# FULL EMPLOYMENT MODELS OF THE PHILIPPINES, 1972-1976[1]

By

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## I. Introduction

This paper considers two simulation models of the Philippine economy with attainment of full employment as a dominant policy objective, using estimated aggregative relationships previously reported in [1] and [2]. It is assumed in each model that the gap between total employment and the projected labor force will diminish gradually to zero over the simulation period 1972-1976.

Interest in the macroeconomic implications of full employment policy for the Philippines derives from two sources: (1) there is widespread awareness of the severity of the unemployment problem in this country;[2] and (2) little quantitative information exists on the possibilities of trade-offs and complementarities among the major policy objectives of output growth, price stability and employment generation. Our major concern here is to derive mutually consistent values of the policy variables that would achieve certain specified goals (with full employment as a leading objective) and to examine the consequences of such directions of policy on the other variables of the aggregative model.

## II. Model Structure

The following estimated equations (see [2], pp. 3-4) comprise the set of behavioral relationships to be used in the simulation of the economy from 1972 to 1976:

(1) $Y = 61.16 + 0.2640\,K + 0.4948\,N$
$\qquad\qquad (7.89) \qquad (2.36)$

$\qquad\qquad R^{-2}/s/DW$
$\qquad\qquad .997/137.9/2.61 \qquad\qquad (56-68)$

(2) $N = 2203.3 + 0.4471\,Y + 191.6\,(100\,P/W)$
$\qquad\qquad (23.66) \qquad (1.71)$

$\qquad\qquad .984/151.8/2.34 \qquad\qquad (56-68)$

(3) $P = 85.37 - 0.0043\,Y + 0.0423\,Z$
$\qquad\qquad (-7.71) \qquad (18.22)$

$\qquad\qquad .993/1.84/1.83$

$$(4)\quad W = -144.3 + 0.7879\ W_{-1} + 4.0895\ P_{-1}$$
$$(8.17)\qquad (3.87)$$

$$.982/33.9/2.19 \qquad (51-69)$$

$$(5)\quad I = -251.2 + 0.1680\ Y + 0.3281\ M + 8.864\ P - 1.095\ W$$
$$(9.09)\qquad (2.94)\qquad (2.47)\qquad (-3.51)$$

$$.987/91.1/2.21$$

where

$Y$ = gross national product at 1955 prices; in million pesos

$K$ = capital stock at 1955 prices at beginning of year; in million pesos $= K_{-1} + I_{-1}$

$N$ = average of May and October employment survey figures; in thousands

$P$ = implicit price index for GNP; $P = 100$ for 1955

$W$ = annual money wage rate; in pesos

$Z$ = average of end-of-month money supply (currency plus demand deposits) from October of preceding year to September of current year; in million pesos

$I$ = gross domestic investment at 1955 prices; in million pesos

$M$ = imports of goods and services at 1955 prices; in million pesos.

Numbers underneath regression coefficients are their t-values; the time series used for each regression is shown in parentheses after $\bar{R}^2$/s/DW if different from 1950-69.

The structural equations (1)-(5) need only be described briefly as they have been discussed fully in [1] and [2]. Equation (1) represents an aggregate production relation, with capital and labor inputs determining the level of real output. Equation (2) may be considered a labor demand function, the level of employment determined not only by real output but also by the real wage rate (represented in (2) by its reciprocal). The price equation (3) provides an explanation of the general price level in terms of the money supply and real output. In eq. (4), current money wage rate is determined by preceding year values of the price and wage variables. Finally, eq. (5) makes investment a function of P and W (which jointly proxy for profitability) together with the volume of imports (capital equipment and

machinery are mostly imported) and real income. Needless to say, these equations represent linear approximations to presumably nonlinear relationships.

The policy objective which is central to the two simulation models that follow is to generate employment over the period 1972-1976 such that the unemployment rate will decrease gradually to zero. The size of the labor force is projected as follows: The average growth rate over the period from 1965 to 1968 (the latest year for which comparable labor force data are available) is computed and applied to the succeeding years through 1976.[3] For 1971 the size of the labor force so projected is 13,770 thousand which, together with the 1971 employment estimate of 12, 764 thousand obtained from the *Four Year Development Plan FY 1972-75*, implies an unemployment rate of 7.29 per cent. The target values of employment over the simulation period are then derived by reducing the rate of unemployment to 6.25, 5.0, 3.5, 1.75 and 0 per cent from 1972 to 1976.[4] Table 1 summarizes the results of the computations. An average annual rate of increase employment of 4.97 per cent from 1972 to 1976 is implied.

