# GOVERNMENT INVESTMENT, INFLATION AND GROWTH IN A MIXED ECONOMY: Theoretical aspects and empirical evidence of the experience of Italian government corporation investments

by

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Submitted to the Department of Economics
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## ABSTRACT

This thesis is composed of two parts not directly related to one another.

In part one, a theoretical analysis of a mixed economy is presented. In this study, a mixed economy is one in which there exist government owned, competitively managed corporations. A traditional two-sector growth model is described in Chapter I. Then, in Chapter II, stabilization policies to control inflation and growth in a closed economy are analyzed. Chapter III adopts an open economy framework, and examines both the two-equal-sized country and small country cases. The focus of these chapters is on the effects that government investment programs can produce on the economy, especially on the steady state rates of growth and of inflation.

Optimal control solutions for these economic systems are presented in Chapter IV. The well known assignment problem is re-examined for a three-targets, three-instruments framework. The three targets are: domestic stability, foreign account equilibrium and optimal growth. The three instruments are: fiscal policy, monetary policy, and government investment programs. In this situation, optimal policies are proven to exist.

Finally, Chapter V briefly comments on the current debate on the optimal rate of return for government investments.

In part two, an attempt to measure the effects of government corporation investments on the Italian economy is presented. The University of Bologna econometric model is used as the basic framework of the analysis, and several simulations are performed on this model. Clearly, the results obtained depend on both the validity of the model in interpreting the behavioral relations of the Italian economy, and on the particular assumptions made on the behavior of Italian government enterprises. In fact, the results obtained could be produced by any kind of investment

expenditure whose timing is similar to that of the investment expenditure of Italian government corporations.

Thesis Supervisor: Robert M. Solow,
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Over the past five years, at M.I.T., at the Catholic University of Milan and at the University of Bologna, I have been fortunate to profit from the advice and help of many people.

At M.I.T., Duncan Foley first introduced me to the analytical framework I developed in the thesis. He also encouraged me to pursue the topic of government investments. Robert Solow taught me the basic skills I needed with his courses in macroeconomics, capital theory and growth theory. He also kindly accepted to be chairman of my thesis committee. I thank him, first, for his patience and dedication in understanding both the economics and the English of my first drafts; and second for helping me to put the work into final shape. Franco Modigliani not only agreed to be a member of my thesis committee and to help me with precious advice, but also created a very friendly and stimulating environment which made my stay in Cambridge so fruitful and enjoyable. To him and his wife, Serena, I express my thanks. At the last stage, Lance Taylor agreed to sit on my thesis committee. I am grateful to him for his interesting and useful observations. Judith Mason heroically typed the thesis against my pressing deadlines, and in between the intervals of the best performance ever of the M.I.T. Choral Society. The stunning review in the next morning's Globe was equal to my appreciation of her typing skills. Finally, I wish to express my thanks to the Saltzbergs. We could not have wished for a better host-family.

At the Catholic University of Milan and at the University of Bologna I found an environment most conducive for my research and for my teaching experience. All colleagues helped create the climate of openness and understanding. A note of thanks is owed to Giancarlo Mazzocchi, who introduced me to the Catholic University of Milan, and to Nino Andreatta and Romano Prodi, who gave me the opportunity to work at the University of Bologna. In particular, Romano's warm friendship was always generous and precious. He did not stint of his help.

To my friend Mario Draghi I owe a considerable debt. He gave generously of his time while he also was completing a dissertation at M.I.T. My chapter three on the open-economy shows the benefits of his support.

The Slaters kindly hosted me during my last residence in the Boston area as a thesis writer. Martin edited the thesis and gave it the distinctive British flavor of this final version. Maria supported my last efforts with warm friendship and delicious warm dinners. Their daughters, Natasha and Daniela, reminded me how difficult it is to bring up children, but also how sweet it is to be woken at six o'clock in the morning by a charming singing child.

Last, but above all, my deep gratitude and love go to my wife, Gabriella, and to my children, Pierfrancesco and Marta. When we first came to Cambridge we were a young family with many problems and many hopes. The warm climate that Gabriella was able to create at any moment , particularly at the most difficult times, allowed us to complete this experience by confronting still new problems and hopes, but with the splendid certainty of our growing love.

To my wife, Gabriella

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# INTRODUCTION AND MAJOR CONCLUSIONS

Direct government intervention in a market economy has traditionally been intended to prevent private monopolies from gaining control of key sectors or to supply public/social goods to the collectivity. More recently, certain countries, Italy among them, have experienced a new and different form of intervention - the entry of government corporations into competitive markets. Such direct intervention appears to be an important tool for both stabilization and growth, and has met with considerable initial success. This form of intervention gives new meaning to the term "mixed economy", previously associated with a system of fiscal-monetary intervention.

The long run capacity for survival of a mixed economy, and the possibilities of its developing into a full-scale centrally planned economy or returning to a fully private one are considered through a variety of approaches. Two major issues of the recent debate about the mixed economy are:

(a) What kind of growth can such an economy attempt? How do income, capital intensity and inflation behave in steady state conditions? Is there any room for government corporation investments in the long run?

(b) To what extent can stabilization through the management of government corporations be successful for the whole economy? How does this use of government corporations affect their own long run efficiency? How adequate is this tool relative to more traditional monetary and fiscal policies?

These questions remain largely unanswered. A lack of theory is complemented by shortcomings in the empirical data. This study, by developing a theory of the role of government corporate investments, and examining certain empirical data in the Italian case, attempts to answer some of the questions.

The analysis is divided into two parts. In the first part, a two sector growth model for a closed and an open economy is the basic theoretical framework.

In Chapter I we present the structure of the consumption/investment goods market and the assets market for the case of a closed economy. The assets market refers to three different assets: money, bonds and physical capital. Within these markets the government is assumed to operate with standard fiscal and monetary tools. However, the government is also assumed to own a share of physical capital, and to allocate its expenditure for the purchase of consumption and investment goods.

Thus, the government plays the role of entrepreneur. For most purposes, the government corporation is assumed to follow the same managerial rules as private corporations. The only difference between the two is the autonomy that the government has in deciding new investments, including the reinvestments of cash flows, too. In fact, the economic results of government corporations are considered as part of the government's budget. Thus, on the expenditure side, the key variables are the government propensities to invest or to consume. These propensities may differ from the ones of the private sector, and they may react to different parameters. Static and dynamic conditions for

this system are then explored.

In Chapter II, the relations between inflation, growth, and government investment programs are investigated. The first two sections deal with the possibility of using monetary or fiscal policy to stabilize price levels. Next, stabilization of the rate of inflation within a perfectly anticipated framework is examined. Finally, laws of adaptive expectations on the rate of inflation and on capital gains or losses are considered. The simulations performed in this chapter with perfectly and imperfectly anticipated inflation, prove that a government investment program may operate in the economy without decreasing the intensity of private capital. An additional, and not a merely reallocative accumulation process, can, therefore, be undertaken. However, such conditions can only be met by making a trade-off between more intensive government investment programs and a higher steady rate of inflation.

In Chapter III, we extend our model to the case of an open economy. Both a two country and a small country model are discussed. Clearly, the distinguishing feature of the open economy is the possibility that domestic demand for goods can always be satisfied by imports, whenever there is a short fall in domestic production. Therefore, government demand constrains the world market. In fact, the world production is the limit of satisfaction of the two countries' and government's demand. As usual, an additional constraint that has to be considered in the case of an open economy is equilibrium in the balance of payments.

Within each country, fiscal and monetary policies are used.

Further, in one country the government manages its own stock of capital. Dynamic equilibrium conditions require that the two countries agree on splitting the burden of fiscal-monetary policy. As is known, the distribution of the burden of fiscal policy determines the distribution of income between the two countries, while the burden of monetary policy determines the distribution of international reserves. However, besides fiscal and monetary policy, the two countries must also negotiate over the government's investment decisions.

The main results in the case of the open economy with two equal sized countries are the positive contribution that government investment programs may make in expanding the world wealth frontier. This positive contribution is evidence that international agreements should not be based only on considerations of balance of payments and government deficits. The composition of government demand, between consumption and investment, should also be included.

Even in the small country case, government investment programs are shown to make possible an increase in the accumulation of capital without crowding out private investments. However, this situation arises only if the government propensity to save is in line with the target level of capital intensity.

Within an open economy framework, the assignment of fiscal and monetary policy to guarantee internal and external equilibrium has been deeply analyzed. It has been proved for the two-instruments/two-targets case in which domestic stability and balance of payments equilibrium are considered, that the economy cannot run its autonomous accumulation path.

In fact, in such a situation, the growth path of the system is endogenous. Direct investment incentives are then suggested as a means to push the economy toward optimal levels of capital accumulation.

In Chapter IV, we restate the assignment problem for a three-instruments/three-targets framework. The targets considered are domestic equilibrium, BOP balance, and the optimal growth path. The instruments are fiscal policy, monetary policy, and government investment programs. The results that we obtain prove the possibility of finding an optimal control solution for such a situation. Government investments can be used to ensure the optimal accumulation process which allows the economy to run its optimal growth path. Then, fiscal and monetary policies are left to meet the targets of domestic and foreign equilibrium. Therefore, if the rate of return on private capital does not lead to the optimal growth path (i.e. it is not socially optimal), government investments can be called for to fill the gap between actual and optimal accumulation of capital.

At this stage, the issue of which rate of return is acceptable for government investment enters the analysis. In Chapter V, we recall briefly the recent debate on this issue and we propose some answers.

Part two of our thesis, not directly related to the theoretical framework of the study, is merely an empirical analysis of the effects produced by government corporation investments within the Italian economy. The University of Bologna quarterly model is used to perform several simulations related to the behavior of government corporation investments. A control solution of the model over the last decade

is presented. It is then compared with the results of a model hypothesizing a lack of government corporation investments. The analysis of these results follows the major blocks considered in the model: (a) final demand; (b) production and employment; (c) government sector; (d) monetary relations.

Our results show the two sides of any investment decision. They are due, from one side, to the demand shock caused by the ordering and purchasing of investment goods, and, from the other side, to the increase in production capacity which follows the integration of investments into current production.

Italian government corporations have played a relevant role in sustaining both the demand and the level of economic activity in the early 1970's. In fact, during that period, the performance of the Italian economy would have been much poorer than the historical experience, had there not been any government corporation investment. However, once such a relevant flow of investment was put into production, quite contradictory results were obtained. From one side, they helped maintain the level of employment during these years, but from the other side, the Italian economy experienced higher capital/labor ratios and lower output/capital ratios. Therefore, they seem to have pushed the economy toward greater capital intensity and higher productivity per man-hour. At the same time, however, lower levels of average working hours per year have been experienced. Clearly, by introducing highly capital intensive plants, associated with poor level of utilization, their performance becomes very unsatisfactory.

Direct comparisons between these empirical findings and the results we obtained in the theoretical part are not possible. In both parts, however, it is clear that government corporate investments can, in several cases, be an interesting and powerful policy tool. The major critical point is that their usefulness is determined by their internal management efficiency. The first-best solution is clearly when government corporations make a positive contribution to the productivity of the system. If this is not the case, like any other tool incorrectly used, government corporation investments cease to be a useful tool and become a very limiting constraint. Unfortunately, the recent experience of the Italian economy confirms this simple rule.

# Part One - THEORETICAL ASPECTS OF A MIXED ECONOMY

## Chapter I - A TWO SECTOR GROWTH MODEL FOR A MIXED ECONOMY

### 0. Introduction

This section deals with stabilization policy implications and steady-state growth conditions for an economy with government owned capital operating within a closed economy framework.

The basic structure of the analysis is a two sector growth model in which government expenditure for investment goods and a government share of capital stock are introduced.

This analysis covers two chapters: first, we give a brief presentation of the model in its static and dynamic versions; second, we investigate the role of fiscal and monetary policies in stabilizing the price level and/or its rate of change. The latter section is principally concerned with the interactions of a government investment program with the steady-state conditions of the intensity of private capital and the rate of inflation. Simulations are used to outline the possibilities open to government in the management of the two policy variables we introduced -- expenditure for investment goods and share of capital stock.

1. The Two Sector Production Model and the Effects of Government Expenditure

Consider a model in which:

I.1) $C = F_c (K_c, N_c)$

I.2) $I = F_I(K_I, N_I)$

are the consumption sector and investment sector production functions, assumed to be homogeneous of first degree, such that in

I.3) $C = N_c f_c (k_c)$

I.4) $I = N_I f_I (k_I)$

$f_c$ and $f_I$ are the "intensive" production function.

