The Long-run Effects of Malaysian Redistribution Policies

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ABSTRACT
Using a general equilibrium approach, this paper simulates the dynamic paths of Malaysian redistribution policies. These effects are traced, firstly, from a once-and-for-all sustained change in the policy instrument; secondly, from repeated and actual changes in borrowed capital of Bumiputeras; and finally, from increasing the share of Bumiputera land ownership. The short-run effects were found to hold in the long-run—that increasing borrowed capital is the most effective instrument in raising Bumiputera share capital ownership. Except for the final experiment, the income redistribution effects favour the high-income Bumiputeras while all employment restructuring outcomes were detrimental to the NEP objectives.

INTRODUCTION
In this paper we will utilize the general equilibrium model of Malaysian redistribution policies (see Ragayah 1988a, 1988b) to simulate the effects of the different policy instruments on our objectives of
increasing Bumiputera capital ownership share, income redistribution and restructuring employment over the period between 1973 and 1990. Ragayah (1988c) has analyzed the impact elasticities of the base period solution or the short-run effects of various policy changes. However, since several equations of the model include lagged values of some variables and, therefore, all reduced-form equations induce lagged effects, the effects of an exogenous stimulus is not fully registered in just the first year. As such, we need to look at the outcomes beyond this single period. Furthermore, we are interested in tracing the paths taken by the various endogenous variables in response to a change in the exogenous variables since it is this disequilibrium, rather than the immediate or the final equilibrium states, that policymakers are concerned with. For this purpose we have to examine the interim effects of dynamic multipliers, defined by Theil and Boot (1968) as:

$$\frac{Y_j(t')}{X_j(t)}, \text{ where } t' > t.$$  

The nature of the dynamic effects depends on both the coefficient of the lagged endogenous variables as well as how the policy instruments change. The dynamic multipliers that we are calculating here are derived, firstly, from a once-and-for-all sustained change in the chosen $X$, for example:

$$t = 0 \ 1 \ 2 \ 3, \ldots$$
$$\hat{X} = 1 \ 0 \ 0 \ 0, \ldots$$

secondly, from a repeated change, for example:

$$t = 0 \ 1 \ 2 \ 3, \ldots$$
$$\hat{X} = 1 \ 1 \ 1 \ 1, \ldots$$

and finally from actual changes. Assuming that the initial conditions are consistent with a static equilibrium we can introduce changes in any of the policy instrument in the base period, $t = 0$. These changes become zero in subsequent periods in the first set of experiments or are repeated for the other sets of experiments. In these experiments, the rest of the exogenous changes are set to zero when there is a change in a particular instrument in order to isolate the effects of one specific policy change.

These dynamic multipliers or elasticities can be derived simply by lagging the following equation 1 (equation 2 in Ragayah 1988c) by one year, and then substituting $Y_{t-1}$ in the same equation with the new equation:
\[ \dot{Y}_t = A_0^{-1} A_1 \dot{Y}_{t-1} + A_0^{-1} B_0 \dot{X}_t \] (1)

and lagging it by one period, we get:

\[ \dot{Y}_{t-1} = A_0^{-1} A_1 \dot{Y}_{t-2} + A_0^{-1} B_0 \dot{X}_{t-1} \] (2)

Eliminating \( \dot{Y}_{t-1} \) in (1) and solving, we obtain:

\[ \dot{Y}_t = (A_0^{-1} A_1)^2 \dot{Y}_{t-2} + A_0^{-1} A_1 A_0^{-1} B_0 \dot{X}_{t-1} + A_0^{-1} B_0 \dot{X}_t \] (3)

Now \( A_0^{-1} B_0 \) and \( A_0^{-1} A_1 A_0^{-1} B_0 \) show the influence of the exogenous variable on endogenous variable in the current year and one year later respectively. \( A_0^{-1} \) assumes the value of zero for the first set of experiments since there is no more change in \( X_t \). If the procedure is repeated by substituting for \( \dot{Y}_{t-2} \), we get:

\[ \dot{Y}_t = (A_0^{-1} A_1)^3 \dot{Y}_{t-3} + (A_0^{-1} A_1)^2 A_0^{-1} B_0 \dot{X}_{t-2}, \] (4)

where the effect felt in the third year of an exogenous change which took place in the first year is given by \( (A_0^{-1} A_1)^2 A_0^{-1} B_0 \). We can repeat this procedure for as many times as desired. Since economists and policy-makers would be interested in the cumulative effects of a certain policy after the lapse of specific time period rather than the effects in any particular year, the elasticities computed are cumulated over the years.

The construction of the data set has been described in Ragayah (1988a, 1988c). As the aim of this exercise is to look at the efficacy of the Government's redistributive policies in attaining the specified targets of the NEP, the dynamic multipliers have been calculated from the base period, 1973, through to the target period of 1990 for the selected endogenous variables. We shall examine the effects on the capital ownership, income distribution and employment elasticities consequent to the various types of change in the policy instruments. Owing to the enormity of the outcomes, we shall discuss the results of the various instruments on the relevant variables only.

**DYNAMIC EFFECTS OF A ONCE-AND-FOR-ALL CHANGE ON POLICY OBJECTIVES**

For the first experiment, we shall only sketch the paths of the dynamic multipliers for the capital ownership and racial income variables (see Figure 1). The paths of these and other directly relevant multipliers are tabulated elsewhere (see Ragayah 1988a). Because a lot of numbers is involved, and it is tedious to go through them in detail, we shall discuss only the salient features and notable results here. The system
is stable, with each endogenous variable converging towards their long-run equilibrium values, some attaining this state long before 1990. Note, however, that we are measuring the effects of a one period change in a policy variable in 1973 and none thereafter. In actual practice there may be disparate changes every year. Although most of the outcomes of the changes in the exogenous variable are felt in the first year, there are some cases when the dynamic effects give a totally different picture from the impact effects. We shall now analyse these multipliers for a one shot change in the exogenous variables.

