Distribution*	*Number (000)*	*% Distribution*	*Percentage Change*
Urban					
<15 Hrs	1673.2	5.70	1933.1	6.38	15.53
<35 Hrs	6120.5	20.85	7314.3	24.14	19.50
≥35 Hrs	23233.3	79.15	22990.2	75.86	−1.05
ALL	29353.8	100.00	30304.5	100.00	3.24
Rural					
<15 Hrs	6497.6	11.59	7260.2	12.66	11.74
<35 Hrs	24444.2	43.61	26987.5	47.04	10.40
≥35 Hrs	31607.5	56.39	30380.4	52.96	−3.88
ALL	56051.7	100.00	57367.9	100.00	2.35

Source: Central Bureau of Statistics, *Sakernas* (1997, 1998), BPS

Table 4 Index of Real Wages by Type of Industry (1994Q1 = 100)

	1996-II	*1997-II*	*1997-III*	*1997-IV*	*1998-I*	*1998-II*	*97–98(II) % change*
Hotel	91.4	86.4	86.8	88.9	84.4	72.5	−16.1
Mining	117.8	104.5	100.6	82.1	79.0	85.2	−18.5
Manufacturing Industry	112.9	125.7	121.5	121.5	96.7	92.2	−26.7
Foods	103.3	117.0	113.2	106.2	88.4	84.6	−27.7
Textiles	113.5	124.5	118.2	124.6	97.8	89.6	−28.0
Wood/ Products	120.4	138.7	140.5	136.7	109.2	107.0	−22.9
Paper/ Printing	128.7	153.9	137.7	129.4	109.7	83.2	−45.9
Chemical	118.2	123.4	118.9	116.8	95.8	95.5	−22.7
Ceramic	111.8	118.2	116.2	117.7	88.8	83.7	−29.2
Basic Metals	95.5	104.7	102.3	98.3	79.5	80.3	−23.3
Metal Products	110.6	131.4	128.4	125.6	97.1	98.8	−24.8
Others	102.5	120.4	115.9	108.8	84.3	75.0	−37.7

Source: Badan Pusat Statistik, Bureau for Demographic and Population Statistics, as quoted in Irawan et al. (1999)

(timing) matters a lot. During 1995–1998, the rural and urban populations increased by 4.6 and 3.3%, respectively, but during 1998–1999, the urban population dropped by 10% and rural population increased by 8% (see Table 5). Hence, there is an indication that during 1998–1999 there might have been considerable urban-rural migration.

Obviously, there are other social variables of interest, one of them is the incidence of poverty. What is the mechanism explaining the transmission of a

Table 5 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 labour 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 labour force (urban)	2,660,015	10,197,213	2,904,680	11,135,142	4,130,884	10,131,141
10.	Urban high	4,025,435	19,376,621	3,623,575	17,442,250	2,930,900	17,902,804
	Total	45,653,084	194,754,808	47,708,029	202,873,000	50,504,200	207,437,100

Source: SAM 1995, 1998 and 1999

financial shock to poverty? The most direct one is through a decline in nominal incomes or wages, and this is related to the fact that the number of laid-off workers increased during the crisis. Another mechanism is through an increase in prices, especially those of basic commodities, so that the poverty line is also raised.

How can the model help predicting the poverty outcome? Since prices are endogenously determined, given a certain basket of basic needs that are made up of food and non-food commodities a monetary poverty line could also be derived *endogenously* in the model. In this way, the usual problems of choosing a correct set of price deflators can be resolved. But in order to come up with estimates of poverty incidence, one has to have information about the overall income distribution. Since in SAM-based CGE models the number of household category is usually limited (there are eight in the current model), this implies that we must generate the intra-group distribution for each of the household categories.

VI. Counterfactual Scenarios: Non IMF-Style Policies

The model allows us to run a set of counterfactuals. In this section, I will discuss the outcome of simulating two counterfactual scenarios, i.e., not allowing the interest rate to rise, and resolving some of the foreign debts. These are basically not in accord with the IMF-style policy. To make a proper comparison, in each stage of simulations the exogenous changes are kept the same as in the sequential simulations described in the preceding section. The only difference is, under the no-interest increase scenario (labeled **No-TMP** in Figures 12 to 16), the interest (SBI) rate is set constant at stage 2 (scale 3 on the X-axis). Such a rate is more or less maintained towards the end of the simulation period. Another counterfactual, labelled **No-TMP&Debt**, is to combine the constant interest rate scenario with the efforts to resolve some of the foreign debts. More specifically, 10% of existing debts is assumed to be restructured (lowering **FOREXDEB** will cause **RISK** variable to decline, and consequently **PFCAPIN** to increase; see equations 1 and 2, and Figures 3 and 4).