Under conditions of pure competition and perfect mobility of factors, the rental rate to capital and the wage rate are given by:

I.5) $r = p_k f_I' (k_I) = f_c' (k_c)$

I.6) $w = p_k [f_I(k_I) - k_I f_I'(k_I)] = f_c(k_c) - k_c f_c'(k_c)$

where we consider the price of consumption goods as the "numeraire", i.e. $p_c = 1$.

The full employment conditions are:

I.7) $K_c + K_I = K^T$

I.8) $N_c + N_I = N$

and assuming that $k_c > k_I$, we can define:[1]

I.9) $\frac{C}{N} = Q_c (\frac{K^T}{N}, 1, p_k) = q_c (k^T, p_k)$

I.10) $I \cdot (1/N) = Q_I (K^T \cdot 1/N, 1, p_k) = q_I (k^T, p_k)$

where $k^T$ is the total (private and government) intensity of capital, and

$$\frac{\partial q_c}{\partial p_k} < 0 \qquad \frac{\partial q_c}{\partial k^T} > 0 \qquad \frac{\partial q_I}{\partial p_k} > 0 \qquad \frac{\partial q_I}{\partial k^T} < 0$$

Consider now, the government owns capital in a certain proportion such that: $K^T/N = (K + K^G)/N$ and $k^G = K/N$, therefore:

I.11) $k^G = \beta k^T \qquad 0 \leq \beta \leq 1$

is the intensity of government capital.

Hence, the intensity of private capital in the economy is:

I.12) $k = (1 - \beta)\, k^T$

We can now define total social wealth as:

I.13) $a^T = (k + k^G)\, p_k$

and the private wealth as:

I.14) $a = (1 - \beta)k^T + (m + b)\, p_m$

where $(m + b)$ is the government debt (money and bonds).

The government share of the capital stock could be anything entering the production process including human capital and environmental conditions. However, this investigation is intended to refer explicitly to government corporations[2] producing within a competitive framework together with private enterprises. As a first approximation, we assume no difference in production functions between private and public corporations.

Public corporations are assumed to follow the same standard criteria of management efficiency as private enterprises. Thus, prices and levels of activities are determined by the market. The exception and key point of the analysis concerns the autonomy from private decision-making

Fig.I.1

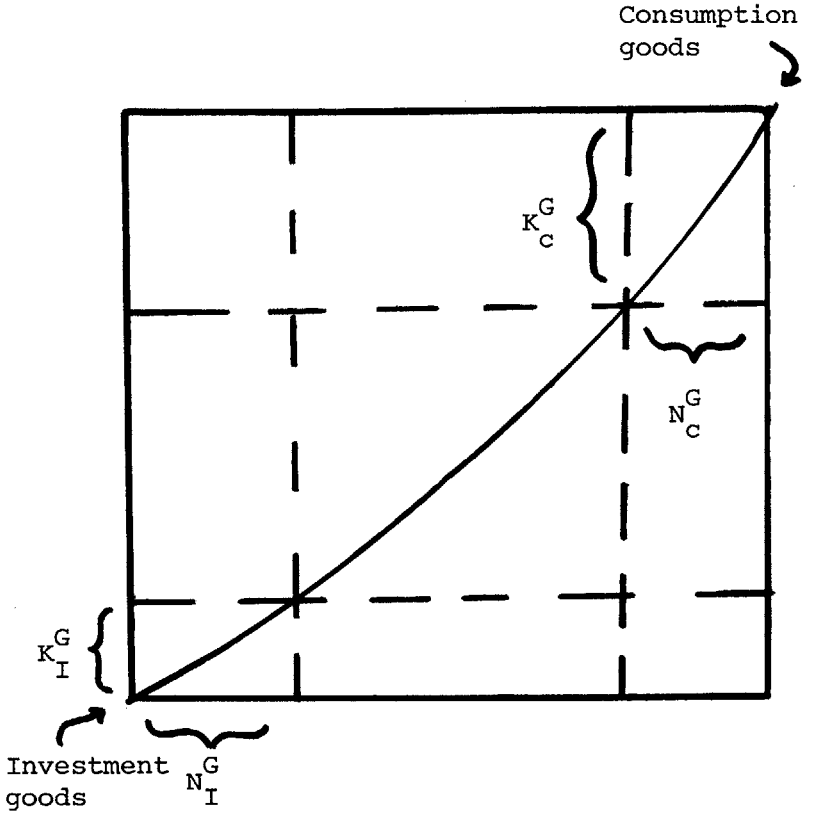
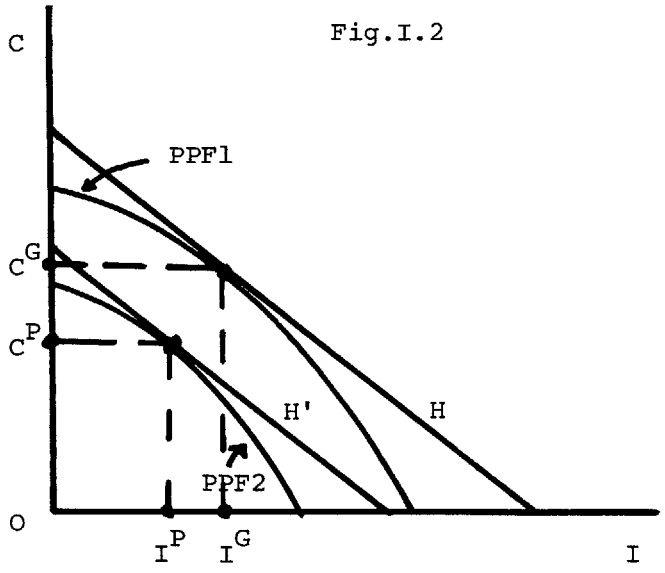

Consumption goods
$K_C^G$
$N_C^G$
$K_I^G$
Investment goods
$N_I^G$

Fig.I.2


C
PPF1
$C^G$
$C^P$
H'
H
PPF2
O
$I^P$
$I^G$
I

of government allocation of profits and investments. This process is supposedly undertaken within the government budget.

Therefore, we assume government expenditure to be directed in a constant proportion "h" to investment goods, and in a proportion (1 - h) to consumption goods.

Then, the flow of goods available for private use will be:

I.15) $C^P = q_c\ (k^T,\ p_k) - (1 - h)\ e$

I.16) $I^P = q_I\ (k^T,\ p_k) - \frac{he}{p_k}$

where $C^P$ and $I^P$ are in per-capita terms and "e" is per-capita government expenditure expressed in consumption goods units.

If the government aims to maintain dynamically its own share of capital stock, the following condition has to be met:

I.14b) $he = \beta p_k q_I\ (k^T,\ p_k)$

Under this constraint, the government propensity to consume (or per-capita government expenditure) must be derived endogenously. Figures I.1 and I.2 illustrate the situation.

The new separating plane H' leads to the reduction in private consumption and investment given by $C^GC^P$ and $I^GI^P$. Thus we can define $(1 - h)e = C^GC^P$ and $he = I^GI^P$ as per-capita government consumption and investment.

## 2. The Assets Market

The equilibrium conditions in the private assets market are:

I.17) $(g/x)p_m = L[(kp_k+gp_m);\ q_c+q_Ip_k;\ \pi_m;\ i+\pi_m;\ r(p_k)/p_k+\pi_k]$ money market

I.18) $(1-1/x)gp_m = H[(kp_k+gp_m); q_c+q_I p_k; \pi_m; i+\pi_m; r(p_k)/p_k+\pi_k]$ bonds market

I.19) $(1-\beta)k^T p_k = J[(kp_k+gp_m);\ q_c+q_I p_k;\ \pi_m;\ i+\pi_m;\ r(p_k)/p_k+\pi_m]$ physical assets market

in which we assume:

| | | | | | |
|---|---|---|---|---|---|
| $1 \geq \frac{\partial L}{\partial a} \geq 0$ | | $\frac{\partial L}{\partial q} \geq 0$ | $(\partial L/\partial \rho_m) > 0$ | $(\partial L/\partial \rho_b) < 0$ | $(\partial L/\partial \rho_k) < 0$ |
| | | $(\partial H/\partial q) \leq 0$ | $(\partial J/\partial \rho_m) < 0$ | $(\partial J/\partial \rho_b) > 0$ | $(\partial H/\partial \rho_k) < 0$ |
| $1 \geq (\partial J/\partial a) \geq 0$ | | $(\partial J/\partial q) \leq 0$ | $(\partial J/\partial \rho_m) < 0$ | $(\partial J/\partial \rho_b) < 0$ | $(\partial J/\partial \rho_k) > 0$ |
| $\Sigma$ | 1 | 0 | 0 | 0 | 0 |
| where $\rho_m = \pi_m$ | | $\rho_b = i + \pi_m$ | | $\rho_k = [r(p_k)/p_k] + \pi_k$ | |

From the equilibrium conditions we can derive two equations for $p_k$ and i as:

I.20) $p_k = \phi(\gamma,\ k,\ \beta,\ \pi_m,\ \pi_k,\ x)$

I.21) $i = \psi(\gamma,\ k,\ \beta,\ \pi_m,\ \pi_k,\ x)$

and we can set down the following conditions:

$(\partial p_k/\gamma\partial) > 0;\quad (\partial p_k/\partial k) < 0;\quad (\partial p_k/\partial\beta) > 0;\quad (\partial p_k/\partial\rho_m) < 0;\quad (\partial p_k/\partial x) < 0$

$(\partial i/\gamma\partial) \gtreqless 0;\quad (\partial i/\partial k) \gtreqless 0;\quad (\partial i/\partial\beta) \gtreqless 0;\quad (\partial i/\partial\pi_m) \gtreqless 0;\quad (\partial i/\partial x) > 0$

In particular, the signs of partial derivatives $\partial p_k/\partial\beta$ and $\partial i/\partial\beta$ can be verified graphically. See Figure 3.

Two cases are met. First, an uncompensated nationalization (i.e.

