Exploring Alternative Policies By Way of Counterfactuals

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I. Introduction

Most analysts believe that the Indonesian economy began to show a recovery sign in 1999. Indeed, while in 1998 the GDP collapsed by more-than 13%, during 1999 the GDP growth started to show a positive number (0.2% and 4.8% in 1999 and 2000, respectively), albeit far from sufficient to lay the ground for a more sustained recovery. More recently, however, pessimisms abound, with most criticisms directed toward the government’s handling of the unstable situation and the lack of compliance to the agreed IMF-sponsored policies. Another widely accepted notion is that, the deteriorating socio-political situation diminishes the efficacy of most policies.

While some of these may be true, attention is hardly given to the damages and severe repercussions that the early crisis policies have created. Impacts of misplaced policies implemented at the early stage have a potential to become a holdup to subsequent policies.

My main intention in this manuscript is to argue that, given the prevailing structure of the economy and the conditions in the country during the time, alternative policies would have removed the undesirable impacts of the original policies that may have blockaded the current and future policies. In particular, policies of (partial) debt resolution and keeping the interest rate at a more reasonable (lower) level are to be explored. By making use of counterfactual policy scenarios simulated on a model specifically constructed for this purpose, one can also make a case that the same alternative policies would have produced a more favorable trajectory of recovery for Indonesia. The model is of an economy-wide type, featuring endogenous price determination. Its financial block, which is the core part, is a major departure from those previously developed by the author (see Azis, 2000a and Azis, 2000b).

The organization of the manuscript is as follows. Section II discusses two fundamental elements aggravating the crisis, i.e., corporate sector’s high leverage (international illiquidity problem), and the adoption of a very high interest rate. I do believe that the implications of the two have been either overlooked or not given sufficient emphasis in the recovery policy. Since the core of the argument is to be supported by the results from running counterfactual policy alternatives based on a model, the mechanisms of the models need to be described. This is done in Section III, while the model structure is described in Appendix 1. Section IV presents the outcomes of selected counterfactual scenarios.

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II. International Illiquidity and Interest Rate Policy

II.1 Corporate Leverage Being Overlooked

It is widely accepted that before the crisis, Indonesia had a fairly long episode of strong economic growth. The inflation rate was low, consistently at one-digit level, and there was even a deflation in some periods. One of the important factors behind the low inflation has been the management of the government budget. Indeed, practically all countries in Southeast Asia had a surplus budget before the crisis. Indonesia’s export performance was also strong, although beginning in 1996 the growth rate started to decline, and the current account deficit widened, i.e., from 3.6 to 3.9 percent during 1995-1996. Even with slower export growth, the country managed to maintain foreign reserves equivalent to 5.5 month of imports (May 1997).

In addition to the frequently quoted reasons, e.g., China’s yuan devaluation, dollar depreciation, and increased competition from other emerging markets, there was also a suspicion that the slower growth of exports was due to currency overvaluation. But with a relatively low inflation, such a proposition is disputable. For Balassa-Samuelson related reasons, a structural model of real exchange rate determination was developed by correcting for underlying structural change. Applied to the Indonesian data, the results of the model show that the size of rupiah overvaluation was relatively small, i.e., less-than 5% (see Chinn, 1998).

In a simpler measure using the CPI, Indonesia’s RER even depreciated, not appreciated, before 1997. JP Morgan’s measure of REER also points to 5.4% depreciation of the rupiah in 1996 (Figure 1).

A lending boom was also frequently noted as one of the good predictors of currency crises in the making. If lending increases rapidly, banks will not be able to screen out higher risk loans as easily, and their portfolio can potentially deteriorate. When banks are weak, the government may be less likely to endure a period of overvaluation and recession due to increased bankruptcies. While there may be a strong growth of credit prior to the crisis, actually data on bank credits only show a weak signs of a lending boom. The recorded growth of credits was only 18 percent, much lower than 116 percent in Mexico prior to the 1994/95 crisis.

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2 Data also suggest that, the widening current account deficit was caused more by increased imports, particularly of the capital and intermediate goods category.

3 From the PPP-based approach, the Singapore dollar is found overvalued by 13 percent, on a par with the Thai baht and Malaysian ringgit. Even when a modified model incorporating monetary and real sectors is used, the Singapore dollar is found overvalued by 45 percent, whereas in Thailand and Malaysia the size of the currency overvaluation is much smaller, i.e., 3.7 and 0.4, respectively. This is obviously inconsistent with the actual fall of the respected currencies after July 1997.

4 The data (taken from the IFS) do not include promissory notes of the multifinance companies. Yet, under a quasi-fixed exchange rate system like in Indonesia during the time, one should include them in the overall financial system’s liabilities. However, it is also the fact that the extent of the multifinance companies in Indonesia was not as large as in Thailand.
A different set of variables and data may point to a less favorable picture. Nonetheless, it remains difficult to claim that the country’s macroeconomic fundamentals were raison d'être for its economic vulnerability.\(^5\) They were too small to explain the magnitude of the subsequent crisis. What is clear is the fact that one of the major outcomes of the shock has been a near collapse of the country’s financial systems. It is in this respect that some have argued that the explanation of the crisis must also be financial in nature (see, for example, Chang & Velasco, 1998).