**Borrowed capital of Bumiputeras, \( k_{t-1}^B \).** The dynamic effect of borrowed capital of Bumiputeras on Bumiputera capital ownership, while still positive, does not change significantly over time from its impact effect. In fact, it reaches its equilibrium value several years before 1990. On the other hand, non-Bumiputera capital ownership contracts throughout the period, but by a very small amount. In terms of the share of capital ownership, Bumiputeras' share remains positive and keep increasing till it reaches its peak value in 1981. The value of the cumulated multiplier for the share of Bumiputera capital in 1990 indicates that there is still a long way to go before the 30 percent target is achieved.

This policy instrument has more mixed results with respect to income distribution over time than its impact effects. Both Bumiputera and non-Bumiputera households in the rural areas and Bumiputera households in the modern urban sector benefit from this policy option, with the latter obtaining the largest gain. This is not surprising since this group holds the largest share of borrowed capital. The other half of the household groups undergo income reduction. Decreases in incomes of non-Bumiputeras in the two urban sectors are not unexpected, considering the contraction in non-Bumiputera capital ownership. The change in the income of Bumiputera household in the urban informal sector become negative after the fifth year while that of the non-Bumiputeras in the same sector decreases after the first year. This negativity is attributed to the fact that this policy has the impact of swelling the labor supplies and causing a negative response of wage in this sector. At the same time, this household group hold only a minute fraction of the borrowed capital and the value of its coefficient is effectively zero in their income equation. Hence, while this policy benefits the population in general and helps the rural poor, it is exacerbating the urban poverty problem.
FIGURE 1 Effects of various policies on selected targets

Notes: All the vertical axes measure the cumulative multipliers while all the horizontal axes measure the time period.
FIGURE 1 (Continued)
FIGURE 1 (Continued)
FIGURE 1 (Continued)
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FIGURE 1 (Continued)
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$w_2$ on $Y_B$

$t_c$ on $Y_B$

$u'$ on $Y_B$

$u''$ on $Y_B$

$i^*$ on $Y_B$

$G$ on $Y_B$

FIGURE 1 (Continued)
FIGURE 1 (Continued)
Malaysian Redistributive Policies

\[ k_{t-1}^B \text{ on } Y_{NB} \]

\[ \tau_B \text{ on } Y_{NB} \]

\[ t_y \text{ on } Y_{NB} \]

\[ t_{\text{dm}} \text{ on } Y_{NB} \]

\[ t_{\text{m}}' \text{ on } Y_{NB} \]

\[ t_{\text{w1}} \text{ on } Y_{NB} \]

FIGURE 1 (Continued)
FIGURE 1 (Continued)
Where labor supplies, and thus employment implications, are concerned the directions of changes of the impact and the dynamic outcomes are the same, with labor supplies of both ethnic groups increasing in the rural and urban informal sector while decreasing in the urban modern sector. Similar to the impact elasticity, these results arise because producers are substituting capital for labor in the modern sector. Furthermore, while wages in all sectors decrease the largest reduction occurs in the modern sector, thus driving labor out of this sector.

**Share of Bumiputera land ownership, \( \tau_B \).** The share of land ownership of Bumiputeras still has favorable outcomes on both capital ownership in the long run. The cumulative dynamic multiplier of Bumiputera capital ownership increases slightly till the fourth year, then falls after the fifth year till it reaches its equilibrium value several years before 1990, with the equilibrium value being higher than the impact value. Similarly, the cumulative multiplier for the value of capital ownership of non-Bumiputeras increases slightly in the second year, and then decreases continuously throughout the period, with its 1990 value being somewhat less than that of the impact multiplier. The value of non-Bumiputera capital accumulation multiplier is considerably smaller than that for Bumiputera, which accounts for the fact that the share of Bumiputera capital ownership increases throughout the period. The latter also reaches its peak value several years before 1990, with the value of the cumulated multiplier then being higher than the impact value.

Only those households in the agriculture sector and Bumiputera households in the urban informal sector sustain positive changes in their income levels over time, although in the latter case the value of the cumulative dynamic multipliers become much smaller in the long run. These results are contrary to what are indicated by the impact elasticities, leading to an increase in rural and a decrease in urban incomes. Nonetheless, they are expected since an increase in land ownership of Bumiputeras implies greater productive capacity for the rural households which are made up mainly of Bumiputeras. The additional land areas require complementary factors of production, capital and labor, derived from the urban sectors and hence causing a fall in the latter's outputs, relative wages and income levels. Still, Bumiputera and non-Bumiputera households as a whole enjoy positive growth in incomes as the beneficial changes in the rural household incomes outweigh the income reductions of the urban households.
There is no reversal in the directions of labor supplies for all the groups. The absolute values of the multipliers of all groups, except for those in the urban informal sector, have become larger in 1990 compared to the base period, reaffirming the explanations forwarded for the impact elasticities.

**Personal income tax, \( t'_y \).** There are no variations in the growth of the three groups of dependent variables of capital ownership, income, and labor supply, aside from the magnitudes, consequent to changes in the personal income tax. Remember that our income tax coefficients are entered as \( t_y = (1 - t'_y) \), that is, a percentage increase in \( t_y \) implies a decrease in the tax rate, \( t'_y \). The annual multipliers of the effects of reducing personal income tax on capital owned by Bumiputeras are positive for the first four years, but negative thereafter. Still, the cumulative multiplier in 1990 is higher than the impact multiplier. Capital owned by non-Bumiputeras is also favorably affected and at a higher rate than that for Bumiputeras. These results are expected since a higher net-of-tax income encourages savings and thus capital accumulation. Since non-Bumiputeras have a higher average of this income, their marginal propensity to save and acquire capital is therefore higher. Thus, it is not puzzling that the share of capital ownership of non-Bumiputeras rises and that of Bumiputeras falls.

As expected, like the impact effects, incomes of all households rise consequent to a reduction in the personal income tax. However, the values of the elasticities for both groups of households in the rural areas increase whereas the elasticities for all households in the urban areas decrease over time. Furthermore, although the dynamic multipliers for non-Bumiputera households as a whole contract marginally and those for Bumiputera households expand throughout the period under study, this policy instrument seems more effective in raising the non-Bumiputera incomes. Therefore, while a reduction in the Malaysian income taxation is beneficial to everyone, the gains are biased towards the non-Bumiputeras. Hence, this policy appears to worsen the income disparity between the Bumiputeras and non-Bumiputeras, and consequently against the objectives of the NEP.