Fig.I.3

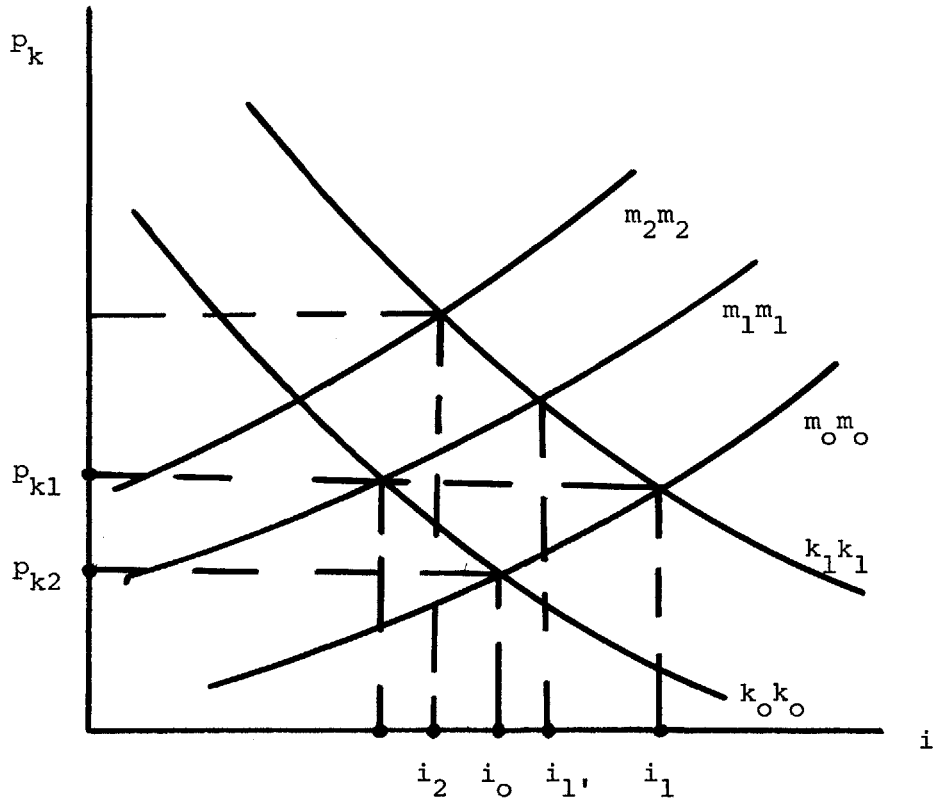
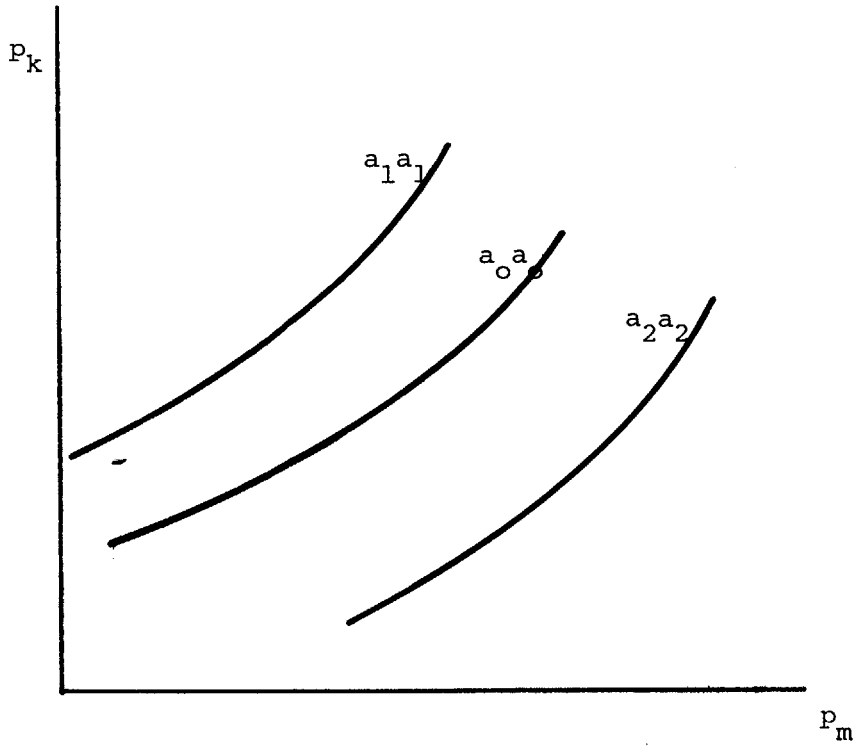


Fig.I.4




| | | |
|---|---|---|
| $a_1a_1$ | → | if g ↑, β ↑, $\pi_m$ ↓, x↓ |
| $a_2a_a$ | → | if k ↑ |

an increase in $\beta$) leads to excess demand for capital goods since $\partial J/\partial a \leq 1$, and the physical assets market clearing equation, kk, has to shift right to some $k_1k_1$. Due to the wealth effect, there will be an excess supply in the money market, and the interest rate will have to be lowered to obtain the clearing condition given by $m_1m_1$. In this situation, the price of capital will increase. To examine the movement of the rate of interest, we should measure two wealth effects in both consumption and money market demands. Indeed, we could get either an increase or a decrease in the rate of interest, as given by $m_1m_1$ and $m_2m_2$.

Second, if we assume the government proceeds with nationalization (i.e. increasing $\beta$), financing it by issuing bonds, then an increase in the rate of interest in the bond market matches the decrease due to the money market, such that both $p_k$ and i will move to a higher equilibrium level, as in the case of $i_1$. If the two effects on the interest rate eliminate one another, the money market clearing equation will not move and a new equilibrium will be reached at increased i and $p_k$. If the increased government capital is financed by bonds, the sign of $\partial i/\partial\beta$ is definitely positive.

In general, in the space $p_kp_m$, the assets market equilibrium condition will lead to an upward sloping aa curve, as in Figure 4.

3. The Consumption Goods Market

The supply of consumption goods available for private use is:

I.22) $q_c(k^T, p_k) - (1 - h)e$

where:

$(1 - h) = \frac{C^G}{e}$ = propensity to consume out of government expenditure

$h = \frac{I^G}{e}$ = propensity to invest out of government expenditure

The demand side of the market is expressed by:

I.23) $C^d \{[(1-\beta)k^T p_k + g p_m]; [q(k^T, p_k) + (d+\pi_m g)p_m - e + \pi_k p_k k]\}$

where we assume that private consumption is positively related to private wealth. Thus, for any given total wealth, private consumption is negatively related to net government wealth, (i.e. government capital minus debt).[3]

Then we have:

$C^d = C(a, Y)$

where

$a$ = private wealth $\qquad$ $Y$ = private income

and

$(\partial C/\partial a) > 0 \qquad 0 < (\partial C/\partial Y) < 1$

The income component of private consumption demand can be derived from the following government and private identities:

- Government Budget Identity

  $T + rk^G + p_m d = b\rho_b p_m + e$

  where: $T$ = taxes per-capita

  $rk^G$ = profits from government assets

  $p_m d$ = government borrowing

  $\rho_b p_m$ = interest payments on government debt

- Private Budget Identity

  $rk + w - T + b\rho_b p_m = q(k^T, p_k) + dp_m - e$

Fig.I.5

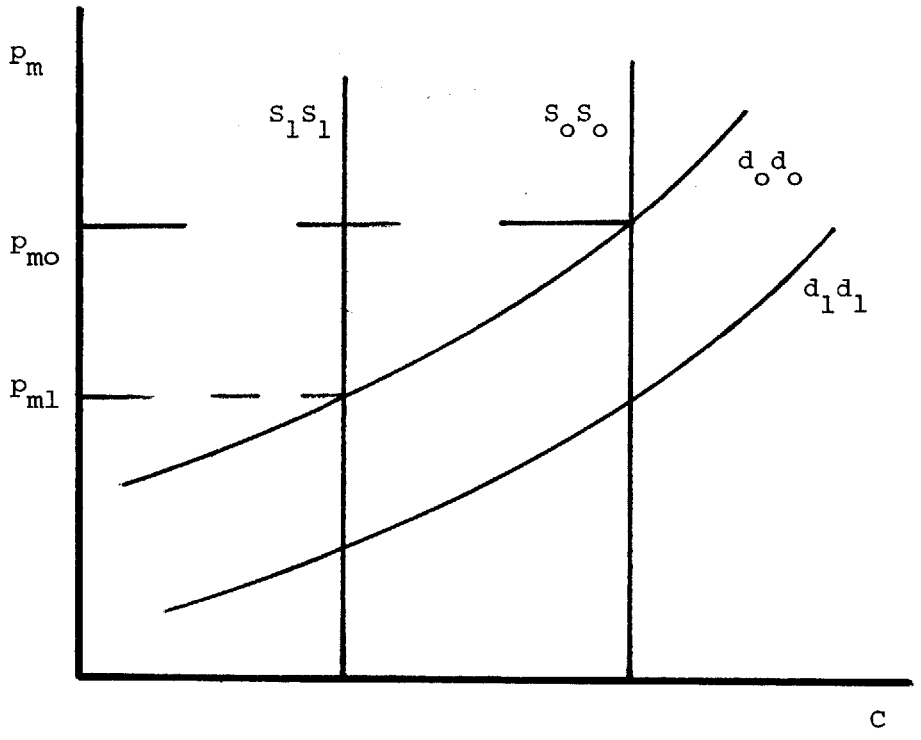
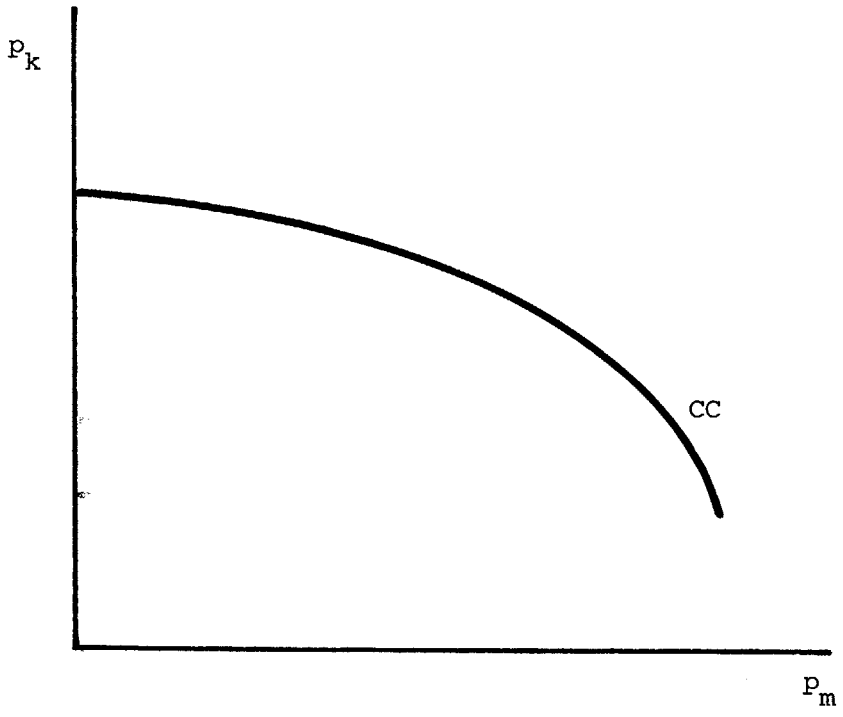


Fig.I.6



Then, the market clearing condition is:

$$I.24) q_c(k^T, p_k) - (1-h)e = c^d \{[(1-\beta)k^T p_k + g p_m]; q(k^T, p_k) + (d+\pi_m g)p_m - e + \pi_k p_k k]$$

which is presented in Figure 5 and Figure 6 for the case in which the income effect is positive either because of a positive expected rate of deflation or because of a government deficit, d, higher than the inflation tax, $\pi_m g$.

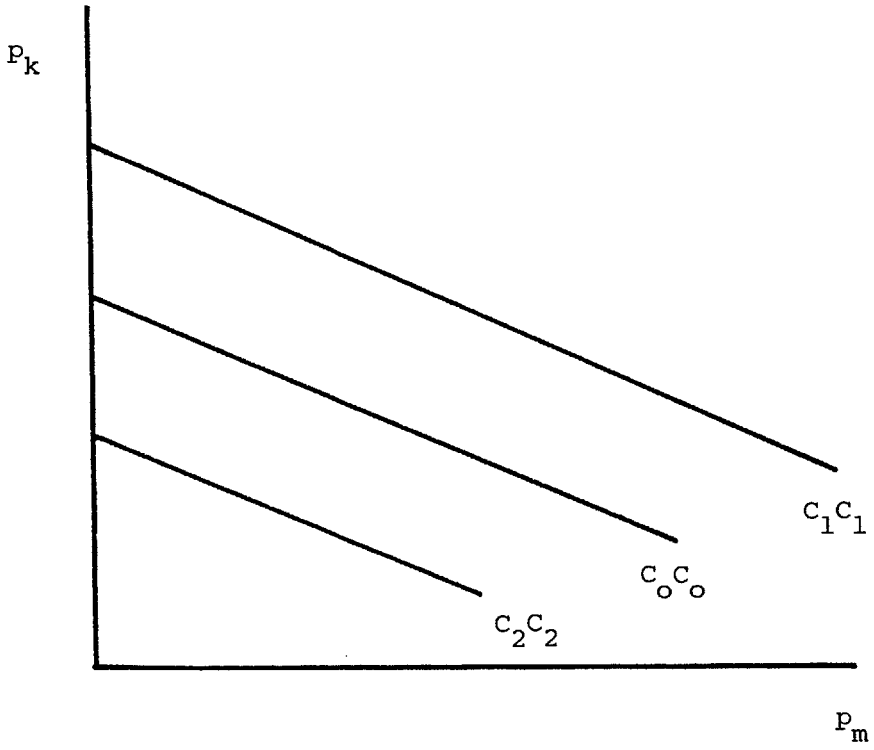
We are now in a position to define the consumption market equilibrium as a "cc" curve in the $p_k$, $p_m$ space. As $p_k$ increases, the supply of consumption goods decreases, and $S_o S_o$ shifts leftwards to $S_1 S_1$. On the demand side, both wealth and income effects are positive, and $d_o d_o$ shifts to $d_1 d_1$. Thus, the level of equilibrium of the price of money $p_m$ is lowered, and CC is downward sloping as in Figure 6.[4]

To test the effects of policy decisions within the consumption goods market, two simulations will be performed and presented in the following sections. We consider, first, an increase in government expenditure covered by taxes; and second, an increase in the government share of capital through nationalization.