I do believe that a maturity mismatch of the private foreign debts holds the key to the story. It is interesting, at least to me, to learn that most analyses about Indonesia’s macroeconomic development up to the mid-1997 hardly touched upon this issue. The following well-known data have only become widely quoted after the crisis burst. The private foreign borrowing increased dramatically to reach more than US$50 billion in the mid 1997, most of which fall under the category of corporate (non-bank) borrowing (Figure 2), and the Japanese banks had the largest exposures. More seriously, the proportion of short-term debts (STD) was considerably larger than the long-term borrowings. At the onset of the crisis, STD was already 170 percent of the foreign reserves.\(^6\) This is a strong case of international illiquidity.\(^7\)

\(^5\) The absence of government’s bad policy, however, does not preclude government’s mistakes related to moral hazards. More often than not, favoritism was being played. A few selected private sectors with high leverage and well-connected groups were given special—non-transparent—facilities. This spelled trouble for the state banks since the probability of default of such loans was very high (an irony emerged: privatization increases—instead of decreases—the public sector’s burden). The combination of corruption, cronyism and nepotism, resulted in misdirected credits, many of which went into projects with the best connection rather than those with the best economic or financial prospect.

\(^6\) While the crisis episodes of most Latin American countries were often characterized by inappropriate government policies (hence weak macroeconomic “fundamentals”), by summer 1997 the Asian crisis countries have been inferior in terms of this indicator of international illiquidity (e.g., in the mid 1997, the STD/forex ratio were recorded at 170%, 206%, and 145% in Indonesia, Korea and Thailand, respectively, compared to 120% in Mexico and less-than 100% in Brazil, Peru, Columbia and Chile).

\(^7\) The increasing trend of private foreign debts was a regional phenomenon. Thanks to a widespread optimism about East Asia’s future growth and the celebrated label of “East Asian Miracle,” many private investors—local and foreign alike—were poised to expand their activities throughout the region. This was the second wave of foreign capital flows to ASEAN, coming mostly from the U.S, Europe and Japan (the first wave occurred during the second half of 1980s, when
Banks’ foreign borrowing was also in an upward trend, albeit relatively small. But given the quasi-fixed exchange rate system, the asset/liability position of the financial system should also include domestic currency deposits as additional obligations in international currency. A depositor could withdraw rupiah from a bank to convert it into dollars at the announced parity. Hence, unless there are sufficient foreign reserves to honor such a demand, by having excessive domestic liabilities a financial system can still suffer from an international illiquidity problem. Indonesia’s ratio of M2 to foreign reserves before the onset of the crisis was indeed the highest among the Asian crisis countries (6.3). Yet, it was still smaller than in Mexico prior to the 1994/95 crisis (9.1).

The above suggests that the problem of a mismatch of asset/liability in foreign currency—hence the problem of short-term foreign debts, is more important to examine. Yet, this issue did not seem to take a center stage in the early policy designs. An interesting question is therefore: would the outcomes be more favorable had a (partial) debt resolution been given a higher priority. This will be one of the policy scenarios conducted in the counterfactual exercise in Section IV.

II.2 A Critical Evaluation of the High Interest Rate Policy

One of the most compelling arguments favoring a high interest rate policy in the wake of depreciated exchange rate is footed on the interest parity relation. While the applicability of such a model in the short run is questionable (Meredith and Chinn, 1998), a number of studies show that the hypothesis the Japanese investment in the region surged, following the Yendaka phenomenon. The high domestic interest rate did not dampen their enthusiasm, largely because foreign loans were obtained easily at a relatively low rate, and stable pegged exchange rates were perceived as a guarantee for earning stability. The label "miracle" swayed lenders and the international financial community, making them to lend recklessly. The fast growing number of banks and multi-finance corporations, following the 1988 deregulation, also produced considerable effects. Many big companies set up new banks primarily to serve their own often-risky projects. Despite regulatory measures formally imposed by the monetary authority (e.g., legal lending limit, capital adequacy ratio), weak enforcement has discouraged the development of a healthy financial sector.

8 In classifying sources of Indonesia’s vulnerabilities, Summers (2000) assigned a value of “1” (meaning “very serious”) for short-term foreign indebtedness, along with the problem of general governance.
of the model breaks down during the crisis, implying that a high interest rate policy is not helpful in strengthening the exchange rate. Studies using the Asian countries before and after the crisis also point to a similar conclusion (Ohno, et.al, 1999, Goldfajn & Baig, 1998, and Turongpun, 2001). Gould and Kamin (1999) show that the exchange rates in the region are not affected by changes in the interest rate, rather, they are influenced by credit spread and stock prices.

The empirical test I run using Indonesian data shows that, indeed, the interest parity hypothesis cannot be accepted. The following results, calculated from daily data, demonstrate that even when the sign of the interest rate coefficient is correct (negative), based on the Wald test the null hypothesis that the intercept \( a_0 \) is zero and the coefficient \( a_1 \) is unity in different periods are all strongly rejected.

\[
dL(ER) = 6.13 - .00003 \text{ ID} \\
(987) \quad (268)
\]

Crisis Period: July 1997 – September 1998
\[
dL(ER) = 4.13^* - .000004 \text{ ID} \\
(000) \quad (979)
\]

where \( dL(ER) \) is the first difference of the log exchange rate, and \( \text{ID} \) is the interest rate differential. Numbers in the parenthesis indicate the p-value, and only the intercept in the second equation is significant at less than 5% critical level. There is clearly no support for the joint hypothesis of the interest parity and market efficiency. The propensity of the coefficients to be closer to zero rather than to unity implies that the use of interest rate policy does not help strengthen the exchange rate.

Two neglected factors, however, are worth noted. First is related to the contagion effect. Frequently raised argument is that, the rupiah depreciation was a result of contagion from the fall of the Thai’s baht. I find that such an assertion is well supported by the data, as the following econometric results show (looking at the influence from the Thai’s baht to the Indonesian rupiah): \( F \) statistics from the Granger test is 3.61; the critical level is 5.84; and the lagged day with strongest pair-wise influence equals to1.