**Table 1**
**Projected Values Of Labor Force And**
**Target Values Of Unemployment Rate And Employment**

| | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 |
|---|---|---|---|---|---|---|
| Labor force (thousands) | 13770 | 14240 | 14726 | 15228 | 15747 | 16284 |
| Unemployment rate (per cent) | 7.29 | 6.25 | 5.0 | 3.5 | 1.75 | 0 |
| Employment (thousands) | 12764 | 13350 | 13990 | 14695 | 15471 | 16284 |

## III. Model I

For our first simulation model it is further assumed that the real wage rate (W/P) is to remain constant during the period. Thus, the full employment policy will unambiguously benefit the labor force as a whole in terms of higher income levels and possibly higher shares of total income.

Given the base year (1971) values of W and P, we can determine the 1972 value of W from eq. (4). Since the wage-price ratio in 1971 will be made to hold for the entire period, this fixes the required value for P in 1972. From the employment equation (2), the 1972 value of Y can be computed given N and P/W. Then Z is obtainable from eq. (3) and the required K for 1972 from eq. (1). Under the assumption that money supply is a controlled policy variable (but cf. [2]), the remaining burden of policy is to ensure that investment in 1971 will increase capital

stock to the necessary level in 1972. The investment equation (5) determines the level of imports in 1971 required to bring about the desired level of investment, given the base year values of Y, P and W. The procedure can be repeated for 1973 and the succeeding years through 1976. Table 2 presents the year-by-year values computed as described.[5]

**Table 2: Simulation Results for Model I**

| | 1972 | 1973 | 1974 | 1975 | 1976 | Average annual rate of increase (per cent) |
|---|---|---|---|---|---|---|
| W | 2710 | 2986 | 3304 | 3671 | 4095 | 10.63 |
| P | 2432 | 267.9 | 296.4 | 329.4 | 367.4 | 10.63 |
| Y | 22997 | 24428 | 26005 | 27741 | 29559 | 6.39 |
| Z | 5659 | 6389 | 7223 | 8179 | 9262 | 13.03 |
| K | 59495 | 63716 | 68368 | 73490 | 78852 | 7.22 |
| $I_{-1}$ | 3852 | 4221 | 4652 | 5121 | 5363 | 9.82 |
| $M_{-1}$ | 4834 | 5508 | 6341 | 7254 | 7436 | 12.40 |

Before commenting on the simulation results, we may note that two instruments, Z and $M_{-1}$, are required to achieve the targets N and W/P for each year. This conforms to the well-known proposition in the Tinbergen-Theil theory of economic policy for the case of nonstochastic, fully determinate models.[6]

It may be recalled that there is simultaneity in the determination of the endogenous variables Y, N and P in the models presented in [1] and [2] from which eqs. (1)-(5) above are drawn. In contrast the simulation model here involving the same variables is recursive. This is explained by the fact that we have chosen a lagged variable ($M_{-1}$) as a policy instrument, i.e. targets are set for the next year rather than the current year.

Considering now the changes in the other variables accompanying the declining unemployment rate over the simulation period, we notice from the last column of Table 2 that, on the average, real GNP grows by 6.39 per cent annually and the general price level increases by 10.63 per cent (so does the money wage rate, by the constant W/P assumption). These result from the expansion of money supply by 12.72 per cent in 1972, increasing gradually to 13.24 per cent in 1976, together with an increase in investment of 49.1 per cent from 1971 to 1975 which in turn

requires that imports increase by 62.0 per cent over the same period. Such values seem intuitively credible. More importantly, they suggest that full employment (in the sense defined above) within five years without deterioration of the real wage rate is within the realm of possibility. The implied growth rates of real output and the general price level are certainly within the range of past values. The major constraint lies in the large import requirements especially in the initial part of the period, however.