### 3.1 Effects of a balanced budget increase in government expenditure

In this section we aim to analyze the effects produced by a balanced budget increase in government expenditure within the consumption goods market. Two kinds of effects are produced in such a situation.

Fig.I.7



First, the increased government expenditure will be directed to consumption and investment goods according to the specific government propensity to consume and to invest. Therefore, the supply of consumption goods available for private use will decrease by $[(1 - h)\Delta e]$. Second, if government raises taxes by an amount equal to the increase in expenditure, $\Delta e$, private disposable income will be decreased by that amount. Thus, the private demand for consumption goods will decrease according to private propensity to consume. By combining these effects, we reach either a situation of excess demand, one of excess supply, or one of equilibrium. In the first two cases, to move the market back into equilibrium, an upward or downward movement of the CC schedule will be needed.

Thus, a balanced budget increase in "e" will result in:

- an increase in $p_k$ if $(1 - h) < (1 - s) \rightarrow C_1C_1$
- a decrease in $p_k$ if $(1 - h) > (1 - s) \rightarrow C_2C_2$
- no effect at all if $(1 - h) = (1 - s) \rightarrow C_oC_o$

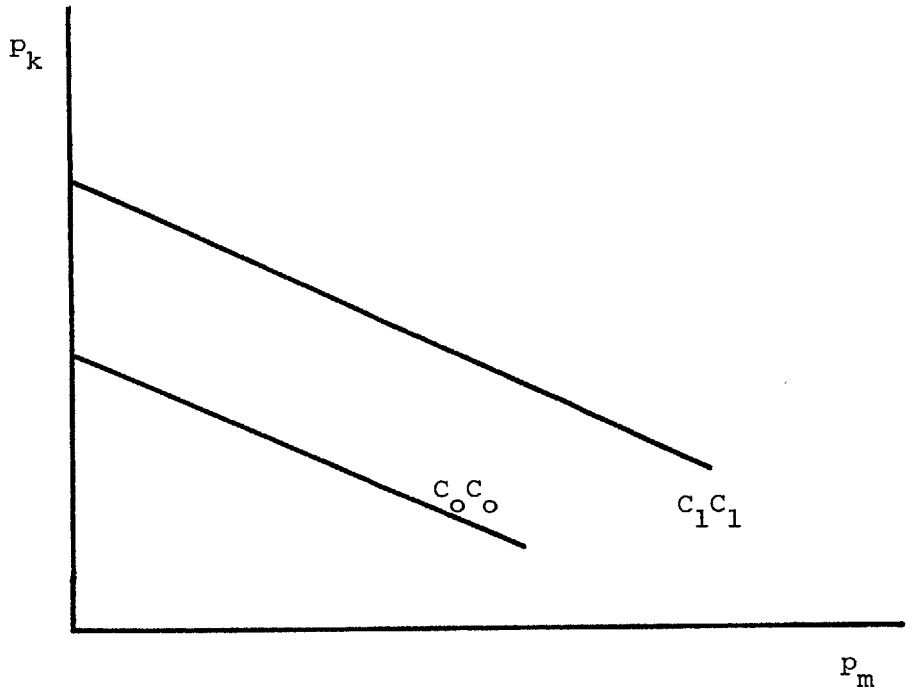
as shown in fig. 7.

3.2 Effects of an increase of the government capital stock

An increase in the government capital stock, i.e. an increase in $\beta$ through an uncompensated nationalization of private corporations, will decrease the amount of private wealth. Hence, the private demand for consumption goods will also decrease. If the government propensity to consume does not change, an excess supply of consumption goods will be registered, and the relation CC will shift upward to clear the market (See Figure I.8, relation $C_1C_1$).

However, as we shall see later, if the government wants to maintain in the long run its higher share of capital stock, it has to

Fig.I.8



increase its propensity to invest according to the relation (I.14b). Thus, a lower government propensity to consume will make available a greater flow of consumption for private use. The final effect of this simulation is unclear. In fact, it will depend on the increase of the government propensity to invest (h) and on the size of the nationalization, producing a negative wealth effect on private demand for consumption. An important relation can, however, be noted: the effects of nationalization should always be considered in the light of government budget policies and the composition of government expenditures for consumption and investment goods.

## 4. The Complete Model - Statics

Drawing on our previous analysis, we can now set out the following model:

$$p_k = \phi(\gamma, k, \beta, \pi_m, \pi_k, x)$$

$$i = \psi(\gamma, k, \beta, \pi_m, \pi_k, x)$$

$$q_c(k^T, p_k) - (1-h)e = C^d\,[(1-\beta)k^T p_k + g p_m;\ (q_I p_k + q_c) + (d+\pi_m g) - e + \pi_k p_k k]$$

where, in $C^d$, the first argument is private wealth and the second argument is private disposable income which follows from the private income constraint.

This model can be represented in the $p_k$, $p_m$ space by the assets market clearing relation "aa" and the consumption market equilibrium condition, CC.

We will now examine the static performance of the model by experiments concerned with parametrical movements in the government propensity to save and in its share of capital stock.

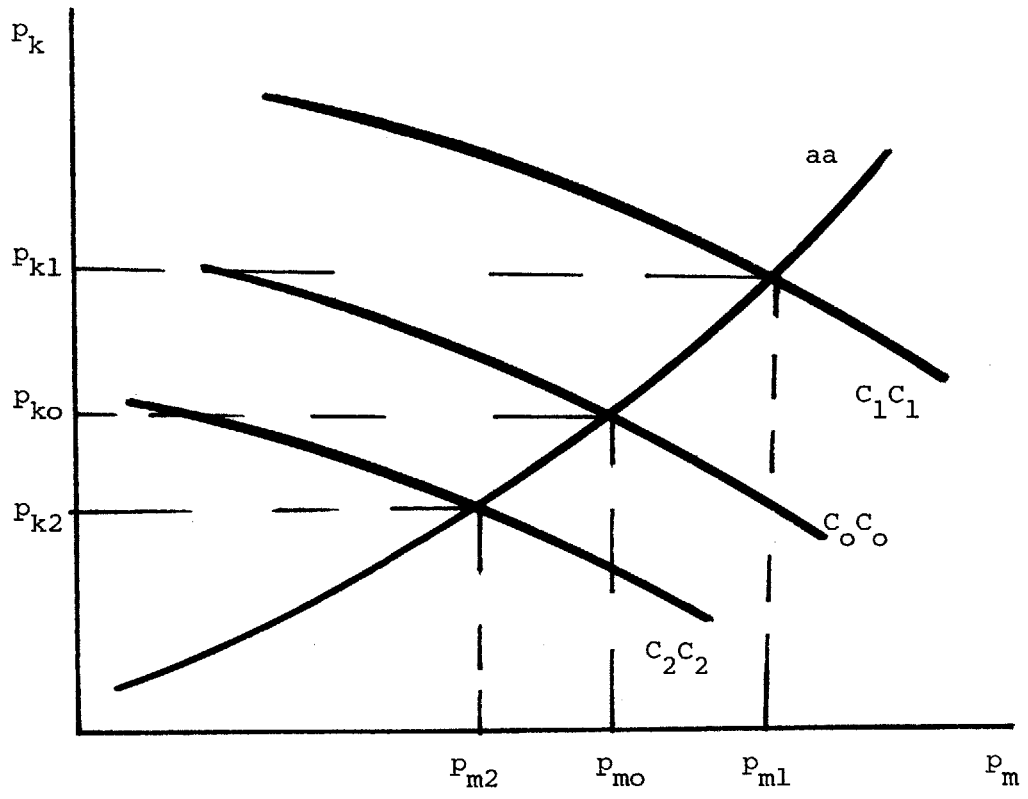
Four simulations have been considered. The first simulation is related to the one on the balanced budget increase in government expenditure which has already been examined within the consumption goods market. When the full model is used, the effects of an increase in government expenditure, fully financed by taxes, are still dependent on the conditions given by the government propensity to consume compared with the private propensity to consume.

The second simulation considers the effects of a sudden variation in the capital stock on both the consumption goods market and the assets market. The results that we obtain are not clear. They appear to depend on the differential impact of wealth and income. Therefore, several solutions are possible. The last two simulations deal with the particular tools that we have considered in our analysis. Both the effects of a nationalization and of differing compositions of government expenditures between consumption and investment are analyzed.

## 4.1 Fiscal policy actions

An increase in government expenditure, fully financed by taxes, affects only the consumption goods market. The supply of consumption goods available for private use decreases by $[(1 - h)\Delta e]$ and their demand decreases by $[(1 - s)\Delta e]$. Thus, the net result on $p_k$ and $p_m$ depends on the relative dimension of the government propensity to consume and the private propensity to save out of income.

Fig.I.9



As can be verified in Figure I.9, if:

a) $(1 - h) < (1 - s)$ $p_k$ and $p_m$ increase → $C_1C_1$

b) $(1 - h) > (1 - s)$ $p_k$ and $p_m$ decrease → $C_2C_2$

c) $(1 - h) = (1 - s)$ $p_k$ and $p_m$ unchanged → $C_oC_o$

Thus, the increase in government expenditure "e" will be inflationary or deflationary according to whether the government propensity to consume exceeds or falls short of the private propensity to consume.[5]

4.2 An increase in the stock of capital

An increase in the stock of capital, $k^T$, affects both assets and the consumption goods markets. For the sake of simplicity, we assume a constant share of government capital.

An increase in the intensity of the capital stock enters the CC schedule in three different ways:[6]

- increases the supply of consumption goods, $q_c$, by $\frac{\partial q_c}{\partial k^T}$, given $k_c > k_I$
- increases the demand through the wealth effect by $\frac{\partial C^d}{\partial q} \frac{\partial a}{\partial k^T} (1 - \beta)$
- increases the demand through the income effect by $\frac{\partial C^d}{\partial q} \frac{\partial q}{\partial k^T}$

The assets market relation is also affected in three ways:

- by an increased supply of capital goods, $(1 - \beta)p_k$
- by an increase of demand due to the wealth effect $\frac{\partial J}{\partial a} \frac{\partial a}{\partial k^T}$
- by a decrease of demand due to the income effect $\frac{\partial J}{\partial q} \frac{\partial q}{\partial k^T}$

Fig.I.10

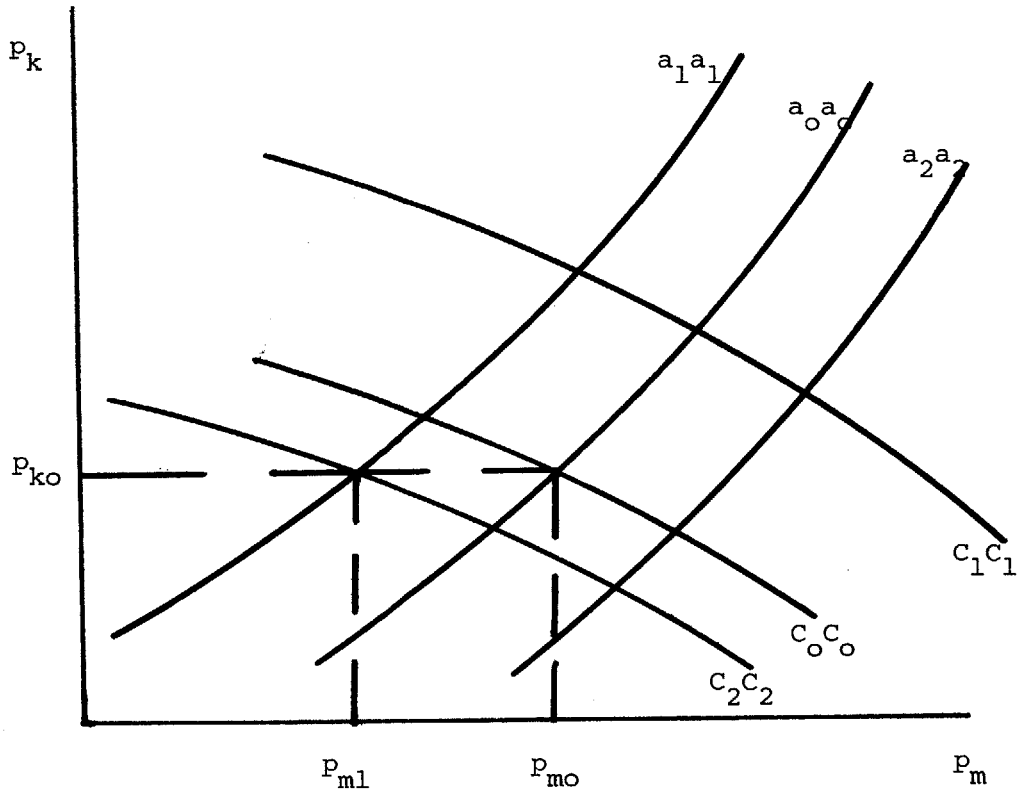


Figure 10 sums up this experiment.