The second neglected factor is the role of the news (good and bad news). It is hypothesized that market psychology is easily affected by the nature of the news during the time. After a careful selection of news (taken among others from the Dow Jones Database), the following is obtained for the period spanning from April 1996 to September 1998.\(^{10}\)

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\(^9\) The use of first difference is necessitated by the fact that the unit root test suggests a non-stationarity in the exchange rate series. The data, span from April 1, 1996 to September 30, 1998, are from Data-Stream Inc. The interest rate on a US 3-month maturity Euro-deposit is used as a proxy for the foreign interest rate.

\(^{10}\) After testing for the unit root, an Auto-Regressive Conditional Heteroskedasticity (ARCH) model is applied. The above results are based on the well-known selection criteria such as Akaike Information Criteria (AIC) and Schwarz Criteria (SC). It turns out that the variance is not constant, and there is a time-varying effect.
\[ d\text{ER}_t = 15.57 - 118.87 \times G\text{NEWS}_t + 25.46 \times B\text{NEWS}_t \]
\[ (1.10) \quad (-2.71) \quad (.34) \]
\[ h_t = 678.44^* + .70^* e_{t-1}^2 + .95^* e_{t-2}^2 \]
\[ (13.2) \quad (5.01) \quad (7.13) \]
\[ D.W = 1.96 \quad \text{Adj-R}^2 = -0.02 \]

where \( d\text{ER} \) is the first difference of the exchange rate. It appears that only good news (GNEWS) has a favorable effect on the rupiah at 5% level. The effect of bad news (BNEWS) does not seem to be significant. Such a conclusion is consistent with the finding of Baig & Goldfajn (1998).

Incorporating those two factors would give more relevant results. When the contagion factor is included in the model, the significance of the interest rate coefficient (and with the right sign) applies only for the early part of the crisis (July 1997-January 1998). For the second part (February 1998-September 1998), the significance disappears. Yet, the interest rate actually increased more sharply during the latter period. A similar finding is detected when the news effects are included in the exchange rate-interest rate model. When both factors are included altogether, the interest rate coefficient shows the wrong sign (positive) in the early crisis period. Although the sign turns negative for the latter period, the corresponding coefficient is insignificant.

It is clear from the above tests that the interest rate policy was futile in trying to calm the market psychology (news) and the exchange rate contagion. On the other hand, the adverse effects of high interest rate on the corporate and bank’s balance sheet are inevitable and serious, as revealed from a study based on the balance sheets of JSE-listed companies in Indonesia.\(^{11}\) Hence, a re-consideration of interest rate policy is warranted. To argue for the alternative, however, one should be able to demonstrate that the alternative policy would generate a more favorable outcome. Therefore, another counterfactual policy experiment in Section IV would be on keeping the interest rate from rising.

Before presenting the alternative policy scenarios, let me first discuss briefly the mechanisms of the model in the next section.

**III. Model Mechanisms: From Financial Shocks to Household Welfare**

The structure of the model is briefly discussed in the Appendix. There are a number of initial shocks one can pick to describe the mechanisms of the model. Let me take the case whereby the shock is in terms of sudden capital outflows (caused by either a contagion or simply a loss of confidence, as was the case in summer 1997). This effect is modeled by a decrease in the amount of equity held by foreign investors. The decline in foreign equity is captured in the model by a decrease in the variable \( \text{EQROW} \). In turn, this leads to capital outflows, represented in the model by an increase in the variable \( \text{PFCAPOUT} \) (capital outflows). The increase in \( \text{PFCAPOUT} \) leads to a depreciation in the exchange rate.

To stabilize the exchange rate, the interest rate is raised, potentially reducing investment and output. The decline in investment reduces the capital stock and thus production. The exchange rate shock not only directly affects investment by producing higher interest rates but also indirectly affects investment by worsening firms’ balance sheets. As the exchange rate falls, the rupiah value of firms’ foreign currency loans increases, making firms less creditworthy. This decrease in creditworthiness hinders firms’ ability to raise funds and further reduces investment. This effect is modeled by including the exchange rate ($EXR$) as a variable in the equation for domestic investment $DOMPINV$.

The high interest rates and deteriorating economy reduce the net worth of the banking sector. In the model, a decrease in the wealth of the banking sector, $WEALBANK$, will decrease the supply of bank loans. This reduction in the supply of loanable funds further reduces the ability of firms to invest and deepen the recession. The deepening recession, combined with the higher interest rates and depreciating exchange rate would further reduce the confidence of foreign investors, leading to another round of declines in equity holding by the rest of the world, a further capital outflow, and further depreciation.

It is clear, therefore, that there is a downward spiral in the model: a deteriorating confidence leads to capital outflows, and capital outflows depreciate the exchange rate, a depreciating exchange rate reduces investment, and at the same time deteriorates the balance sheet of high leverage corporate and banking sector. Lower investment produces a deepening recession, and a deepening recession leads to a further decline in confidence. This downward spiral can be aggravated if most of the debts remain mainly short-term, denominated in foreign currencies, and not successfully rescheduled. The short-term maturity of the debt can magnify the effect of the depreciation on firms’ balance sheets and hence exacerbating the depreciation. At any rate, a vicious recessionary cycle could replace the virtuous growth cycle—as depicted in Figure 3.