After examining the outcome of this policy on outputs and wages of the various sectors, the effects on the labor supplies are acceptable. Outputs contract in sectors 2, 3 and 4, the fall in wage is also highest in the modern sector, causing labor to be ejected from the modern sector to the other two sectors. The result of the present policy is to augment the rural labor supplies, with their cumulative multipliers
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exceeding their impact multipliers. This result is believable since the cumulative growth in incomes also exceed the impact effects. The sequel to this is the contraction of the modern sector labor supplies over time. The response of labor supplies in the urban informal sector also corresponds to the reactions of the income level in this sector.

Commodity taxes, $t'_{dm}$. While these taxes slightly augment Bumiputera capital ownership in the first several years, the cumulative multipliers become negative thereafter. Hence, an increase in these taxes represents a contradiction to Bumiputera interests, though the effects are small. Likewise, the long-run value of non-Bumiputera capital ownership elasticity is also negative. However, the values of these elasticities for the two ethnic groups are small, and since the absolute value of that of the non-Bumiputera is slightly higher, the end result is to enhance the share of Bumiputera capital ownership. These negative dynamic multipliers of capital accumulation for both races can be explained by the following effects. The levying of commodity taxes causes output of most of the modern sectors, as well as wages and return to capital, to fall in the long run. With these variables, and thus incomes, contracting, then there is not much incentive for capital accumulation to increase.

The long-run reactions of household incomes with respect to an increase in the commodity taxes are favorable to the rural households, but disadvantageous to the urban households. Although the impact effect on rural income is negative, the cumulative elasticities become positive after the early years. Conversely, households in the urban informal sector at first experience positive income effects which later become negative. The long-run bias towards rural incomes and against urban incomes can be explained by the following reactions. Imposing these commodity taxes have the effects of reducing most outputs in the modern sector. At the same time, the urban sectors wages fall more than that in the rural sector. The effect on the long-run rate of return to capital is also negative. Consumption in these sectors increase, which reduces their savings and thus capital accumulation and return from capital. All these responses negate the growth in urban incomes.

Corresponding to these changes, labor supplies of both ethnic groups in the agriculture sector expand while those to the urban modern sector contract subsequent to a rise in these taxes. Urban informal labor supplies still grow despite a decrease in income. An explanation for this phenomenon is that the contraction of labor
supplies in the urban modern sector requires the absorption of this surplus labor both by the rural as well as the urban informal sector, since the latter also acts as a repository for the unemployed.

**Import taxes, $t'_m$.** The consequence of imposing import duties is to reduce the capital accumulation of Bumiputeras throughout the period. Although the value of the cumulative multiplier increases continuously, its absolute value is very small. Non-Bumiputera capital accumulation, which begins by growing consequent to a rise in these taxes, also declines after the second year. The net effect is to increase the capital ownership share of Bumiputeras after the second year marginally. This phenomenon could be attributed to the negative effects of this tax on incomes of most households in the urban sector, and the negative changes in the rate of return to capital in particular, making the proportionate change in savings of most households negative.

With regards to the dynamic changes in incomes, over time incomes of households in the rural sector experience positive changes, while those in the urban areas undergo negative changes. In other words, the directions of these income changes are completely opposite to their impact effects. The adverse influence on urban incomes arise because all urban wages are also negatively affected in the long run. The negativity in the elasticities of these wages, in turn, are caused by the reduction in the net prices of these affected sectors following the imposition of higher import taxes. These net prices are more liable to the changes in import taxes because these taxes play a greater role in determining them. On the other hand, output in the agriculture sector and the return to land experience positive changes, enough to overcome the negative changes in wages, resulting in an expansion in the rural incomes.

The response in labor supplies corresponds to the changes in wages. Urban modern sector labor supplies contract following the relatively larger adverse effects on wages while those in the urban informal and rural sector expand a little. Labor supplies in the agriculture and urban informal sectors rise since they act as depots for the unemployed ejected by the urban modern sector.

**Social security tax contributions, $t'_{w_1}$, $t'_{w_2}$.** We have also defined the employees’ social security tax contributions as $t_{w_1} = (1 - t'_{v_1})$, and that reductions in these contributions will enhance the realized disposable household incomes. This then elucidates the favorable effects
on all income groups in the long run. Income redistribution as a consequence of a decrease in this tax is pro-urban and slightly pro-Bumiputeras. These results are expected since most contributors are in the urban areas and this social security contributions represent a relatively higher proportion of Bumiputeras' incomes.

With the multipliers of all income variables being positive, we anticipate that the value of capital accumulation elasticities to be positive too. Unfortunately, like the impact elasticities, the capital accumulation variables of both ethnic groups continue to change negatively till the end of the period. The same explanation offered for the impact multipliers hold true, that a reduction in the employees' contributions effectively decreases forced savings by 100%, while only part of the expansion in income arising from this policy would be saved. Since the former is larger than the latter, capital accumulation will shrink. In addition, except for the first year, the absolute values of these elasticities are larger for non-Bumiputeras than Bumiputeras, and so the net effect is to increase the share of Bumiputera capital ownership after the first year.

Labor supplies have the same results as the impact effects, that is, labor supplies in the modern sector shrink while those in the urban informal and agriculture sectors expand. The shrinkage of outputs in most of the modern sector leads to a greater proportionate decrease in the modern sector wage, which discourage labor from migrating into this sector.

An increase in the employers' part of this tax continues to have favorable effects on the value of capital ownership of both races in the long run. The same explanation given for the impact effect still holds, that is, a rise in the relative price of labor due to this tax leads to more capital investment. As the cumulative values of Bumiputera capital accumulation multiplier are less than those of non-Bumiputeras', the net result is to decrease the share of Bumiputera capital ownership throughout the period. The dynamic consequences on urban incomes are negative. The negativity of the latter can be explained by the adverse effects of this policy on output and the return to land.