As can be seen, different solutions of $p_k p_m$ result, depending on the shifts of the aa and CC curves. Note that if $p_k$ does not move, the new equilibrium implies a decrease in $p_m$, from $p_{mo}$ to $p_{m1}$.

In this case, the aa schedule has to shift to $a_1a_1$, and the cc to $c_2c_2$, thus:

$$(1 - \beta)p_k < \underbrace{\frac{\partial J}{\partial a^T}\frac{\partial a^T}{\partial k^T}}_{\text{wealth effect (positive)}} + \underbrace{\frac{\partial J}{\partial q}\frac{\partial q}{\partial k^T}}_{\text{income effect (negative)}} \quad \Bigg| \quad \frac{\partial q_c}{\partial k^T} < \frac{\partial c^d}{\partial a}\frac{\partial a}{\partial k^T} + \frac{\partial c^d}{\partial q}\frac{\partial q}{\partial k^T}$$

Again, the final result depends on a combination of wealth and income effects in the two markets considered.

4.3 Effects of an increase in the share of government capital

For any given stock of capital, a sudden increase in the stock of government capital affects both the assets and consumption markets.

In the latter market, an increase in $\beta$ leads to a condition of excess supply. This is due to the wealth effect. Then, for the market to be in equilibrium, CC has to shift upward to $C_1C_1$. In the former market, an increase in $\beta$ leads to an excess demand of capital. In addition, the aa schedule shifts upward to $a_1a_1$.[6] Thus, $p_k$ increases and $p_m$ can either increase or decrease, as shown in Figure I.11.

4.4 The role of the government propensity to consume

An increase in the government propensity to consume, (1 - h), affects only the consumption goods market and leads it to a situation of excess demand. Thus, CC shifts downward. Both the price of capital and

Fig.I.11

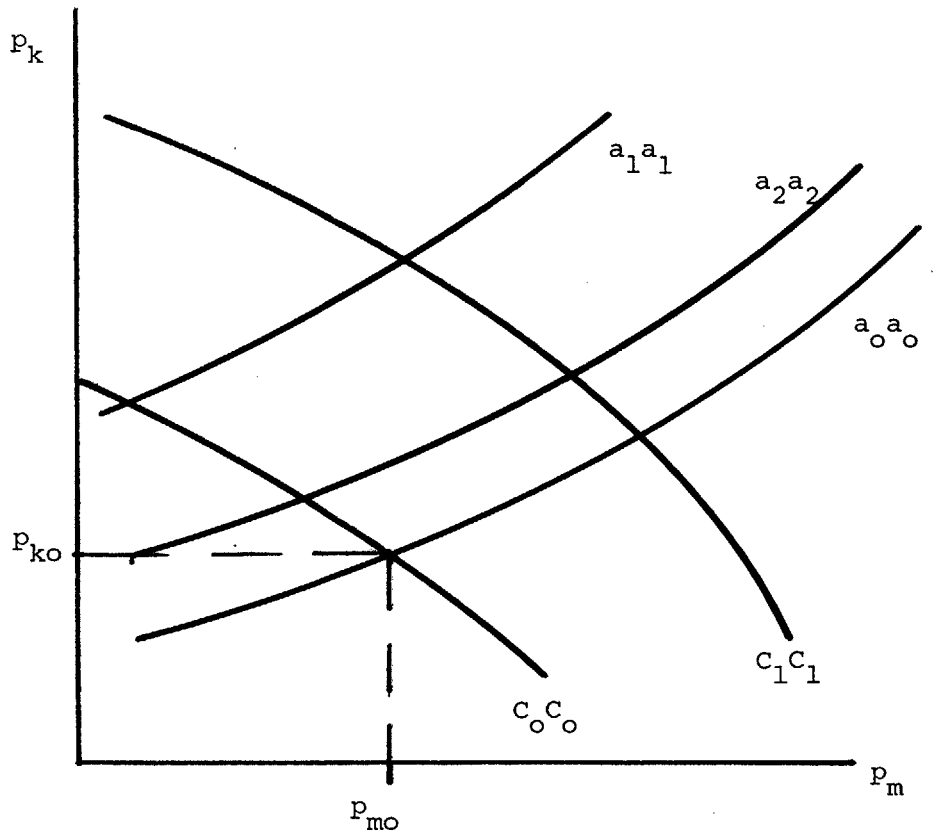
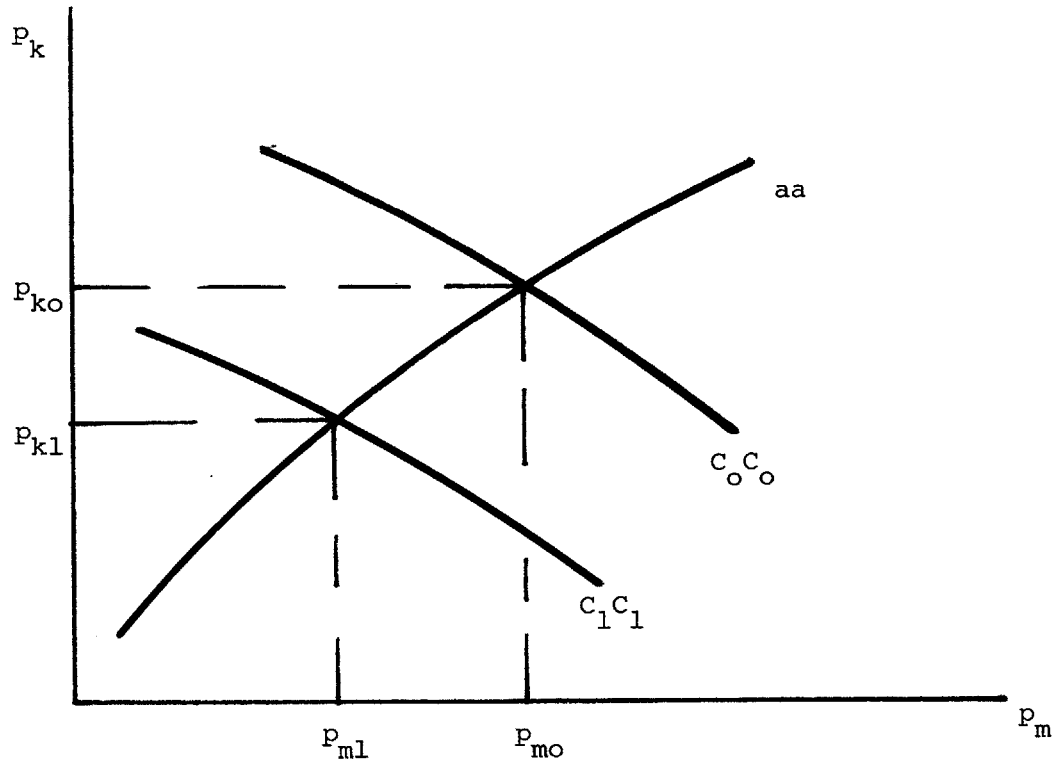


Fig.I.12



of money will decrease. See Figure I.12.

5. The Complete Model - Dynamics

As the population grows, both the stock of capital and the government debt have to increase to maintain their per capita values constant and to keep the whole economy growing at a positive equilibrium rate.

We can now define the relations:

I.24) $\dot{k} = q_I(k^T, p_k) - \frac{he}{p_k} - nk$

I.25) $\dot{g} = d - ng$

Then, if the economy is to maintain the given per capita level of private capital, the following condition has to hold:

$$q_I(k^T, p_k) = \frac{he}{p_k} + nk$$

Further, we can consider that the government determines its own propensity to invest such that either its share of the capital stock or the per capita intensity of government capital remains constant. Thus, using (I.14b) and (I.24), we define

I.26) $\dot{k}^G = \beta q_I(k^T, p_k) - nk^G$

I.27) $\dot{k} = (1 - \beta)\, q_I(k^T, p_k) - nk$

(since $\dot{k}^T = q_I(k^T, p_k) - nk^T$)

from which we can express two different targets/constraints that the government may want to pursue:

a) $\dot{k}^G = 0$, to maintain a given per capita intensity of government capital

b) $\beta$ = constant, to keep constant its share of capital

5.1 Stock and/or flow equilibrium conditions

Consider the general condition of equilibrium:

$$\text{I.28)} \quad q(k^T, p_k) + zp_m = C^d + \frac{\dot{K}^d}{N} p_k + \frac{\dot{G}^d}{N} p_m$$

where z is the net transfer variable, N is the population, and the superscript d is for demand.

Now, we know that:

$$q = q_c + p_k q_I = q_c + p_k \frac{\dot{K}_s^T}{N}$$

where the subscript s is for supply. Then, since

$$ap_m = dp_m - e = dp_m - he - (1 - h)e$$

we obtain:

$$\text{I.29)} \quad q_c + p_k \frac{\dot{K}_s^T}{N} + dp_m - (1-h)e - he = C^d + \frac{\dot{K}^d}{N} p_k + \frac{\dot{G}^d}{N} p_m$$

Now, if the consumption market clears:

$$q_c - (1 - h)e = C^d$$

and, if the government equilibrium condition holds:

$$he = p_k \, q_I(k^T, p_k)$$

we then have $\dot{K}_s^T/N - \dot{K}^G/N = \dot{K}/N$ , and we can express the private sector condition as:

$$\text{I.30)} \quad p_k\left(\frac{\dot{K}^s}{N} - \frac{\dot{K}^d}{N}\right) = p_m \left(\frac{\dot{G}^d}{N} - d\right)$$

In general, we can say that:

if $he > p_k \beta q_I(k^T, p_k)$

then $\frac{\dot{K}^{s'}}{N} < \frac{\dot{K}^{s}}{N}$ and substituting

$$p_k\left(\frac{\dot{K}^{s'}}{N} = \frac{\dot{K}^{d}}{N}\right) < p_m(\dot{G}^d/N - d)$$

$$< 0 \rightarrow \text{excess demand for private capital}$$

$$0 < p_m(\dot{G}^d/N - d) \rightarrow \text{excess demand for government debt}$$

Finally, given the clearing condition of the consumption market, we have:

$S = I$ if $he = p_k \beta q_I(k^T, p_k)$

$S < I$ if $he < p_k \beta q_I(k^T, p_k)$

$S > I$ if $he > p_k \beta q_I(k^T, p_k)$

Clearly, the two inequalities hold in an ex-ante situation. As in any standard Keynesian system, the savings/investment identity always holds ex-post by further income adjustments. In this framework, however, equilibrium can also be reached by government behavior. As we shall see in Section II.1, the government propensity to save can become endogenously determined such that an equilibrium condition will be assured.

# Chapter II - ISSUES IN PRICE STABILIZATION AND GOVERNMENT INVESTMENT PROGRAMS

This section of the analysis investigates the performance of the model through three different approaches: (a) government using monetary policy to stabilize the price of money, $p_m$; (b) government using fiscal policy to stabilize the price of money, $p_m$; and (c) government using fiscal and monetary policy to stabilize the rate of change of prices, $\pi_m$.

With each approach where only one policy instrument is used, the others are assumed to operate "neutrally", meaning that the size of their variables is kept constant in per capita terms.