Figure 12 shows the assumed trends of interest rate under three scenarios: the actual or IMF-style policy (**IMF Pol**), the absence of tight monetary policy by not raising the interest rate (**No-TMP**), and same scenario as the latter but combined with a partial debt resolution (**No-TMP&Debt**). As shown in Figures 13 and 14, under the two alternative scenarios the impacts on output (real GDP) and prices are more favourable than under the **IMF Pol** scenario. While a lower interest rate clearly has an output-stimulating effect, some of the outcomes are also due to the Bernanke-Gertler-Krugman effects of exchange rate on investment described in Section III. But this also implies that the exchange rate should be less depreciated under the alternative scenarios. As indicated in Figure 15, this is indeed the case for the **No-TMP&Debt** scenario.

Figure 12 Counterfactuals Versus IMF Policies: On Interest Rate

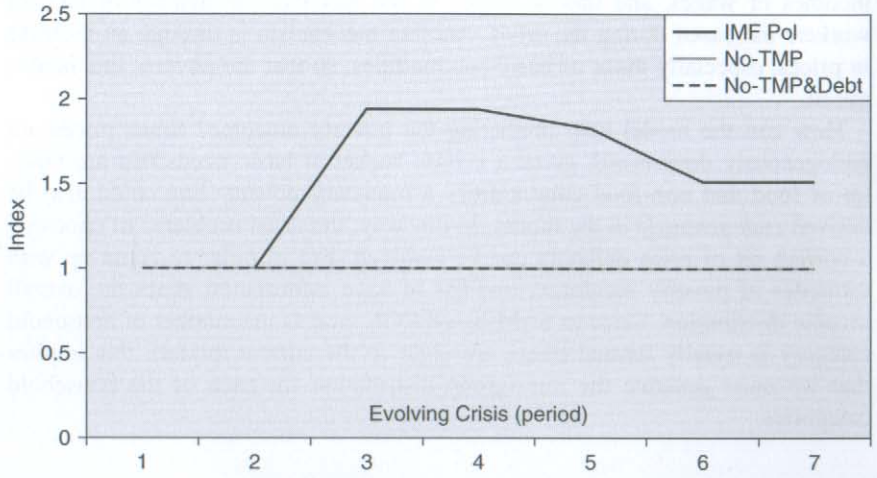
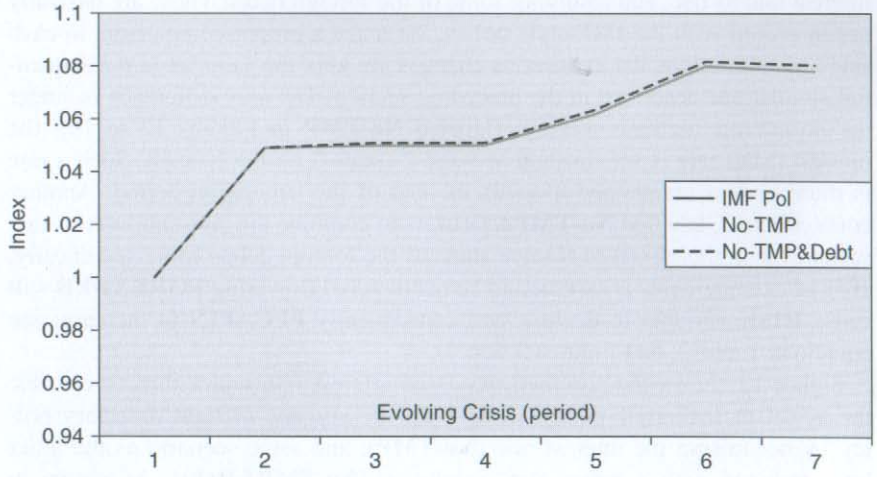


Figure 13 Counterefactual Versus IMF Policies: On Real GDP



But the most dramatic impact is on income distribution. By looking at the ratio of income of the high-income groups and that of the low income households, Figure 16 clearly shows that the two alternative policy scenarios would have generated a better distribution. The main mechanism is through the interest income in Equation (8) (see the discussions in Section IV). When the interest rate is not raised, there is no windfall income for the high- and medium-income