The outcomes of labor supplies are consistent with the changes in incomes. That is, labor supplies in the urban modern sector expands while the rest contracts. The same reasons offered for the impact effects still hold true here. That is, labor leaves the rural and urban informal sectors for the more attractive modern sector where wage is increasing more than elsewhere.
Corporation tax, \( t_c \). This tax was also entered as \( t_c = (1 - t_c') \) in our computations. Thus, a reduction in the corporation tax is advantageous for capital accumulations to both the racial groups which rise throughout the period. In terms of magnitude it is pro-non-Bumiputera. Hence, it is not surprising that it leads to a reduction in the share of capital ownership of Bumiputeras throughout the period. The positive capital accumulation outcomes tally with our prediction since the lower corporation tax would encourage capital investment, both via increase in savings and the return to capital.

The long-run response in income is adverse for Bumiputeras in the rural and urban informal sector, but favorable for the rest. The former is explained by the fact that these households own a very small amount of capital to really benefit from this policy while, at the same time, the return to land falls. The beneficial effects on incomes, particularly of the modern sector, can easily be explained since a lowering of this tax means larger dividends being distributed to the shareholders. This also provides incentive for capital reinvestment. Generally, it is pro-non-Bumiputera and pro-urban, and therefore not redistributive.

As far as labor supplies are concerned, a reduction in this tax would cause urban modern sector labor supplies to swell in response to the higher proportionate change in wage and expanded demand for labor owing to the increased industrial activities since most of the modern sector outputs expand. Labor supplies in the other sectors shrink. Thus, it seems that this policy instrument contributes towards the employment restructuring objective of the NEP.

Undistributed profits shares, \( u', u'' \). Undistributed profits of Bumiputeras continue to have favorable influence on Bumiputera capital accumulation till the end of the period under study. Their effects on the capital accumulation of non-Bumiputeras is also positive, although the magnitude is much smaller. Thus, it comes as no surprise that the share of Bumiputera capital ownership is increasing following this policy implementation, though it reaches its equilibrium value several years before 1990. Similarly, undistributed profits of non-Bumiputeras have advantageous outcome on capital accumulation of non-Bumiputeras over time, and have slight favorable effects on capital accumulation of Bumiputeras. The overall effect is to decrease the share of capital ownership of Bumiputeras. These results are foreseen since the higher are the level of undistributed profits of each race, the higher are their rates of savings and hence their capital accumulation.
With the exception of the marginal increase in the incomes of non-Bumiputeras consequent to raising the undistributed profits of Bumiputeras, the long-run effects of undistributed profits on Bumiputera, as well as on rural and urban, household incomes as a whole are slightly adverse. This implies that the higher returns through savings and thus capital ownership could not overcome the lower rate of distributed profits. However, at the individual group level, raising the undistributed profits of Bumiputeras has the long-term consequence of improving the incomes of non-Bumiputera households in the urban sector and Bumiputera households in the urban informal sector. Increasing undistributed profits of non-Bumiputeras, in turn, favours only the income of Bumiputera households in the urban areas, even then marginally. The latter results are not surprising for these households in the urban sector since wages are rising and their distributed profits are not affected. Incomes of Bumiputeras in the agriculture sector decrease because the increase in retained earnings causes output in this sector to decrease, which leads to a negative change in the return from land.

Labor supplies to the urban modern sector continue to grow while those in the other two sectors shrink if either of the undistributed profits share is increased. This could be accounted for by the fact that labor is being pushed out of the non-modern sectors because of the adverse effects on incomes. Although wages are increasing in all sectors, but the wage coefficients indicate that labor is more responsive to a change in the modern sector wage than the rural wage.

Cost of borrowing capital to Bumiputeras, \( i^* \). As anticipated, the long-run effect of increasing the cost of borrowing capital is to reduce the value of capital accumulation of Bumiputeras. On the other hand, the capital accumulation of non-Bumiputeras grows a little, thus reducing the share of Bumiputera capital ownership.

Incomes of Bumiputeras in the rural and the modern urban sector are unfavourably affected while that of the Bumiputeras in the urban informal sector improved marginally. The former is expected since a shrinkage in the subsidy element and in capital ownership means less dividends. The latter can be explained by the fact that their borrowed capital, as well as their income in the form of returns to capital, is minimal. Thus, a rise in the cost of borrowing capital hardly makes a dent in their incomes. Incomes of non-Bumiputeras in the rural sector is negatively affected, but the value of the multiplier is so small that it can be considered as zero. Incomes of the rest of the house-
holds are not directly influenced, and they all improve slightly. This could be due to the fact that the higher cost of borrowing capital to Bumiputeras makes it relatively more available to non-Bumiputeras, particularly those in the modern sector. On the whole, only incomes of non-Bumiputeras are improving as a result of this instrument, and even then only minimally.

The impact effects of an increase in the cost of borrowing capital to Bumiputeras on labor supplies continues in the same direction in the long run, with an expansion in the modern sector labor supplies and a contraction of rural and urban informal labor supplies. The same explanation also holds true, that labor is magnetized to the modern sector because the relative wage increase is highest here among all the sectors. The rate at which labor is being absorbed into the modern sector is neutral between the two races.

Government Expenditure Benefits, G. The long run effects of government expenditure benefits on Bumiputera capital accumulation is favorable. The opposite is true for that of non-Bumiputera capital accumulation. If we examine the elasticities of incomes and savings, only those belonging to households in the agriculture sector are positive. Since Bumiputera households form a majority in the rural and a minority in the urban areas, then their positive income and savings elasticities would lead to an increase in their capital accumulation. On the other hand, as non-Bumiputera form a majority in the urban sector, their capital accumulation decreases. Therefore, this policy leads to an increase in the share of capital ownership of Bumiputeras.