## 1. Monetary Policy

When the government uses open market operations to maintain the price of money, $p_m$, constant at some level, $p_m^*$, the complete model is:

$$\text{II.1)(a)} \quad \dot{k} = q_I(k^T, p_k) - \frac{he}{p_k} - nk$$

$$\text{II.1)(b)} \quad \dot{k}^G = (he/p_k) - nk^G$$

$$\text{II.1)(c)} \quad \dot{k}^T = \dot{k} + \dot{k}^G$$

$$\text{II.2)} \quad \dot{g} = d - ng$$

$$\text{II.3)} \quad p_k = \phi(\gamma, k^T, \beta, \pi_k, \pi_m, x)$$

$$\text{II.4)} \quad i = \psi(\gamma, k^T, \beta, \pi_k, \pi_m, x)$$

$$\text{II.5)} \quad q_c(k^T, p_k) - (1-h)e = C^d\,[(1-\beta)k^T p_k + gp_m;\ q(k^T, p_k)$$

$$+ (d + \pi_m g)p_m + e + \pi_k p_k k]$$

II.6) $\pi_m = 0$ II.7) $\pi_k = 0$ II.8) $p_m = p_m^*$

II.9) $e = e^*$ II.10) $d = d^*$ II.11) $k^T = k + k^G$

which is a system of twelve equations with thirteen unknowns:

$$h,\ k^T,\ k^G,\ k,\ g,\ p_m,\ p_k,\ i,\ \pi_m,\ \pi_k,\ d,\ e,\ x$$

One way to close the model would be to specify $k^G$ as a function of time. However, we prefer to follow an alternative line.

We assume the government wants one of two things:

- either to maintain a constant share of capital, $\beta$. Therefore:

II.12) $he = \beta p_k q_I(k^T, p_k)$

which can be substituted in the first equation:

II.1a) $k = (1 - \beta)\, q_I(k^T, p_k) - nk$

II.1b) $k^G = \beta q_I(k^T, p_k) - nk^G$

- or to maintain a constant per capita intensity of capital, $k^G$. Therefore, from II.1b, we get:

II.12') $he/p_k = nk^G$

In both cases, either the government propensity to save or the share of capital, $\beta$, become endogenous variables. Then, the previous set of relations forms a complete model describing the growth path of the economy under monetary policy stabilization.

1.1 Static Analysis

When monetary policy is used to stabilize the price of money, the assets and the consumption market clearing equations can be described in the debt/money ratio, x, and price of capital, $p_k$, space. The former expresses an inverse relation between x and $p_k$. The latter, unaffected by monetary policy, is represented by a line vertical to the $p_k$ axis, see Figure II.1.

Within this static framework three different simulations are performed: an international transfer which increases the stock of physical assets, a nationalization which increases the government stock of capital, and an increase in the government propensity to invest.

1.1.1. Effects of an increase in the total stock of capital

An increase in the stock of capital (an international transfer, for instance) affects the assets and the consumption goods market clearing equations in several ways.

The CC schedule can shift right, left, or not at all, depending on the effect of an increase in $k^T$. On the supply side, this effect goes through the production function. On the demand side, it works through the wealth and income effect.

As described in Figure II.2, we have the following results:

$- C_oC_o$ if $\partial q_c/\partial k = (\partial C^d/\partial a)(\partial a/\partial k^T) + (\partial C^d/\partial q)(\partial q/\partial k^T)$

$- C_1C_1$ if $\partial q_c/\partial k > (\partial C^d/\partial a)(\partial a/\partial k^T) + (\partial C^d/\partial q)(\partial q/\partial k^T)$

(excess supply at $C_oC_o$)

Fig.II.1

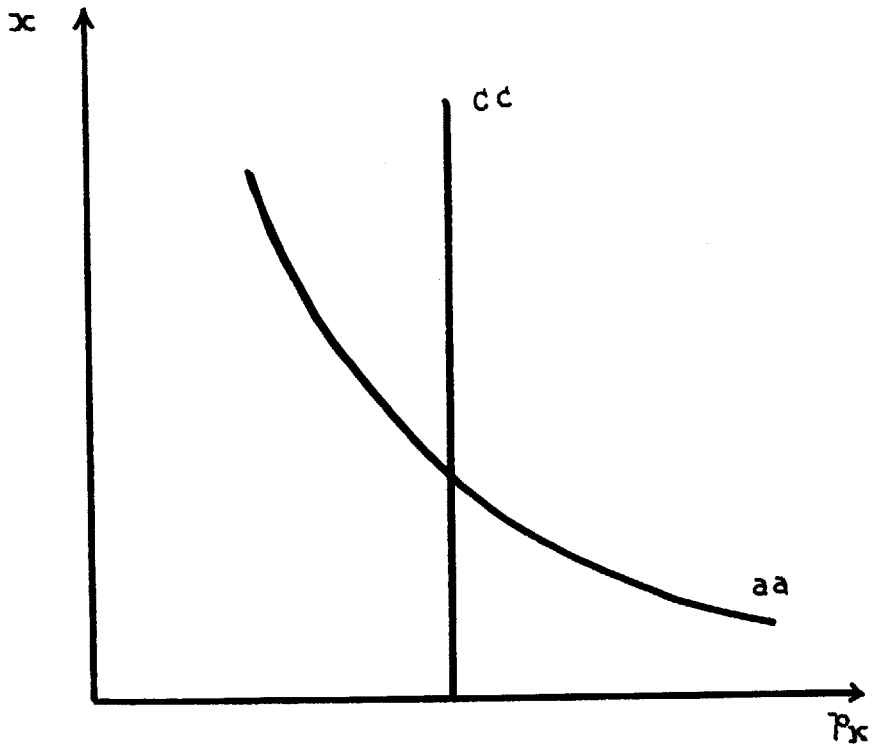
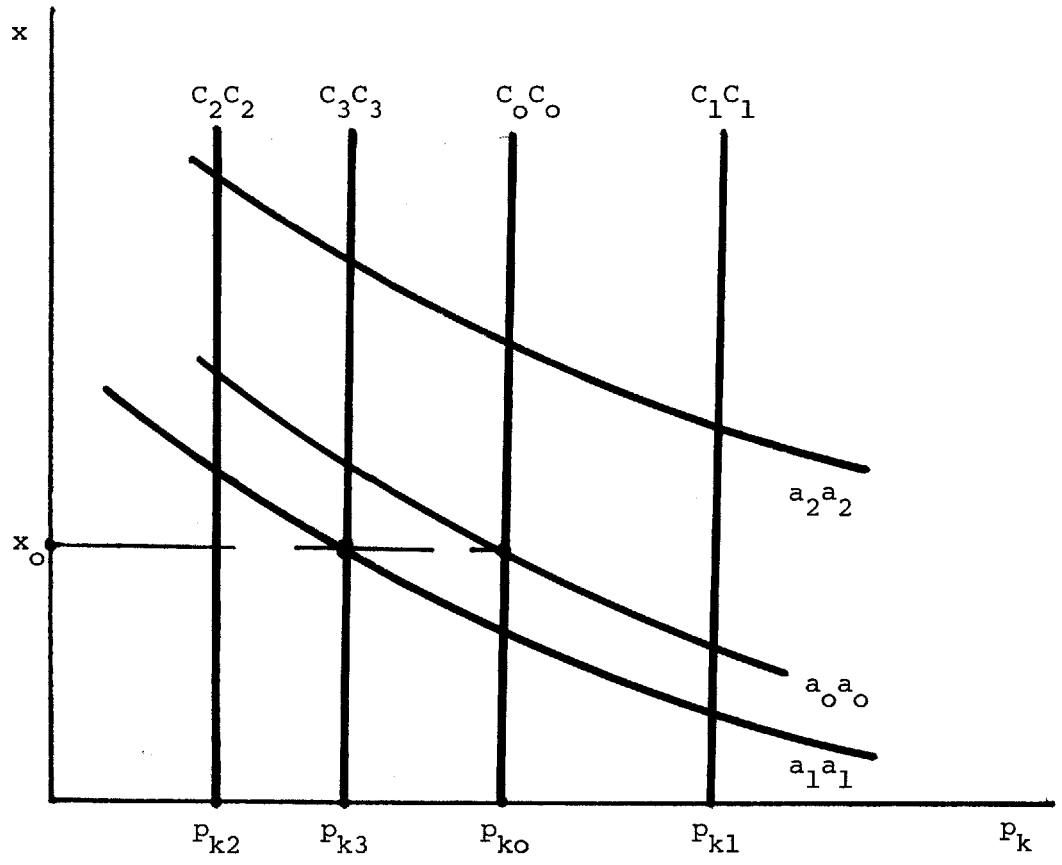


Fig.II.2



$- C_2C_2,\ C_3C_3$ if $\partial q_c/\partial k < (\partial C^d/\partial a)(\partial a/\partial k^T) + (\partial C^d/\partial q)(\partial q/\partial k^T)$

(excess demand at $C_oC_o$)

If the demand function is linear with respect to income, then $\partial C^d/\partial q = (1 - s)$.

The capital market is affected on the supply side by the effect on the term $[(1 - \beta)k^T]$ and on the demand side by a positive wealth effect and a negative income effect. The latter expresses the transaction demand for money. Thus, we have:

$- a_oa_o$ if $(1 - \beta) = (\partial J/\partial q)(\partial q/\partial k^T) + (\partial J/\partial a^T)(\partial a^T/\partial k^T)$

$- a_1a_1$ if $(1 - \beta) > (\partial J/\partial q)(\partial q/\partial k^T) + (\partial J/\partial a^T)(\partial a^T/\partial k^T)$

$- a_2a_2$ if $(1 - \beta) < (\partial J/\partial q)(\partial q/\partial k^T) + (\partial J/\partial a^T)(\partial a^T/\partial k^T)$

The open market operation to be performed by the government depends for both amount and sign (purchase or sale) on the combination of all the above listed effects. We will here outline only the case described by the $C_3C_3$ and $a_1a_1$ schedules. In that situation, no open market operation has to be performed because the system immediately reaches a new equilibrium position with a lower price of capital, $p_k$.

### 1.1.2. Effects of an increase of the share of government capital stock

An increase in the government share of capital, $\beta$, affects the assets market clearing equation and produces an excess demand for capital. The new equilibrium condition is then found at the higher $a_1a_1$, as shown in Figure II.3.