## IV. Model II

For our second simulation model we relax the assumption on the constancy of the real wage rate and adjust instead a typical feature of actual planning: that a specified growth rate of real GNP is targeted initially. The current Development Plan has set an output growth target of 7 per cent annually. Given also the employment targets described earlier, we need to derive again the required values of the two instrument variables Z and $M_{-1}$ for 1972-1976 and their implications on the other macroeconomic variables.

As before, the recursive nature of the relationships simplifies the solution of the simulation model. The required capital stock values for 1972-76 immediately follow from the production relation (1), yielding in turn annual investment from 1971 to 1975. The wage and price variables have to be computed jointly year by year, using eqs. (2) and (4). It becomes possible then to determine the required levels of money supply for 1972-76 and imports for 1971-1975 from eqs. (3) and (5), respectively. The computed values are presented in Table 3.

**Table 3: Simulation Results for Model II**

| | 1972 | 1973 | 1974 | 1975 | 1976 | Average annual rate of increase (per cent) |
|---|---|---|---|---|---|---|
| Y | 23209 | 24834 | 26572 | 28432 | 30422 | 7.00 |
| K | 59911 | 64867 | 70129 | 75720 | 81734 | 8.14 |
| $I_{-1}$ | 4655 | 4956 | 5262 | 5591 | 6014 | 12.06 |
| W | 2710 | 2928 | 3122 | 3294 | 3445 | 6.88 |
| P | 229.0 | 234.7 | 239.1 | 243.1 | 241.0 | 1.68 |
| Z | 5345 | 5645 | 5926 | 6209 | 6362 | 4.86 |
| $M_{-1}$ | 7282 | 8024 | 8696 | 9340 | 10140 | 22.08 |

The cost of a full employment policy with an annual output growth rate target of 7 per cent (or higher) appears prohibitive in terms of the required volume of importation. It is doubtful therefore whether such a policy is at all feasible considering that the economy has yet to resolve a continuing balance of payments problem.

Another striking consequence of Model II policy is the much lower rates of increase (compared to the results of Model I policy) in the general price level and hence the required monetary expansion. This is due to the higher real wage rates associated with higher output levels for the same amount of employment; since current money wage is predetermined, the burden of adjustment falls on the price variable. Increasing real wages have a significant effect on aggregate consumption (see [1] and [2]), and explicit consideration of this relationship would add further doubts as to the feasibility of Model II policy.

## V. Concluding Remarks

A major conclusion that we draw from the two simulation models considered above is that the primary constraint in a full employment policy for the Philippines would seem to lie in the balance of payments. The role of the money wage variable is also seen from our simulation results to be a key factor in the success of a full employment policy.

The present note has been largely exploratory. We have not suggested any full employment strategy for actual use in planning but merely examined the macroeconomic consequences of particular directions of policy in the context of an estimated model structure for the Philippine economy.[7] It seems clear that additional work needs to be done in this area, especially along lines of optimization.[8] Moreover, it is necessary that disaggregative models of full employment be developed to complement the results from macro-analysis.[9] In particular, the severe underemployment problem in the Philippines can be adequately analyzed only with detailed sectoral models.

## FOOTNOTES

1. This paper is part of a research project of the National Economic Council ınd the second author. Opinions expressed are not to be interpreted as those of the NEC, however, but only of the authors. Research assistance was provided by Frances Santos.

2. Past and present national development plans never fail to mention the necessity of reducing the country's high unemployment rate. In a joint resolution passed by the Sixth Congress in the Ninth Special Session, the "attainment of maximum employment" is stated as one of the basic objectives of economic policy. Also noteworthy is the plentiful supply in the Philippines of labor force data, which seems relatively uncommon in the less developed countries.

3. The calculated annual rate of increase of the labor force for 1965-1968 is 3.41 per cent.

4. This particular choice of steadily declining unemployment rates is of course arbitrary in the absence of an explicitly defined social welfare function. We hope to incorporate optimality considerations in a later study.

5. Eqs. (1)-(5) were actually transformed to first differences for the computations in both Model I and Model II.

6. Cf. [3] and [4].

7. Such structure may change in fact with the introduction of new and effective instruments of policy.

8. Cf. [7] and [6].

9. An initial step in this direction has been made in [5], which uses the 1968 input-output structure for Ceylon.

## REFERENCES


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