Except for incomes of Bumiputeras in the urban informal sector, the long-run effects of government expenditure on the various income variables have the same signs as their impact effects. Incomes of Bumiputera households in the urban informal sector experience negative changes in the long run. This implies that the gains made by the rural households are at the expense of those households in the urban sector. An explanation for this phenomenon is that higher government expenditure causes reductions in outputs in most of the modern sector leading to a substantial decline in wage. Wage in the urban informal sector also decreases significantly despite the increase in output because labor supply rises here. Generally, this policy is pro-Bumiputera and pro-rural. Non-Bumiputera and urban modern households both experience negative changes in incomes over the period.
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Labor supply reactions are as expected. The much smaller proportionate reduction in rural wage deter labor from leaving the agriculture sector, and hence labor supplies increase here. Conversely, the larger relative negative response of the modern sector wage, as well as the damped economic activity consequent to the lessening of funds available for investment, discouraged the flow of labor into this sector. It is, therefore, not surprising that labor supplies in the urban informal sector, which acts as one of the repositories for the unemployeds, swell and has the effect of depressing the income level there.

SIMULATION RESULTS OF REPEATED CHANGES IN BORROWED CAPITAL OF BUMIPUTERAS

In the above section we have looked at changes in the government targets where there is only a once-and-for-all sustained change in the various policy variables. However, in reality, some of these instruments are repeatedly changed, such as borrowed capital of Bumiputeras. Since the Malaysian government is overtly employing this policy to redistribute the ownership of share capital through increasing the borrowing of capital by Bumiputeras, there are a number of simulations we can perform with respect to this policy. One such simulation is to examine the effects of a 10% sustained annual change in the borrowed capital of Bumiputeras since 1973. Another is to simulate the effects of actual increases in this borrowing that have been undertaken so far (up to 1985) plus the predicted increase up to 1990. These will be discussed below.

TEN PERCENT SUSTAINED ANNUAL INCREASE IN BORROWED CAPITAL OF BUMIPUTERAS

We have mentioned earlier that the cumulated annual multiplier of the base year increase in borrowed capital of Bumiputeras would only raise the capital share of Bumiputeras by a small amount. This is attributed to the fact that this policy was just enacted and the amount of this borrowing was still small. Another reason why the effect of the cumulated dynamic multiplier of this instrument on the share of capital ownership of Bumiputeras is small is because we are just looking at a one-shot sustained increment in the base year. It is more realistic to look at the effect on the endogenous variables when this instrument is increased every year. Since we do not have the actual annual figures of these increments, we can suppose that borrowed capital of Bumiputeras increases by 10% each year.
TABLE 1  Aggregated cumulative multipliers consequent to increases in borrowed capital of Bumiputeras

<table>
<thead>
<tr>
<th>Dependent Variables</th>
<th>Aggregated Cumulative Multipliers</th>
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<tr>
<td>$k_B$</td>
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<tr>
<td>$k_{NB}$</td>
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<tr>
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<td>$Y_{1B}$</td>
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<td>$L_{6NB}$</td>
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</table>

Note:

1. Definitions of endogenous variables:
- $k_B$: Capital owned by Bumiputera household
- $k_{NB}$: Capital owned by non-Bumiputera household
- $K_B$: Share of Bumiputera capital ownership
- $Y_{1B}$: Income of Bumiputera household in the rural sector
- $Y_{1NB}$: Income of non-Bumiputera household in the rural sector
- $Y_{mB}$: Income of Bumiputera household in the modern sector
- $Y_{mNB}$: Income of non-Bumiputera household in the modern sector
- $Y_{6B}$: Income of Bumiputera household in the urban informal sector
- $Y_{6NB}$: Income of non-Bumiputera household in the urban informal sector
- $Y_R$: Income of rural household
- $Y_U$: Income of urban household
- $L_{1B}$: Bumiputera labor supply to the rural sector
- $L_{1NB}$: Non-Bumiputera labor supply to the rural sector
- $L_{2B}$: Bumiputera labor supply to the secondary sector
- $L_{2NB}$: Non-Bumiputera labor supply to the secondary sector
2. Definitions of exogenous variables:

- \( k_{tB}^{-1} \): Borrowed capital of Bumiputera household
- \( t_B \): Share of Bumiputera land ownership
- \( t_r \): \( t_r = 1 - t_t; t_t \) is personal income tax rate
- \( t_{dm} \): Domestic or commodity tax rate
- \( t_M \): Import tax rate
- \( t_{W1} \): \( t_{W1} = 1 - t_{W1}; t_{W1} \) is employees' contribution rate to the EPF
- \( t_{W2} \): \( t_{W2} = 1 + t_{W2}; t_{W2} \) is employers' contribution rate to the EPF
- \( t_c \): \( t_c = 1 - t_c; t_c \) is corporation tax as a percentage of profits
- \( u' \): Undistributed profits rate of Bumiputera household
- \( u'' \): Undistributed profits rate of non-Bumiputera household
- \( i^* \): Cost of borrowing capital to Bumiputera household
- \( G \): Government expenditure benefits to each household.

However, these experiments would be arduous and costly. A shortcut is available in which the dynamic multipliers of the first experiment for this instrument are simply aggregated to give its effects on the various endogenous variables in 1990. These aggregated cumulative multipliers, shown in Table 1 will be the lower limit of the responses of these targets to the 10% annual increase of borrowed capital of Bumiputeras because this process ignores any other changes that would have taken place over the years.

The effects on Bumiputera capital accumulation remain positive while that of non-Bumiputeras' continues to be negative, their respective aggregated multipliers being 0.9852 and -0.0004. Our particular interest is the multipliers for the share capital of Bumiputeras, which add up to 0.9488. However, this assumes that the base year borrowed capital remains constant, which accounts for the fact that the share capital of Bumiputeras only rises by less than 10%. As such, we must include the expansion in the base year borrowed capital from the 10% increase in every year. When these are multiplied by their respective elasticities and summed up over the period, the total proportionate change in Bumiputera capital share rises to 2.3882. With a base period share of 3.73%, then this share will increase to 12.64% in 1990. If the base period share is assumed to be 5.64%, then the predicted share of Bumiputera capital ownership is 19.11%. Thus, on the basis of these multipliers, the target Bumiputera capital ownership share will not be achieved by 1990, although these increases do represent a substantial expansion in the share of Bumiputera capital ownership over a period of eighteen years.
Given a 10% annual increase in borrowed capital of Bumiputeras, incomes of all households, except non-Bumiputeras in the urban areas, react favorably. Like before, Bumiputera households in the modern sector obtain the highest gain in income, which is expected since these households acquire the largest share in borrowed capital. This result also leads to incomes being redistributed from non-Bumiputeras to Bumiputeras, although the benefits are mainly acquired by the rich Bumiputeras. Hence, it is also not surprising that urban income as whole rises faster than rural income.