Fig.II.3

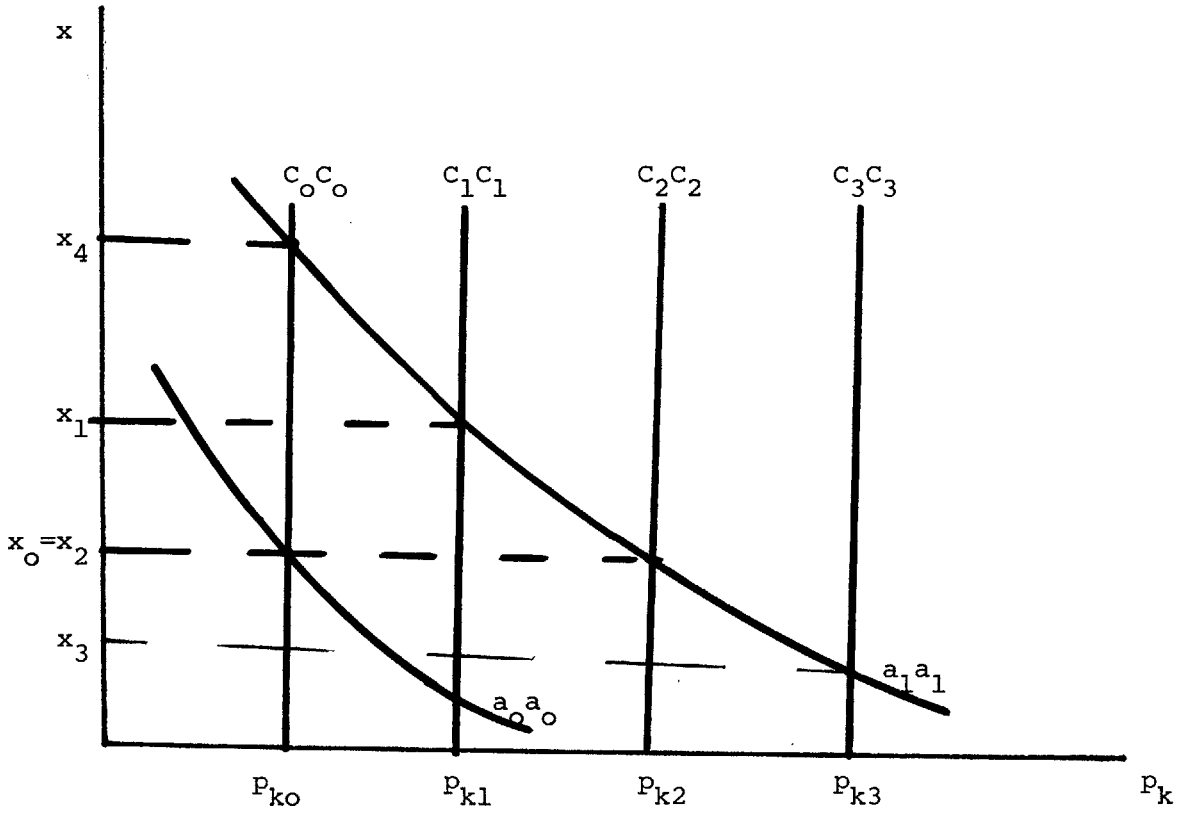
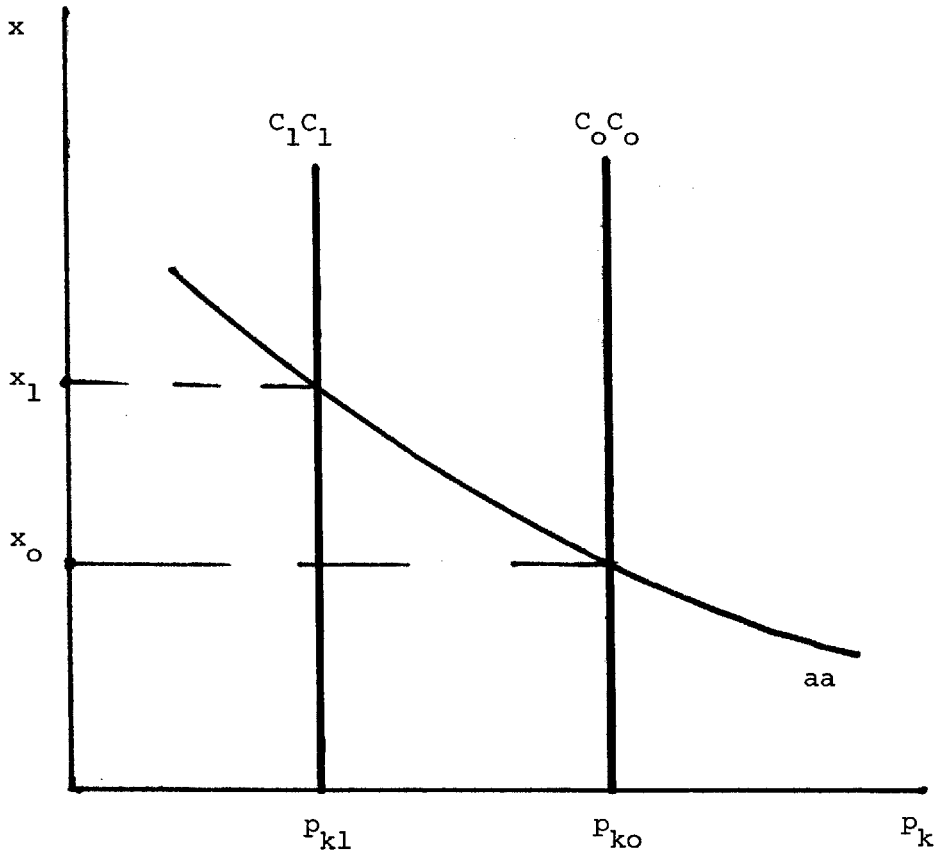


Fig.II.4



If we exclude wealth from the consumption demand function, the cc schedule does not move. Thus, the government has to perform an open market sale. On the other hand, in the case in which we include private wealth, the consumption clearing equation shifts to the right. Indeed, at the old $C_oC_o$, there would be an excess supply of consumption goods. A rightward movement of cc, given the $a_1a_1$ schedule, can lead to a situation in which the government does not have to perform any open market operations, $x_o=x_2$, because the system reaches a new equilibrium simply by increasing the price of capital to $p_{k2}$.

Last, if the wealth effect on consumption demand is sufficiently strong, there could even be an open market purchase, as in the $C_3C_3$-$a_1a_1$ case.

1.1.3. An increase in the government propensity to consume

Under the hypothesis of an increase in the government propensity to consume, no effect on the assets market clearing equation will result. Instead, in the consumption goods market there will be a situation of excess demand. Then, to clear the market, the price of capital, $p_k$, has to decrease. The government has to perform an open market sale, as in Figure II.4, and the debt/money ratio increases from $x_o$ to $x_1$.

1.2 Dynamic Analysis

From the system we have investigated in the previous section, we can define in the $p_k$, $k^T$ space the following dynamic relation:

$$\dot{k}^T = q_I - nk^T$$

$$\dot{k} = q_I - (he/k_k) - nk = q_I - nk^T - (he/p_k) + nk^G = \dot{k}^T + (nk^G - he/p_k)$$

which, taking into account condition II.12, becomes:

$$\dot{k} = q_I - \beta q_I - n(1 - \beta)k^T = (q_I - nk^T)(1 - \beta) = (1 - \beta)\dot{k}^T$$

or: $\dot{k} = \dot{k}^T$ if condition II.12' holds.

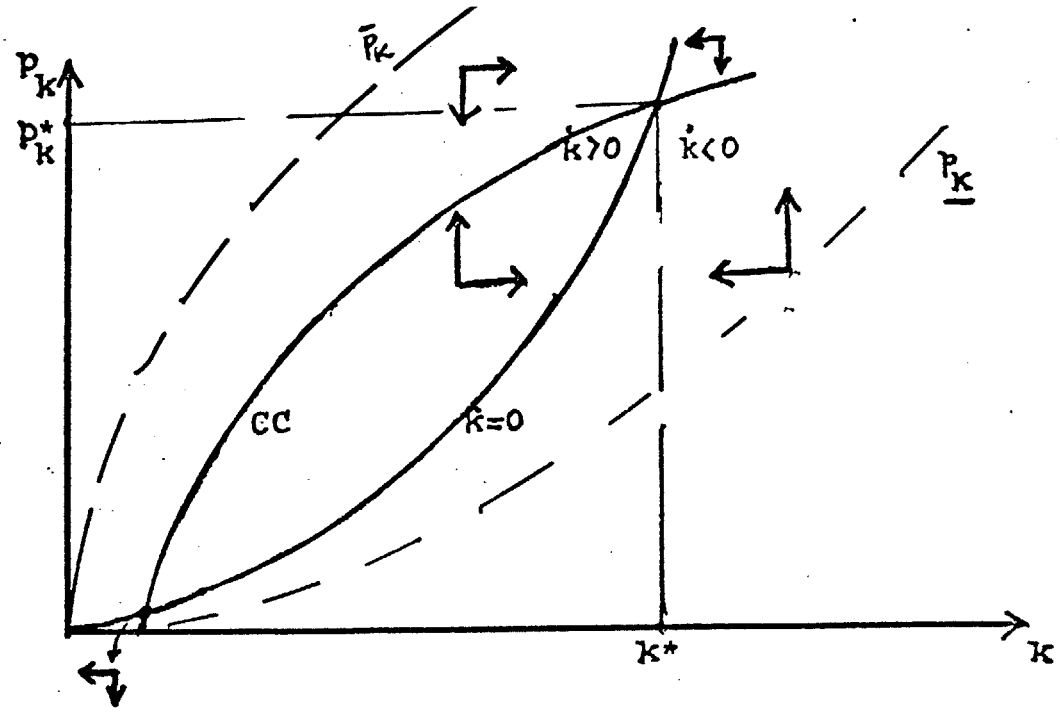
Then, if the government owns a positive share of capital and aims to maintain it dynamically, we have $\dot{k} < \dot{k}^T > 0$ and $\dot{k}^T = 0 = \dot{k}$. Hence, in the $p_k$, k plane, the $\dot{k} = 0$ schedule indicates these equilibrium conditions. Further, if the government target is to maintain a given level of per capita government capital intensity, $k^G = K^G/N$, then the government share of capital, $\beta$, will tend either to zero or to one, depending on whether $k^T$ is positive or negative, i.e. if the rate of growth of population is smaller or greater than the rate of capital accumulation. Only if these rates are equal, can $\beta$ be kept constant in a growth situation.

Then, we can verify the slope of the $\dot{k} = 0$ schedule. As shown in II.13, it is represented by an upward sloping function, since:

$$\text{II.13)} \quad (\partial p_k/\partial k)\Big|_{\dot{k}=0} = - \frac{\overset{(-)}{(\partial q_I/\partial k^T)}\ (\partial k^T/\partial k) - n}{\underset{(+)}{(\partial q_I/\partial p_k)} + \underset{(+)}{he/p_k^2}} > 0$$

Furthermore, from the consumption market clearing equation we have:

Fig.II.5



$$q_c(k^T, p_k) - (1-h)e = C^d [ (1 - \beta)k^T p_k + gp_m; q(k^T, p_k) + (d + \pi_m g)p_m - e + \pi_k p_k k ]$$

The slope of this relation is given by:

$$\text{II.14)} \quad (\partial p_k/\partial k)\Big|_{CC} = \frac{- (\partial q_c/\partial k^T)(\partial k^T/\partial k) + (\partial C^d/\partial a)(\partial a/\partial k^T)(\partial k^T/\partial k)}{- (\partial q_c/\partial p_k) + (\partial C^d/\partial a)(\partial a/\partial p_k) + (\partial C^d/\partial q)(\partial q/\partial p_k)} +$$

$$+ \underbrace{\frac{(\partial C^d/\partial q)(\partial q/\partial k^T)(\partial k^T/\partial k)}{(*)}}$$

which is positive for:

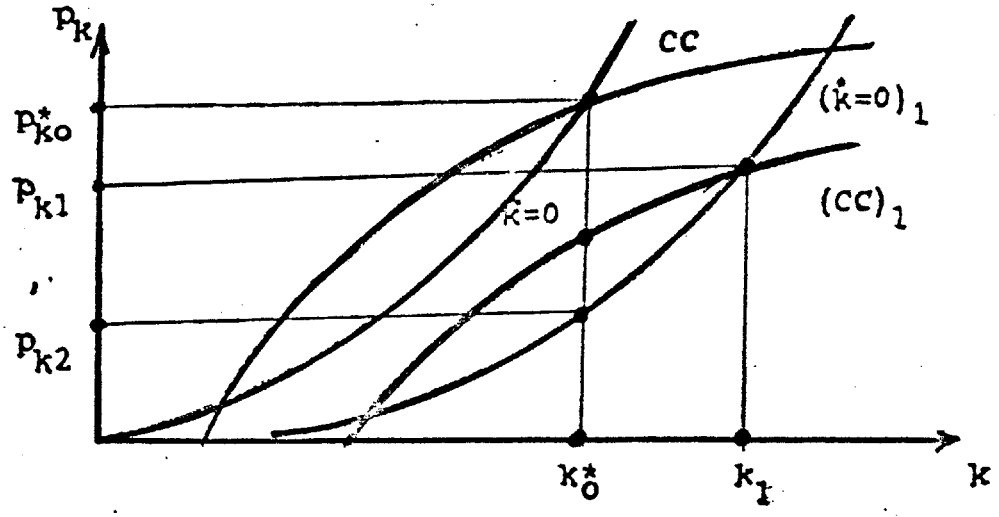
$$(\partial q_c/\partial k^T)(\partial k^T/\partial k) < (\partial C^d/\partial a)(\partial a/\partial k^T)(\partial k^T/\partial k) + (\partial C^d/\partial q)(\partial q/\partial k^T)(\partial k^T/\partial k)$$

Let us now assume the signs of the second derivatives to be such that a steady-state solution is possible. We can plot the $\dot{k} = 0$ and cc schedules as in Figure II.5, where $p_k^*$ and $k^*$ are the stable steady state conditions. (We exclude here the small area at the bottom of the figure.) Since we also assume the government has priority in purchasing goods on the market, we can refer to the private equilibrium condition. Total capital intensity follows from II.12. Dotted lines represent the usual limits of specialization into one of the two goods.

1.2.1. Effects of an increase in the government propensity to consume

As the government increases its propensity to consume, the schedule, $\dot{k} = 0$, shifts rightward to $(\dot{k} = 0)_1$, see Figure II.6, and

Fig.II.6



cc shifts to $(cc)_1$. The condition under which $\dot{k} = 0$ shifts more than cc can be proved as follows:

- at $k_o^*$ on the $(\dot{k} = 0)_1$, $p_k$ is decreased to $p_{k2}$, and if the increase in the production of consumption goods is greater than the increase in government consumption, at $k_o^*$, cc has to be in excess supply, hence $(cc)_1$ has to be above $(\dot{k}=0)_1$.