Figure 14 Counterfactual Versus IMF Policies: On Prices

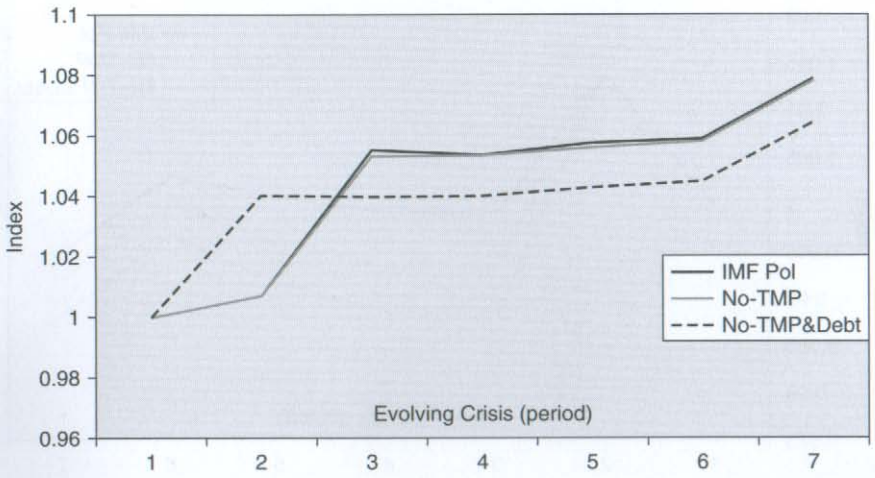
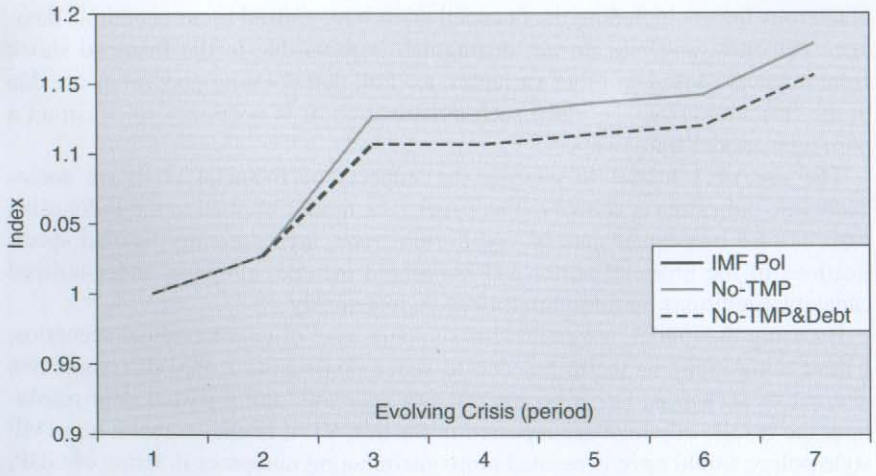


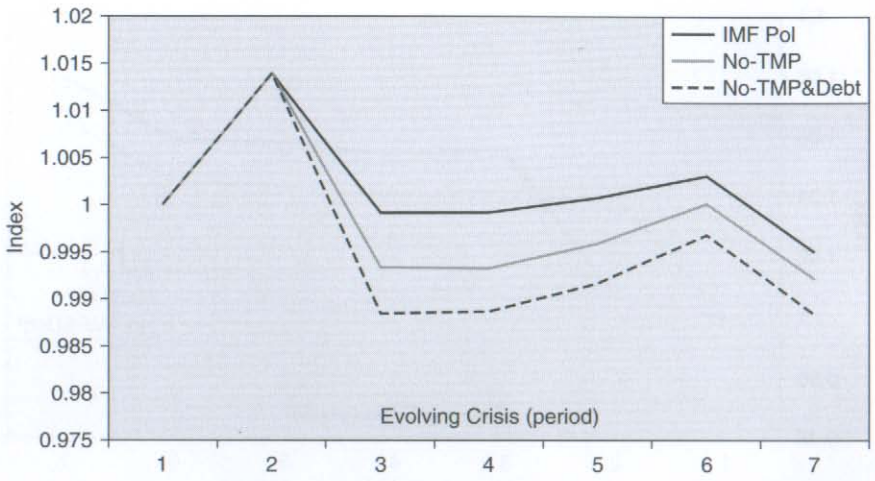
Figure 15 Counterfactual Versus IMF Policies: On Exchange Rate



groups (the savers), suggesting that the relative income distribution would have been better under such a scenario.