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12 During the crisis, it was also combined with bank runs. Contrary to Fama’s (1980) claims, a bank run can have real effects due to the presence of asymmetric information.
Four subsequent repercussions could be expected: (1) a standard push on net-exports, \(E-M\), via more competitive export prices; \(PE\); (2) an increase in the value of foreign savings (in domestic currency) 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 the direct impact of worsening firm balance sheets due to the rising value of foreign liabilities. At some point, the negative impact of (4) can dominate and more than compensate the positive combined effects of (1), (2) and (3). As a result, total supply \((Q)\) drops and so does aggregate demand.

The resulting inflation \((PINDEX)\) is determined through the interaction between aggregate demand and supply. One may also want to add several cost-push sources of inflation, e.g., a drop in food...
production due to unfavorable weather condition. Another potential contributing factor to inflation maybe less economic in nature, e.g., political instability and concomitant higher transaction costs. The inflation may also be further fueled by rising import prices resulting from the exchange rate depreciation.

Theoretically, pressures on prices can be countered through an appropriate tight monetary policy (MS2). But the brakes might not be effective if the monetary authority injects funds, simultaneously, to several commercial banks (increased CBLNTOT in Figure 4). Such a decision may be taken in response to the fear of a collapse in the financial system (for example, following a major bank rush).

There are 5 components of household incomes (YHH): in the first bracket on the RHS of equation 1 is factor income; the second bracket consists of transfers from 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 deposit (OTDH is the time deposit at the initial period); and the last bracket captures the interest income from foreign currency-denominated time deposits. Disposable income (YCONS) is given by equation 2.

\[
YHH_{ihh} = \left[ \sum_f \text{factoin}_{ihh,f} \cdot YF_f \right] + \left[ \text{EXR} \ast \text{ROWTRAN}_{ihh} + \sum_{ihh} \text{transihih}, YHH_{ihh} \cdot \left( 1 - \text{th}_{ihh} \right) + \text{gtransi}, \text{GTRANTOT} \right] + \left[ \text{compdist}_{ihh} \cdot (1 - \text{ctax}) \cdot YCORP \right] + \left[ \text{rt} \cdot \text{OTDH}_{ihh} \right] + \left[ \text{rfloan} \cdot \text{EXR} \cdot \text{OTFH}_{ihh} \right] \\
(1)
\]

\[
YCONS_{ihh} = YHH_{ihh} \cdot (1 - \text{th}_{ihh}) \cdot (1 - \text{mps}_{ihh} - \sum_{ihh} \text{transihih}, YHH_{ihh})
\]

Notice that if the deposit rate \text{rt} is raised, the \text{YHH} of household \text{ihh} who hold savings (OTDH) will also increase. Hence those holding more time deposit assets will enjoy higher incomes. Household time deposit \text{TDH} will be affected by the size of household wealth (WEALH in equation 3), the latter being determined by the sum of current household saving, HHSAV, defined as the \text{mps} or marginal propensity to save proportion of \text{YHH} after tax (equations 4 and 5), wealth at the beginning of the period, and a revaluation of assets. 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:

\[
TDH_{ihh} = gh_{ihh} \cdot \text{gh}_{ihh} \cdot (\text{WEALH}_{ihh} - \text{MDH}_{ihh} - \text{EXR} \cdot \text{HHFR}_{ihh})
\]

\[
HHSAV = \sum_{ihh} \text{mps}_{ihh} \cdot YHH_{ihh} \cdot (1 - \text{th}_{ihh})
\]

\[
\text{WEALH}_{ihh} = \text{mps}_{ihh} \cdot YHH_{ihh} \cdot (1 - \text{th}_{ihh}) + OWEALH_{ihh} + (\text{EXR} - \text{EXR0}) \cdot \text{OTFH}_{ihh} + (\text{PEQ} - \text{PEQ0}) \cdot \text{OEQH}
\]

As depicted in Figure 5, a depreciation of the exchange rate (that can be exacerbated by short-term foreign debts), will not only affect the household income \text{YHH} through the standard price and labor income channel, but also through the interest income of the foreign assets held by households (TFH). As the portion of this interest income increases, \text{YHH} of savers holding TFH also increases,
causing the value of their saving 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.

Once the whole system is specified, the sequential dynamics of the model are then expressed through the following motion equations for the aggregate capital stock $K$:

$$K_t = K_{t-1}(1 – \Delta) + \psi DK_t$$  \hspace{1cm} (6)

where $\Delta$ is depreciation rate, and $\psi$ is the scaling factor.

There are two transmission mechanisms through which the above shock can affect the household welfare. The most direct one is through a decline in nominal incomes or wages. This is related to the fact that the number of laid-off workers is likely to increase due to the shock. Another mechanism is through an increase in prices, especially those of basic commodities, leading to a rise in the poverty line.

Since prices are endogenously determined, given a certain basket of basic needs, made up of food and non-food commodities, a monetary poverty line is derived *endogenously*, i.e., $\sum_{com} \pi_{com} \cdot P_{com}$, where $\pi_{com}$ is a basket of quantities of commodities reflecting basic needs. This basket is invariant and applies to all households.

In order to come up with estimates of poverty incidence, one has to have information about the overall income distribution and more particularly the intra-group income (expenditure) distributions of the eight socio-economic household categories appearing in the current model. Since the number of household categories used in the model is rather limited (only 8), one must know the initial (pre-
shock) distributions and should be able to generate the post-shock distributions for each of the household category. In turn, a comparison of the pre- and post-shock distributions confronted with the endogenously derived poverty line allows one to estimate the evolution of poverty.

IV. Counterfactual Policy Simulations

In this section, the model is used to simulate a number of alternative policy scenarios. The model is calibrated on the basis of the initial conditions prevailing at the onset of the crisis as reflected in the Indonesian social accounting matrix (SAM). Many parameters and coefficients were statistically estimated on the basis of quarterly data from mid 1997 to mid 1999. A re-classification of the SAM yields the following classification: 16 production sectors, 8 labor types, 8 household categories, 3 borrowing institutions, and 7 non-labor institutions.