The effects of the same policy on the directions of labor supplies remain the same, with those in the modern sector contracting and those in the agriculture and urban informal sectors expanding. In fact, Bumiputera labor supplies decrease proportionately more than non-Bumiputera labor supplies in the modern sector. This implies that not only does this policy not fulfill the employment restructuring prong of the NEP, but it is also detrimental to the Bumiputera employment situation in the modern sector.

**ACTUAL INCREASES IN BORROWED CAPITAL OF BUMIPUTERAS**

We can also compare the performance of our model with that of reality through the following experiments. Even though there are no actual annual figures on the additional amount of borrowed capital of Bumiputeras, there are some published figures in the various Malaysia five-year plans for certain years on the total Bumiputera share capital ownership (including those held by trust agencies) and the amount of this capital in the hands of all Bumiputera individuals. The difference between these two are then considered to be the borrowed capital of Bumiputeras. Such figures are available for the years 1975, 1980, 1982, and 1985. These figures are deflated by the Consumer Price Index to be consistent with the base year value. Using the incremental values for these years, we have re-linearized the relevant equations and run the simulation experiments. We shall look at the results of capital ownership share up to 1985 since the approximated actual shares are available till this year. These results are presented in Tables 2 below.

This table shows two paths of Bumiputera capital ownership depending on the share of Bumiputera capital ownership in 1973. The first begins with this share being equal to 3.73% in 1973. This share is derived from the base year data and distribution assumptions of our model. According to this base period share, the capital ownership of Bumiputeras would have risen to 12.69% in 1975, 18.82% in
TABLE 2 Simulated shares of Bumiputera capital ownership

<table>
<thead>
<tr>
<th>Year</th>
<th>$K_B$</th>
<th>$k^{B,a}_{t-1}$</th>
<th>Actual shares</th>
<th>$K_B^b$</th>
<th>$K_B^c$</th>
</tr>
</thead>
<tbody>
<tr>
<td>1970</td>
<td>0.00</td>
<td>0.00</td>
<td>2.4</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>1973</td>
<td>0.05306</td>
<td>221.8</td>
<td>3.73</td>
<td>5.64</td>
<td>5.64</td>
</tr>
<tr>
<td>1975</td>
<td>0.04958</td>
<td>622.6</td>
<td>7.8</td>
<td>12.69</td>
<td>14.60</td>
</tr>
<tr>
<td>1980</td>
<td>0.05764</td>
<td>1284.3</td>
<td>12.4</td>
<td>18.82</td>
<td>20.73</td>
</tr>
<tr>
<td>1982</td>
<td>0.04728</td>
<td>2019.0</td>
<td>15.6</td>
<td>21.52</td>
<td>23.43</td>
</tr>
<tr>
<td>1985</td>
<td>0.03663</td>
<td>2762.6</td>
<td>17.8</td>
<td>22.87</td>
<td>24.78</td>
</tr>
</tbody>
</table>

a. Deflated by CPI to 1973 values (M$\text{million}$)

b. Share calculated based on our own model (%)

c. Share approximated for 1973 from Table 10, R gayah (1988a)

1980, 1982, and 22.87% in 1985. From the informations found in Table 10 in Ragayah (1988a), this share is estimated to be 7.8% in 1975 and 12.4% in 1980. Additional information [see Malaysia, 1986, Table 3.8 and Table 3.9] indicate that these share are 15.6% and 17.8% respectively for 1982 and 1985. The second path is derived by approximating the share of Bumiputera capital ownership for 1973 from Ragayah’s Table 10. With this base period share, capital ownership of Bumiputeras would rise to 14.60% in 1975, 20.73% in 1980, 23.43% in 1982, and 24.78% in 1985. When compared to the actual shares of 1975, 1980, 1982, and 1985, the first path of the simulated shares seems to predict the actual share better. A possible reason why the simulated shares are higher than the actual shares is because of the first component of our savings assumption, which leads to higher savings, and thus capital accumulation, than what really occured.

However, our principal interest is the simulated effects of actual changes in borrowed capital of Bumiputeras on the capital ownership, income and employment variables up to 1990. Since the predicted amount of this borrowed capital is available [Malaysia, 1986, Table 3.15], the same experiment was repeated for this year. The consumer price index for 1990 is extrapolated from the trend between 1973 and 1985. The cumulative multipliers from the year they begin are shown in Table 3.

Bumiputera capital accumulation continues to be positive and the values of their cumulative 1990 multipliers vary only slightly. This is because most of the efect of this policy is felt in the first year. Non-Bumiputera capital accumulation is being reduced only mar-
ginally, which implies that Bumiputera capital ownership comes mainly from the increased size of the pie. The net effect of these responses in capital accumulation is to increase the share of Bumiputera capital ownership. The values of these multipliers hardly differ from those in Table 2. If we take the initial share of Bumiputeras' capital to be 3.73%, then our simulations predict that their share will rise to 25.31% in 1990. On the other hand, if the base period share is 5.64%, then Bumiputeras' capital share will expand to 27.22%. These figures are higher than the revised predicted 1990 share, which is 22.2% [Malaysia, 1985, ibid.]. As mentioned earlier, these higher figures are due to our assumption of higher marginal propensity to save than what took place.