From the above counterfactual analysis, a policy of not raising the interest rate and simultaneously attempting to resolve some foreign debts would have been highly desirable.

Figure 16 Counterfactual Versus IMF Policies: On Income Distribution



VII. Closing Remarks

Numerous factors including the financial crisis have caused socio-economic damage. Yet, most analyses do not distinguish impacts due to the financial shock from impacts caused by other variables, as if all deteriorating conditions are due to the financial crisis. To make such a distinction, it is necessary to construct a particular model framework.

The use of a model to analyse the impacts of financial crisis on socio-economic indicators is shown in this paper. The model, applied to the Indonesian case, is of a non-linear general equilibrium type, incorporating detailed specifications of the financial sector and household income, allowing under-utilized capacity conditions, and treating prices endogenously.

By using the model, we could also simulate a set of counterfactual scenarios. I have done many of them, but due to space constraints I only discussed two alternative scenarios, i.e., a no interest rate increase, and a partial debt resolution, the results of which are reported in Section VI. It is shown that a non-IMF style policy would have generated more encouraging outcomes in terms of GDP, prices, and even exchange rate. But more importantly, the resulting relative income distributions under the alternative scenarios are also more favourable. Needless to say, this would have important ramifications on the policy-based analysis of the crisis. Clearly, by simulating alternative policy scenarios the quality of policy debates could be significantly enhanced. .

Further refinements of the financial sector and the socio-economic block of the model are possible, and they are continuously being made. However, I have not yet encountered cases whereby the overall conclusions with respect to the impact

of the crisis on socio-economic conditions are considerably different from those reported here.

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APPENDIX

Results of SPA Based on SAM 1995

Case	Path origin(i)	Path destination(j)	GI(i→j)	Elementary Path (i→j)	DI(i→j)	Mp	TI(i→j)	TI(i→j)/ GI(i→j) (%)
1	FoodI68	HR30 (High rural)	0.127	FoodI68-FoodI43-FarmC61-FarmC36-AG3-HR30	0.019	1.509	0.029	23.0
				FoodI68-FoodI43-FarmFC61-FarmFC36-LAL17-HR30	0.009	1.535	0.015	11.5
				FoodI68-FoodI43-Fish64-Fish40-LAL17-HR30	0.003	1.594	0.005	4.1
2	TxI69	LU31 (Low urban)	0.117	TxI69-TxI44-MWU6-LU31	0.048	1.408	0.067	57.4
				TxI69-TxI44-UC20-LU31	0.006	1.435	0.009	7.4
				IeI69-TxI44-ChI72-ChI47-UC20-LU31	0.001	1.692	0.002	2
3	WoodI70	HU30 (High urban)	0.111	WoodI70-WoodI45-Forest64-Forest39-LAL17-HU33	0.022	1.345	0.030	26.5
				WoodI70-WoodI45-ChI72-ChI47-UC20-HU30	0.003	1.381	0.004	3.8
4	PaperI71	LU31 (Low urban)	0.098	PaperI71-PaperI46-MWU6-LU31	0.039	1.290	0.051	51.8
				PaperI71-PaperI46-UC20-LU31	0.007	1.313	0.009	9.6
				PaperI71-PaperI46-ChI72-ChI47-UC20-LU31	0.002	1.544	0.003	3.2

Continued

Case	Path origin(i)	Path destination(j)	GI(i→j)	Elementary Path (i→j)	DI(i→j)	Mp	TI(i→j)	TI(i→j)/ GI(i→j) (%)
5	ChI72	LU31 (Low urban)	0.009	ChI72-ChI47-MWU6-LU31	0.029	1.283	0.037	37.6
				ChI72-ChI47-UC20-LU31	0.022	1.301	0.029	28.7
				ChI72-ChI47-AWU10-LU31	0.003	1.309	0.004	4.3

Notes: The repeated names of some sectors in the 'Elementary Path' column is due to the fact that the SAM format of 'Production' block is such that there are three sub-blocks: 'Production Sector', 'Domestic Commodity', and 'Imported Commodity'.