Prior to running the counterfactuals, a benchmark scenario (a form of baseline) is first simulated. This is done by setting the values of all the exogenous variables (including policy variables) and exogenous events equal to their actual (observed) values, based upon which the model is used to derive the resulting values of the endogenous variables. The latter are, in turn, compared with the actual values of these variables. In this way, the extent to which the model replicates the changes that actually occurred can be checked. This can be thought of as a kind of backward validation of the model. I have shown the results elsewhere (Azis, et.al, 2001), and will refrain from doing it here due to space constraint.

My main intention in this manuscript is to use the model to run some counterfactual policy scenarios. Following the arguments stated in Section II, I will concentrate on two alternative policies, the results of which are to be compared with the benchmark simulation described above.

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13 One can, for example, use a Beta distribution function for this purpose. 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. For a given household group,

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

where

$$B(p, q) = \int_{\min}^{\max} \frac{(s - \min)^{p-1}(\max - s)^{q-1}}{(\max - \min)^{p+q-2}} ds , \text{ and } y \in [\min, \max] .$$

Based on such distributions, one can subsequently apply a poverty measure of the Foster-Greer-Thorbecke (FGT) type. For socio-economic group j, the following applies:

$$P_a^* = \int_0^z \frac{\cdot}{z} \int f'(y; p_j, q_j) dy_j , \text{ where } z \text{ is the poverty line, and}$$

$$\alpha$$ is the poverty-aversion parameter. The headcount index ($R_0$), poverty depth ($I_1$), and poverty severity ($I_2$) can then be measured.

14 In particular, eight sequential events (stages) are used to shock the model. Each event (stage) is superimposed on the resulting values of the endogenous variables generated in the preceding stage.
Since the major policy response (to the crisis) has been largely influenced by the IMF, I will label the benchmark simulation “Benchmark (IMF).”

The two sets of counterfactuals are: 1) a scenario of keeping the interest rate from rising, implying that the interest rate is lower than under the actual (benchmark) case; this alternative scenario is labeled “Less tight;” and 2) the same as number 1 but is combined with the restructuring of some foreign debts (labeled “Less tight & debt”). Obviously, these scenarios contrast with the actual or “Benchmark (IMF)” case. Since the IMF entry was in November 1997--roughly equivalent to Stage 4, the starting point of the relevant adjustments to the exogenous variables is in Stage 4. To conduct a proper comparison, the exogenous changes in each stage, except for the interest rate and the level of foreign debt, are kept the same as in the benchmark simulation described in the preceding section.  

In stages 4 to 7, the influence of the political risks variable (POLRISK) under the two counterfactual scenarios is set lower than in the benchmark simulation. This approach is taken because political and socio-economic repercussions of a more “reasonable” level of interest rate are expected to be less severe. The second counterfactual experiment, labeled “Less tight & debt,” is to combine a lower interest rate with a partial resolution of the foreign debts. This is done by lowering the value of the variable DEBSERV in Stages 4 and 5, that will cause RISK variable to decline, and consequently PFCAPIN (capital inflows) to increase (see equations A1 and A2 in the Appendix). The interest rates in the alternative scenarios are set lower by roughly 12 percent in average compared to the rates in the benchmark case.

Let me now discuss the results of the counterfactual experiments. Since the different shocks for the counterfactual experiments are applied starting at Stage 4, the Figures in the following discussions show only the trends from Stage 4 to Stage 8.

### IV.1 Macroeconomic Outcomes

Under the two alternative scenarios, the impact on output (real GDP) and prices are more favorable than in the “Benchmark (IMF)” scenario. While higher interest rate produces an output-curtailment effect, the corresponding depreciation of the exchange rate appears to be worse. The latter is formed through the following mechanism. As the domestic investment (DOMPI) drops, domestic output, D, and exports, E, are adversely affected, causing GDP to decline and the RISK factor to rise. In turn, this reduces private capital inflows, PFCAPIN. The higher RISK also pushes the expected exchange rate, EXPEXPR, to surge, resulting in severe depreciation of the rupiah. Hence, despite the standard

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15 When the interest rate is set lower, the decline in the banking sector should have also been lower (e.g., less bankruptcy). The size of the resulting depressed construction sector, being the most bank-sensitive activity, would also be affected subsequently. In the two counterfactuals, I accommodate such changes in the relevant stages where downward adjustments have been imposed under the benchmark simulation.

16 When the interest rates surge, the probability of more bankruptcies becomes higher. Furthermore, the unfavorable impact on output drags domestic investment further down, causing more severe repercussions on the economy. At some stage, the political environment and uncertainty will be further jeopardized. Hence, under the two counterfactuals, the POLRISK exogenous variable should be lower than in the “Benchmark (IMF)” scenario.
mechanism of the interest parity equation, the intended impact of high interest rate is offset by a rise in \( \text{EXPEXR} \) through the above channel, causing greater depreciation of the exchange rate.

The above mechanism is repeated and reinforced by the presence of the Bernanke-Gertler-Krugman effects of the exchange rate on investment. As shown in Figure 6, the high and non-high interest rate policy could result in a difference of real GDP as much as 5.7% for the entire Stage 4-Stage 8 period, but in Stage 8 alone the gap could be as high as 9.6%. Meanwhile, the exchange rate under the non-high interest rate scenario would have been stronger by between 3.9 to 5.5%. (Figure 7). With identical \( \text{POLRISK} \) under the “Less tight” and “Less tight & debt” scenarios, the exchange rate is stronger in the latter.