### TABLE 3 Simulations of actual increases in borrowed capital of Bumiputeras

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>k^B'</td>
<td>0.05509</td>
<td>0.05146</td>
<td>0.05981</td>
<td>0.04909</td>
<td>0.04457</td>
<td>0.05038</td>
</tr>
<tr>
<td>k^NB</td>
<td>-0.00003</td>
<td>-0.00005</td>
<td>-0.00006</td>
<td>-0.00007</td>
<td>-0.00007</td>
<td>-0.00002</td>
</tr>
<tr>
<td>K_B</td>
<td>0.05306</td>
<td>0.04958</td>
<td>0.05764</td>
<td>0.04733</td>
<td>0.04298</td>
<td>0.04852</td>
</tr>
<tr>
<td>Y_{1B}</td>
<td>0.00010</td>
<td>0.00029</td>
<td>0.00035</td>
<td>0.00043</td>
<td>0.00045</td>
<td>0.00011</td>
</tr>
<tr>
<td>Y_{1NB}</td>
<td>0.00001</td>
<td>0.00003</td>
<td>0.00004</td>
<td>0.00004</td>
<td>0.00004</td>
<td>-0.00005</td>
</tr>
<tr>
<td>Y_{mB}</td>
<td>0.00606</td>
<td>0.01082</td>
<td>0.01505</td>
<td>0.01658</td>
<td>0.01967</td>
<td>0.02757</td>
</tr>
<tr>
<td>Y_{mNB}</td>
<td>-0.00018</td>
<td>-0.00132</td>
<td>-0.00045</td>
<td>-0.00049</td>
<td>-0.00054</td>
<td>-0.00013</td>
</tr>
<tr>
<td>Y_{5B}</td>
<td>-0.00007</td>
<td>-0.00013</td>
<td>-0.00017</td>
<td>-0.00018</td>
<td>-0.00009</td>
<td>-0.000239</td>
</tr>
<tr>
<td>Y_{5NB}</td>
<td>-0.00014</td>
<td>-0.00024</td>
<td>-0.00033</td>
<td>-0.00036</td>
<td>-0.00039</td>
<td>-0.00028</td>
</tr>
<tr>
<td>Y_{6B}</td>
<td>0.00044</td>
<td>0.00082</td>
<td>0.00113</td>
<td>0.00127</td>
<td>0.00150</td>
<td>0.00204</td>
</tr>
<tr>
<td>Y_{6NB}</td>
<td>-0.00002</td>
<td>-0.00004</td>
<td>-0.00005</td>
<td>-0.00006</td>
<td>-0.00007</td>
<td>-0.00003</td>
</tr>
<tr>
<td>Y_{7B}</td>
<td>0.00002</td>
<td>0.00005</td>
<td>0.00006</td>
<td>0.00008</td>
<td>0.00008</td>
<td>0.00000</td>
</tr>
<tr>
<td>Y_{7NB}</td>
<td>0.00045</td>
<td>0.00081</td>
<td>0.00114</td>
<td>0.00129</td>
<td>0.00156</td>
<td>0.00239</td>
</tr>
<tr>
<td>L_{1B}</td>
<td>0.00028</td>
<td>0.00050</td>
<td>0.00069</td>
<td>0.00076</td>
<td>0.00090</td>
<td>0.00114</td>
</tr>
<tr>
<td>L_{1NB}</td>
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<td>0.00091</td>
<td>0.00099</td>
<td>0.00115</td>
<td>0.00093</td>
</tr>
<tr>
<td>L_{2B}</td>
<td>-0.00108</td>
<td>-0.00193</td>
<td>-0.00267</td>
<td>-0.00294</td>
<td>-0.00342</td>
<td>-0.00350</td>
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<tr>
<td>L_{2NB}</td>
<td>-0.00100</td>
<td>-0.00180</td>
<td>-0.00249</td>
<td>-0.00272</td>
<td>-0.00305</td>
<td>-0.00095</td>
</tr>
<tr>
<td>L_{3B}</td>
<td>-0.00127</td>
<td>-0.00227</td>
<td>-0.00314</td>
<td>-0.00345</td>
<td>-0.00396</td>
<td>-0.00306</td>
</tr>
<tr>
<td>L_{3NB}</td>
<td>-0.00123</td>
<td>-0.00221</td>
<td>-0.00305</td>
<td>-0.00334</td>
<td>-0.00378</td>
<td>-0.00177</td>
</tr>
<tr>
<td>L_{6B}</td>
<td>0.00018</td>
<td>0.00032</td>
<td>0.00046</td>
<td>0.00054</td>
<td>0.00092</td>
<td>0.00648</td>
</tr>
<tr>
<td>L_{6NB}</td>
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<td>0.00040</td>
<td>0.00048</td>
<td>0.00080</td>
<td>0.00569</td>
</tr>
</tbody>
</table>

* Refer to Table 1 for the definitions of the dependent and independent variables
Except for the income multiplier of non-Bumiputeras in the agriculture sector (which turn negative in 1990), all others have the same signs and with mainly similar values. That is, an increase in borrowed capital of Bumiputra will lead to a rise in the incomes of all households in the agriculture sector and Bumiputra households in the modern sector, and a reduction in the incomes of the rest. Consequently, the overall income of Bumiputeras rises while that of non-Bumiputeras contracts, and both rural and urban average incomes increase, with the latter exceeding the former. Hence, this policy is actually benefiting the richer Bumiputeras in the modern sector, rather than those poor ones in the urban informal or rural sector.

Labor supplies to all sectors also maintain the same signs throughout the period, with the supplies of both racial groups to the modern sector contracting while their supplies to the agriculture and urban informal sector expanding. In all instances, Bumiputra labor supplies in the modern sector shrink more than non-Bumiputra labor supplies. This means that not only is the NEP employment restructuring target not achieved, but this policy is also detrimental to Bumiputra employment in the more highly paid modern sector.

FURTHER SIMULATIONS OF THE EFFECTS OF INCREASING THE SHARE OF BUMIPUTERA LAND OWNERSHIP

From the discussion of the dynamic multipliers above, our results indicate that increasing the share of land ownership of Bumiputeras appears to be one of the most effective tool in achieving the NEP targets. Except for increasing Bumiputra land ownership marginally through the opening of new land schemes, the Malaysian Government has not taken any drastic land reform to increase the share of Bumiputra land ownership. As such, we also simulate one such reform and examine the consequences on the various policy targets. This simulation experiment we performed was a rather drastic land reform program in the shape of redistributing land to Bumiputeras so that they have 30% share by 1982. This means a rise of over 112% over their 1973 share.

The consequences of this reform on our target variables are the following. Implementing this program has the effect of increasing the values of Bumiputra capital accumulation multipliers. Non-Bumiputera accumulation still rises marginally, but the value of the cumulative multiplier decreases continuously after the third year such that its value in 1990 is less than half of its impact value. The net effect
of these changes results in the rate at which the share of Bumiputera capital ownership expands to rise by over 70%. With this policy, the share of Bumiputera capital ownership would have risen by 2.56% between 1982 and 1985, and if this added to the predicted shares of Bumiputera capital ownership in 1982 in Table 2, then our estimates of this share will either be 24.08% or 25.99% in 1985, and 24.1% or 26.01% in 1990, depending on the base period share. Without this policy, then the original share of Bumiputera land ownership would have increased Bumiputera share capital by a mere 0.0007%. While this policy does increase the capital ownership share significantly, it is not as effective as increasing borrowed capital of Bumiputeras or Government expenditure benefits in achieving this target. Nevertheless, if it is possible to carry out this policy, then it can be counted as one that would be able to ensure the achievement of the 30% share target.

Although this policy may not be the most effective in raising the share of Bumiputera capital ownership, it is the most efficient instrument in redistributing incomes to Bumiputeras. In fact, it satisfies both the objective of income redistribution, that from non-Bumiputera households to Bumiputera households and from urban to rural households. Indeed, it also redistributes income from the rich to the poor since not only non-Bumiputera households are affected adversely by this policy, but also those Bumiputera households in the modern sector. As expected, Bumiputera households in the rural areas are the chief beneficiaries of this policy.

While this tool is best used to attain the income redistribution goals, it is not a good one to employ for restructuring employment. Raising the share of Bumiputera land ownership has the same effects on labor supplies as increasing borrowed capital of Bumiputeras. That is, labor supplies in the modern sector contract while those in the rural and urban informal sector swell. In addition, Bumiputera labor supplies shrink relatively more than non-Bumiputera labor supplies in the modern sector. This means that increasing the share of Bumiputera land ownership has the effect of completely jeopardizing the employment restructuring objective of the NEP.

CONCLUSIONS

Despite certain fluctuations in the values of the multipliers for some policy instruments, there is no major deviations in the effects on Bumiputera capital accumulation from the impact elasticities with respect to the directions of change and the most effective policy tools.
The only exception is the effect of domestic taxes on Bumiputera capital accumulation where the value of the multiplier become negative in the sixth year and continue to be so till the end of the period. In terms of the share of capital ownership, increasing import taxes reducing employees' contributions to the social security fund reverse the share to be in Bumiputeras' favor after the second and first year respectively. The most effective instrument in raising the share of Bumiputera capital ownership are increasing borrowed capital of Bumiputera followed by increasing Government expenditure benefits and the share of land ownership of Bumiputeras. However, since increasing the first two is also going to decrease the value of capital accumulation of non-Bumiputeras, this implies that redistribution is at the expense of the non-Bumiputeras, which is against the tenets of the NEP. Nevertheless, the first reduces the capital accumulation of non-Bumiputeras only marginally and might still be acceptable. Thus, the best policies to be pursued, that is, the most likely to lead us to the desired result of increasing Bumiputera share capital ownership, are raising borrowed capital and land ownership share of Bumiputeras.

The elasticity of non-Bumiputera capital ownership shows a reversal in value only under import duties, which turn negative after the first two years. The most effective policy tools available in raising the share of non-Bumiputera capital ownership are increasing employees' contributions to the EPF followed by the reduction in the income and corporation tax rates. However, it is not the Government's current policy to increase the share of non-Bumiputera capital ownership.

Like the impact effects, the most effective instruments in raising the incomes of Bumiputeras are the reductions in the personal income tax rates and the social security contributions by employees. The former is pro-non-Bumiputeras and therefore not redistributive while the latter favor Bumiputeras only slightly. Raising the share of Bumiputera land ownership, reducing employees' contributions to the EPF, and increasing Government expenditure benefits are the effective instruments of redistributing income from non-Bumiputeras to Bumiputeras. Rural household incomes can be best raised by the reduction in the income tax rates and employees' contributions to the EPF, increasing the provision of government expenditure benefits and the share of Bumiputera land ownership. Except for the second policy, all others redistribute incomes from the urban to the rural households.
Again increasing the employers’ contributions to the EPF and reducing the corporation income tax rates appear to be the most efficient in attracting the supplies of labor to the modern sector. Since both are pro-Bumiputeras, they also help in the restructuring of employment objective. Undistributed profits of both racial groups and raising the cost of borrowing capital to Bumiputeras can also be used to achieve this target, but they are not as effective as the first two.

When the cumulative multipliers for borrowed capital of Bumiputeras were aggregated and this borrowed capital is assumed to rise by 10% every year, the share of capital ownership of Bumiputeras is predicted to increase to less than 13% by 1990. Even though this represent the lower limit of the response of Bumiputera share capital ownership, the figure is still too low to warrant the attainment of the 30% share. The results of the other simulation experiments for the actual increase in borrowed capital of Bumiputeras seem to predict the actual increases of this share better. In fact, our simulations predict the shares of Bumiputera capital ownership to be higher than those actually achieved and the revised prediction for 1990, even though they are still less then the original target figure of 30% in 1990. Nevertheless, these figures are not too far off and given our assumptions and restrictions, our model has performed well. Furthermore, these predicted increases in the share of Bumiputera capital ownership represent an enormous shift in capital ownership over this period, and can be considered a significant achievement. Finally, these results indicate that income redistribution and employment restructuring objectives cannot be attained via this policy.

The land redistribution simulation performs quite well and gives the expected results. While it is also an effective way of increasing the share of Bumiputera capital ownership, it is not the most effective instrument. However, this tool appears to be the best one for redistributing income and reducing poverty since it not only redistributes income from non-Bumiputera to Bumiputera and from urban to rural households, but also from the rich Bumiputera households in the modern sector to those poor Bumiputeras in the rural and urban informal sectors.

Finally, sometimes queries may arise over the appropriateness and quality of the functions employed in solving the model. A sensitivity analysis has been carried out in anticapation of these questions (see Ragayah 1988a).
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