![Figure 6. Real GDP: Benchmark & Counterfactuals](image1)

![Figure 7. Exchange Rates: Benchmark & Counterfactuals](image2)
In terms of net capital flows, there is a fluctuating trend, but “Less tight” is always superior to the other two (Figure 8). The reason why it produces greater inflows than in “Less tight & debt” is because, with a debt rescheduling the new inflows appear to be much smaller than with no debt rescheduling (any debt resolution would tend to deter further inflows), although the outflows are larger in the latter. It is important to stress that the length of the period covered in the sequential simulations is rather limited. The positive effects of a debt resolution (e.g., on exchange rate) may not be immediately felt; it would probably emerge only beyond Stage 8.

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 tend to converge in the remaining stages. In fact, in Stage 8 the price level under the “Benchmark (IMF)” is slightly lower.
than under the “Less tight” scenario (Figure 9). However, for the entire period, the poverty line price level is still highest under the “Benchmark (IMF)” experiment.

With additional pressures from the **RISK** factor, the actual (nominal) exchange rate could go into a free fall. As stated earlier, the declines in the domestic investment and GDP, preventing the exchange rate-stimulated exports to expand, are likely to increase the **RISK** factor. The higher **RISK** pushes up the expected exchange rate, causing the exchange rate to collapse. From the counterfactual experiments, it appears that lower interest rate and partial debt resolution would have generated a lower risk to the country, as shown in Figure 10.

### Figure 10. Risk Factor: Benchmark and Counterfactuals

![Figure 10. Risk Factor: Benchmark and Counterfactuals](image)

**IV.2 Some Social Indicators**

Indonesia’s progress in social development and poverty alleviation until the onset of the crisis was caused by a number of factors, ranging from the government’s emphasis on education and health sector, pricing policy for basic consumption goods (such as rice), government’s massive investment in infrastructure and agricultural technologies, and a fairly successful family planning program. The country’s flexible labor markets also helped mitigate the potential unemployment problems.

The recorded data from the National Surveys of Labor Force (*Sakernas*) show that during the crisis the unemployment rate increased by only less-than one percentage point (around .8 percent), suggesting a fairly high degree of flexibility in the country’s labor markets. Indeed, the benchmark scenario generated by the model also points to only a small increase of the unemployment rate. However, from the perspectives of counterfactuals, the unemployment rate under the “Benchmark (IMF)” scenario is still highest among the three, a result that is consistent with the GDP trend. As an illustration, in Stage 8, the unemployment rate in the “Less tight” experiment is considerably lower than (around half of) the rate under the benchmark scenario (Figure 11).
The generated income distribution is rather interesting. Up to Stage 5, all scenarios produce an improvement. But in the subsequent stages, there is clearly a worsening trend of income distribution (Figure 12). The resulting difference between “Less tight” and “Less tight & debt” scenarios is small, but still favoring the latter, e.g., 1.45 versus 1.43. It is revealing that under the “Benchmark (IMF)” scenario there is a close correlation between worsening (improving) trend of income distribution and increasing (lowering) interest rate. Surely, the increase in interest incomes and the windfall from foreign asset holding (e.g., time deposit in foreign currency) in an environment of super-high interest rate and severe exchange rate collapse have contributed to such a relation.

Nevertheless, the relative income distribution under the “Benchmark (IMF)” is clearly the least preferable one; it is persistently worst among the three scenarios. Note that the inequality measure used here is derived from the mean incomes of the 8 household groups. Each intra-group distribution is assumed to remain the same as in the base (1995/6) period. In the present context, this is a
defensible assumption, as a comparison of the actual pre- and post-crisis group distributions suggest (available upon request).

The shock and sudden reversal due to the crisis forced the government to review the existing social policies and to take some emergency programs. Considering the fact that the inflation surge, particularly of the basic-need goods, contributes significantly to poverty fluctuation, an anti-inflation strategy is critical. But when the exchange rate collapses, such a strategy becomes more difficult to implement, since inflation varies 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 increase (e.g., landless farm workers who are net consumers of food), others may benefit from such an increase (e.g., export-oriented plantation farmers).

As indicated earlier, the effects on prices show that up to Stage 7 the “Benchmark (IMF)” produces a highest price index, in which the gap is largest in Stage 6, though in the remaining stages prices tend to converge. A similar trend would have been also observed for the poverty line price level. As shown in Figure 13, generally for the entire period the poverty line price level is highest under the “Benchmark (IMF)” experiment.

![Figure 13. Prices for Poverty Line](image)

It is therefore evident from the above model simulations that not only the macroeconomic indicators but also the socio-economic and poverty conditions would have been better if a prolonged high-interest rate policy was avoided. Furthermore, with the only exception of net capital flows, the results generated from the combination of non-high interest rate and partial debt resolution appear to be most preferable.

V. Closing Remarks

To support my main argument that the alternative policies would have produced a more favorable outcome, in this study an economy-wide model is used to generate two counterfactual policy scenarios. The model incorporates various channels and transmission mechanisms through which the financial shock and other non-economic perturbation (e.g., political instability) will affect the socio-
economical system. Expectedly, the model contains a detailed financial sector, elaborated household incomes, and a poverty module.

On the financial sector, the notion of asymmetric information is particularly forceful in the model. The damage done to the banking sector by the high interest rates (more so when added with a bank run, as was the case during the last quarter of 1997) deter spending. The high interest rates will have already raised the cost of capital and make fewer projects profitable. The banking crisis denies bank-dependent borrowers needed funds, forcing them to reduce investment further. While restrictions of the supply of credit from banks can reduce economic activity, reductions in firms’ net worth can have similar effects. This effect occurs because, with asymmetric information, it matters whether firms finance investment through debt, equity, or retained earnings. Retained earnings will be least costly, and thus firms with healthier balance sheets and more internal funds are more likely to invest.

The second policy option evaluated is related to (private) foreign debts. The depreciation of the rupiah causes firms with foreign currency-denominated debts suffer from a decline in their net worth. This deterioration in their balance sheets may worsen the terms on which external finance is available just as firms need to borrow more. Firms thus have to curtail spending, leading to a further decline in asset values, borrowing, and spending. Hence, the spiraling effect could easily emerge.

While each of the two policy options has its own compelling effects on both macroeconomic and socio-economic conditions, they are actually interrelated. As the domestic investment drops due to the high interest rate, production of domestic output and exports goods can be adversely affected, causing GDP to decline and the risk factor to rise. This will push the expected exchange rate up, causing further depreciation of the rupiah. Hence, the intended impact of high interest rate can be offset by a rise in the expected exchange rate through the above channel. Furthermore, if the debt problems are not resolved, the mechanisms are likely to be repeated and reinforced by the presence of the Bernanke-Gertler-Krugman effects of the exchange rate on investment, hence on output.

Based on such model mechanisms, two counterfactual experiments clearly indicate that the policy scenario of not raising the interest rate would have created more favorable outcomes in terms of macroeconomic indicators as well as social indicators. With the only exception of net capital flows, the results generated from the combination of non-high interest rate and partial debt resolution appear to be most preferable.

With or without small modifications, there are several other counterfactuals one can experiment by using the model. Examples of other scenarios are: implementing partial restriction on capital flows, and reallocating the huge amount of bank recapitalization funds for other sectors considering that such a reallocation may generate a more effective process of recovery. My work on such experiments is still underway.
References


_____________________, SAKERNAS, various volumes

_____________________ , SUSENAS, various volumes


Appendix

The following discusses briefly the key components of the financial block of the model and the mechanisms and channels of influence through which a shock (such as the one occurred in the summer 1997, including the political instability) affect the socio-economic system. Some of the parameters and coefficients in the model were calibrated, while others were estimated econometrically.

1. Financial Sector

In the first stage, gross private capital inflows are specified as a function of interest rate differentials and country risks (labeled $RISK$), the latter being influenced by the debt service ratio (debt service to exports):

\[
PFCAPIN = \sigma_0 + \text{degree} \cdot \sigma_1 (RLOAN - RFLOAN - RISK)
\]

\[
RISK = \alpha_0 + \alpha_1 \cdot \Sigma_{in} \text{DEBSERV}_{in} / \Sigma_{p} \text{pwe}_{p}
\]

where $RLOAN$ and $RFLOAN$ are domestic and foreign interest rate, respectively, $PFCAPIN$ and $DEBSERV$ are the gross private capital flows and the debt service, respectively; $\text{degree}$ indicates the intensity of capital openness, the size of which is calibrated from the SAM, $\text{pwe}$ is the world price of exports, and $E$ is export volume.

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 as it was influenced by IMF conditionality requirements and manipulated by the monetary authorities, hence exogenously determined. On the other hand, the exchange rates in practically all crisis countries, with the exception of Malaysia, were allowed to float. In this sense, the exchange rate plays an important role in the determination of the saving-investment balance.

The phenomenon of capital outflows, particularly undertaken by foreign investors, is widespread during the early part of a financial crisis. This is modeled through a shrinking equity asset $EQROW$ in the foreign sector’s balance sheet, that will eventually contribute to the rising outflows, $PFCAPOUT$ (expressed in US$).

Next, the exchange rate determination and the role of non-economic factors need to be specified. Since a standard testable uncovered interest parity (UIP) model requires a rational expectation assumption, the corresponding risk premia (lumped together with expectational errors, $\xi$) would have a rather loose economic interpretation. The usual assumption that $\xi$ is orthogonal to the interest rate differential (hence the slope parameter is close to unity) is nothing more than a statistical conjecture.

Hence, alternative interpretations can be suggested, providing a scope for introducing other risk factors. The selection of risk factors depends on the prevailing country’s

\footnote{It is not surprising that a clear consensus could hardly be reached by most empirical tests using UIP model (see for example, Froot, 1990, MacDonald & Taylor, 1992, and Meredith & Chin, 1998). On the other hand, many studies also reject the proposition that exchange rate movements are best characterized as a random walk, (see for example Meese & Rogoff, 1983).}
situation. When political factors play a major role, for example, a proxy for political instability, say, \( POL \), may enter the equation—a simple example of which would be like in equation A3:

\[
\begin{align*}
RLOAN &= RFLOAN + (\text{EXPEXR}/\text{EXR} - 1) + POLRISK \\
\text{EXPEXR} &= \text{EXR} \left(\frac{\text{PFCAPOUT}}{\text{PFCAPOUT0}}\right)^{gh1} \left(\frac{\text{RISK}}{\text{RISK0}}\right)^{gh2} \left(\frac{\text{M2CBFR}}{\text{M2CBFR0}}\right)^{gh3} \\
\end{align*}
\]

where \( M2CBFR \) is the ratio of broad money \( M2 \) to central bank’s foreign reserves. As the expected exchange rate \( \text{EXPEXR} \) increases, the following alternatives must occur, individually or simultaneously, in order to be consistent with the above equation: (1) the interest rate \( RLOAN \) increases, and (2) the actual exchange rate \( \text{EXR} \) depreciates. The same alternatives apply to the case where the political instability, \( POL \), worsens.

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 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, I chose to follow the approach of James Tobin (1970), Brunner & Meltzer (1972), Bernanke & Blinder (1988), and Bourguignon, Branson and de Melo (1989) 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 deposit, foreign time deposit, and equity. The specific allocation is determined by household’s preferences/tastes.

In the model, the preference for time deposit and equity is 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 \( \text{EXPEXR} \). In this way, the portfolio selection is also affected by the country’s political conditions in addition to the standard economic risks.

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 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 the commercial bank’s borrowing and the reserve requirements.

The money supply is modeled 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

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18 This approach was also used in Thorbecke et.al (1992).
19 As \( \text{EXPEXR} \) increases with the loss of market confidence due to deteriorating political conditions, household portfolio shifts to foreign assets including foreign time deposit, \( TFH \) (an increase in \( 1-gh2 \))
rather sharply during the crisis, because household behavior varied considerably. Therefore, money multipliers are allowed to vary freely, influenced among others by government’s policy such as reserve requirements (see Harberger, 2000 for a discussion of flexible multipliers during the Asian crisis).

The saving-investment closure departs drastically from a neo-classical specification. Private sectoral domestic investment in sector \( p \), i.e., \( \text{DOMPINV}_p \) is determined through an independent function as in equation A5. In Indonesia, it has been observed empirically that over an extensive period domestic investment into a sector is highly correlated with value added (the output accelerator), the interest rate and the inflation rate. Foreign investment \( \text{FORINV} \), which is part of net private capital inflows, \( f_1(1-f_2) \) \( \text{PFCAP} \), along with \( \text{DOMPINV}_p \) and the exogenous government investment \( \text{GOVINV}_p \), constitute total investment \( \text{TOTINVEST} \).

\[
\text{DOMPINV}_p = \lambda_p \text{VA}_p \lambda^{\text{p}}_r (1+\text{RLOAN})^{\lambda^{\text{p}}_r} (\text{EXR}/\text{PINDEX})^{\lambda^{\text{p}}_r} \\
\text{TOTINVEST} = \Sigma_p (\text{DOMPINV}_p + \text{GOVINV}_p) + (f_1(1-f_2) \text{PFCAP}). \text{EXR}
\]

where \( \text{VA}_p \) is the value added of sector \( p \), and \( \text{RLOAN} \) and \( \text{EXR} \) are interest rate and nominal exchange rate, respectively. \( \text{PINDEX} \) is the price index.

The above specification of domestic investment reflects the financing behavior (i.e., bank-dependent) of agents, and the emerging constraints on the corporate balance sheet following the exchange rate collapse (Bernanke & Gertler, 1989, and Krugman, 1999). This fits fairly well with the prevailing pre-crisis conditions in some East Asian countries.

Hence, the interest rate and the production capacity, combined with the (depreciating) exchange rate, is assumed to affect the size of domestic investment. When the real exchange rate \( (\text{RER}=\text{EXR}/\text{PINDEX}) \) is favorable, few firms would be balance sheet-constrained. In such a case, the direct effect of \( \text{RER} \) on aggregate demand would be minor. On the other hand, if the exchange rate collapses (as it did in Indonesia), firms with foreign-currency debt--deteriorating balance sheet--would be unable to invest. This would further accelerate the recession. In the interim, exports may rise, but the effects of a bankrupt corporate sector and the absence of new investment may be large enough to outweigh the direct effects of greater export competitiveness. In this case the worsening exchange rate would be contractionary.

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

2. Output and Factor Markets

The specification of the real sector is standard for this class of CGE models, in which the production structure is modeled as a set of nested 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. Similar to many East Asian economies, Indonesia’s structure of production and trade is
such that many intermediate inputs are still imported. Therefore, the composite intermediate inputs are necessarily modeled as a CES function of domestic and imported inputs, such that in the model simulations one can alter the elasticity of substitutions of some of these inputs. In the second stage, domestic output is specified as a CES function of value-added and composite intermediate inputs.

On the supply side, exports are assumed to be differentiated from domestically sold products in each sector. 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; a 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 process, the producers’ behavior is captured through equations that express the ratio of exports to domestic sales as a function of 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 & transport margin, the world price is assumed to determine the domestic price of imports.

The labor market is specified by assuming that sectoral wage rates are endogenously derived as functions of value-added, labor productivity, and the inflation rate. The wage factor income is set to be proportional to wages. In a crisis model, even when it is used for a short-term analysis, the composition of labor supply cannot be treated exogenously. More specifically, labor supply must be influenced by spatial migration.

When there is a shock affecting the urban-oriented sector, labor may 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 the rural areas (for example, there is evidence of a major reverse migration during the 1997/1998 crisis).

In most standard migration specifications, a Harris-Todaro approach is often used, in which labor movements are determined by the growths of earning differentials and employment opportunity. Despite its widespread use, however, such a model does not necessarily fit well with the actual migration in some countries. In particular, either due to imperfect information or other reasons, wage differentials do not always explain the observed labor movements. As shown in Azis (1997), this has been indeed the case in Indonesia. Modeling the migration behavior during a severe crisis like in 1997 is even more difficult. The fact that a considerable number of people have moved from urban to rural areas does not necessarily reflect the trend in wage differentials, e.g., wages in the agricultural sector remain much lower than in the urban-related activities, even after the shock. On the basis of this information, the migration is modeled by making use of the changes in labor demand, DFL, to represent labor opportunity, as the explanatory variable:

\[
MIG = LS0 \{ \tau [(DFL/Y)/DFL0/Y]/(DFL/Y)/DFL0/Y]^{\tau} - 1 \} \quad (A7)
\]
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.