Under this hypothesis, the steady-state private capital intensity increases to $k_1$.

On the other hand, the price of capital can either increase or decrease depending on the two combined effects.

Such a result is reinforced by the government constraint II.12, where a decrease in h has to be followed by a decrease in $\beta$, i.e. an increase in private wealth.

Consider now the constraint given by government targets. Under a policy of constant $\beta$, since the government propensity to invest, h, is decreased, the price of capital, $p_k$, must also decrease to maintain the condition: $he/p_k = \beta q_I$

Hence, if the solution of the system gives a lower price of capital goods such that the previous condition holds, no operation will be needed. Otherwise, and more likely, the government will have to perform open market purchases or sales to reach a level of $p_k$, leading to an equilibrium position both in assets and consumption goods market and satisfying the constraint at a lowered government propensity to save. Such operations will be needed even under a policy of constant per capita intensity of government capital, i.e. when $\dot{k}^G = 0$.

1.2.2. Effects of an increase in the share of government capital stock

The increase in $\beta$, the share of capital stock owned by the government, has to be analyzed for two different cases.

In the first case, the government performs a nationalization and announces no changes in its expenditure function. Its propensity to invest remains invariate in the long-run.[1] If we do not consider any wealth effect, the two schedules do not move. We have a sudden jump to $k_1$, and in the long-run, the economy will return to the starting situation. (See Figure II.7).

We now consider the wealth effect on the consumption clearing equation. Along the old $C_oC_o$, there is an excess supply, and the new $C_1C_1$ is above $C_oC_o$. The price of capital increases to the point, C, and in the long-run both $p_k$ and k increase.

In the second case, the government performs a nationalization, increasing $\beta$, and announces an increase in its marginal propensity to invest in order to maintain the higher $\beta$ in the future. As plotted in Figure II.8, even with no wealth effect, the consumption goods market shows excess supply and the cc schedule shifts upward to $C_oC_o$.

If we consider the wealth effect, cc shifts further upward. Now, given the shift in cc, let us detail the behavior of $\dot{k} = 0$. Take k*. At the corresponding point on $C_oC_o$, we can have $\dot{k} \gtreqless 0$ depending on the combination of the effect due to the increased share of government capital, $\beta$, and the increased government propensity to invest, h.

Given k* and an increased $\beta$, we have a higher $k^T$, a higher $p_k$ and a higher (1-h). Thus, we have two opposite effects in the production

fig.II.7

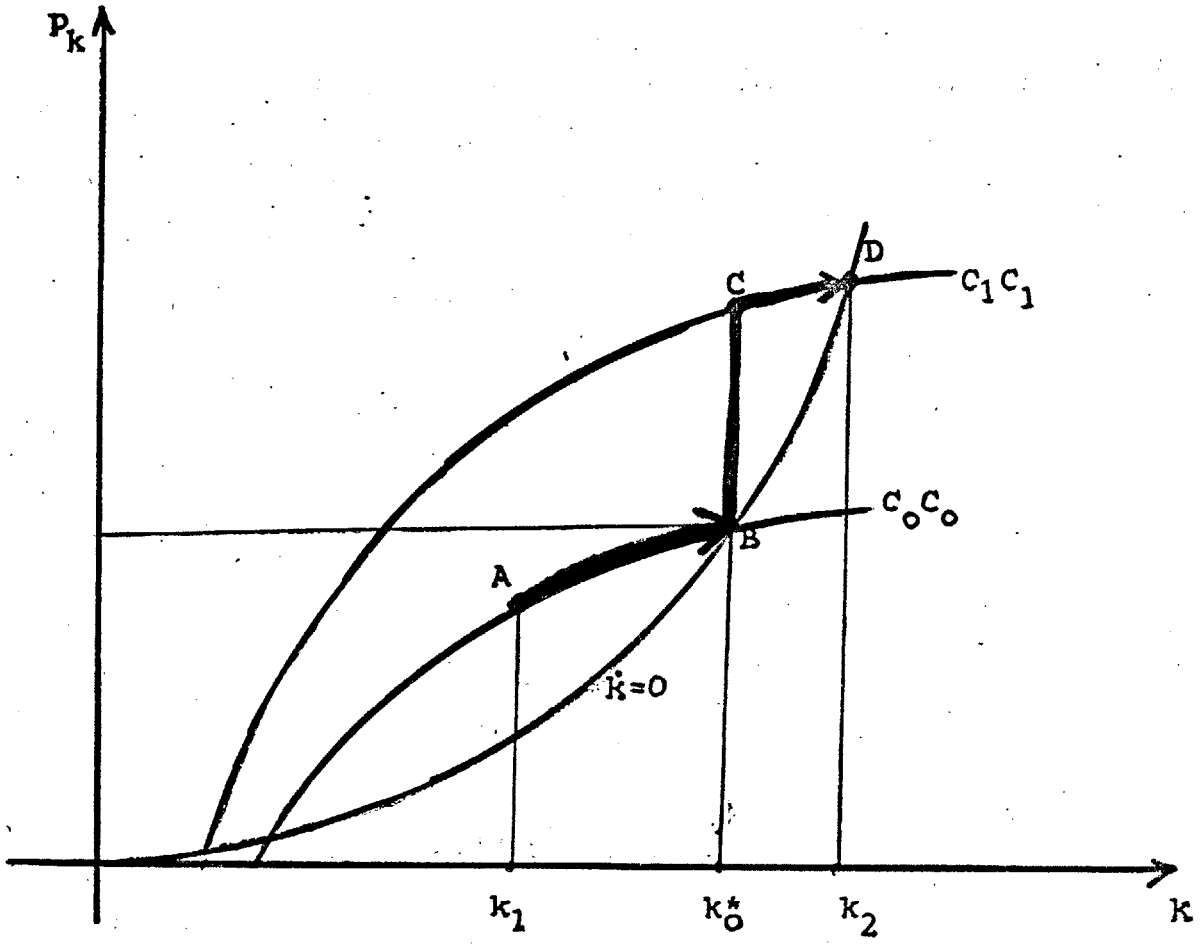
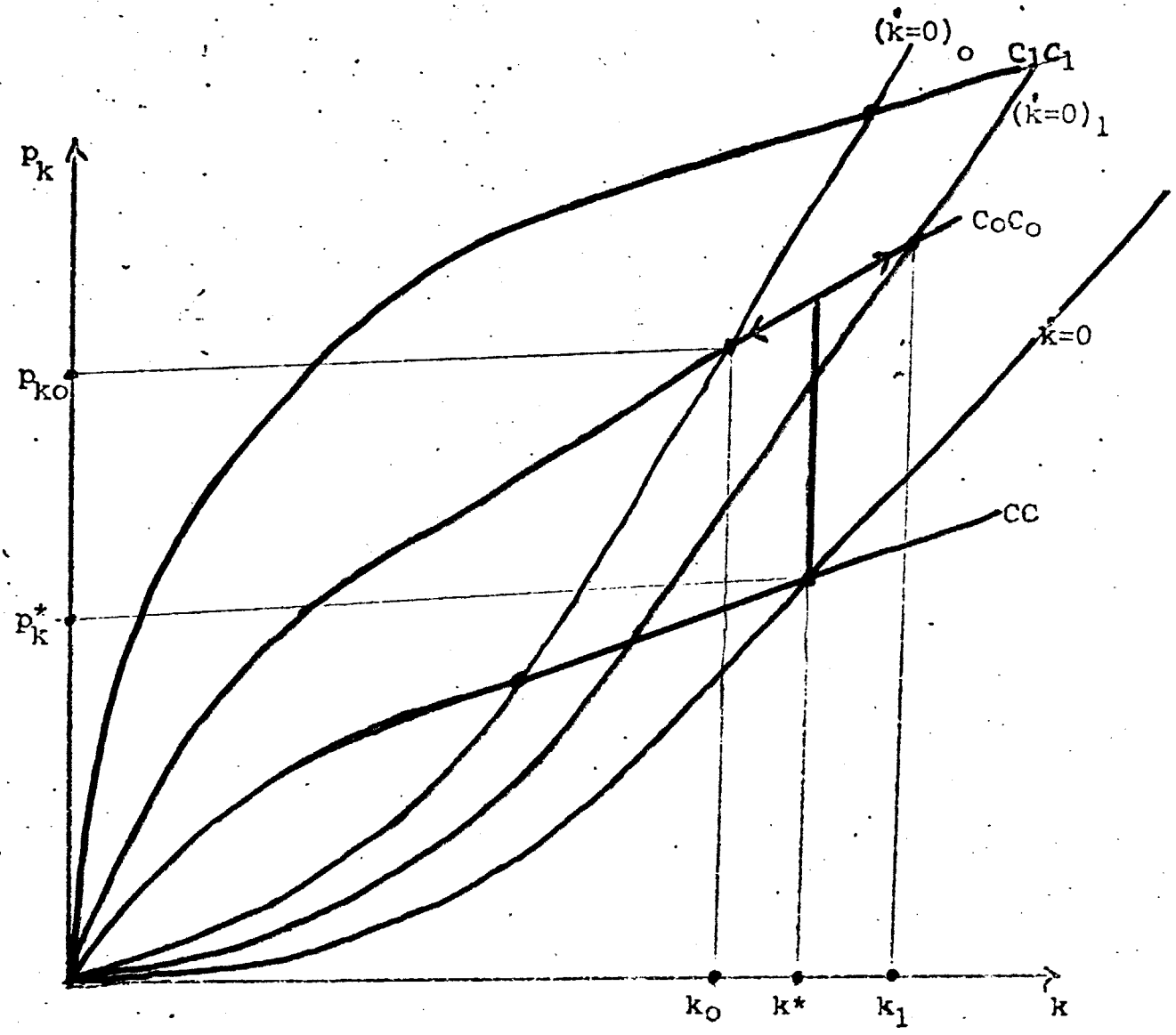


Fig.II.8



of capital goods: $\frac{\partial q_1}{\partial k^T} < 0$, and $\frac{\partial q_1}{\partial p_k} > 0$ .

Hence, at $k^*$ on $C_oC_o$ we may have:

(a) $\dot{k} > 0$, provided $\frac{\partial q_I}{\partial p_k}$ is large enough to outweigh the decrease in investment production due to the higher $k^T$ and to the variation in the government demand for investment $he/p_k$, which in turn results from the higher government intensity to invest, h, and the higher price of capital, $p_k$.

Under this hypothesis the new $\dot{k} = 0$ will be some $(\dot{k} = 0)_1$, and the steady state intensity of private capital increases to $k_1$.

(b) $\dot{k} < 0$, provided the effect of a higher price of capital is outweighed by the higher $k^T$ and by the new value $(he/p_k)$. The $\dot{k} = 0$ schedule shifts to $(\dot{k} = 0)_o$ and the long-run intensity of private capital decreases to $k_o$.

In both cases, the price of capital increases.[8]

A very peculiar situation could result if the wealth effect due to the increase in $\beta$ on the private demand for consumption goods were so strong as to outweigh any other effect. That is the case of $C_1C_1$ in which both the price of capital and the private capital intensity increase in their steady state values.

2. Fiscal Policy

We now assume that the government changes its deficit through variations in taxes in order to maintain constant the price of money, $p_m$.

Under this situation, the complete model is:

II.1°) $\dot{k} = q_I(k^T, p_k) - he/p_k - nk$ (a)

II.1°) $\dot{k}^G = (he/p_k) - nk^G$ (b)

II.2°) $\dot{g} = d - ng$

II.3°) $p_k = \phi(\gamma, k^T, \beta, \pi_m, \pi_k, x)$

II.4°) $i = \psi(\gamma, k^T, \beta, \pi_m, \pi_k, x)$

II.5°) $q_c(k^T, p_k) - (1-h)e = C^d [(1 - \beta)k^T p_k + gp_m; q(k^T, p_k) + (d + \pi_m g)p_m - e + \pi_k k p_k]$

II.6°) $\pi_m = 0$ II.7°) $\pi_k = 0$ II.8°) $p_m = p_m^*$

II.9°) $e = e^*$ II.10°) $x = x^*$ II.11°) $k + k^G = k^T$

As before, we assume:

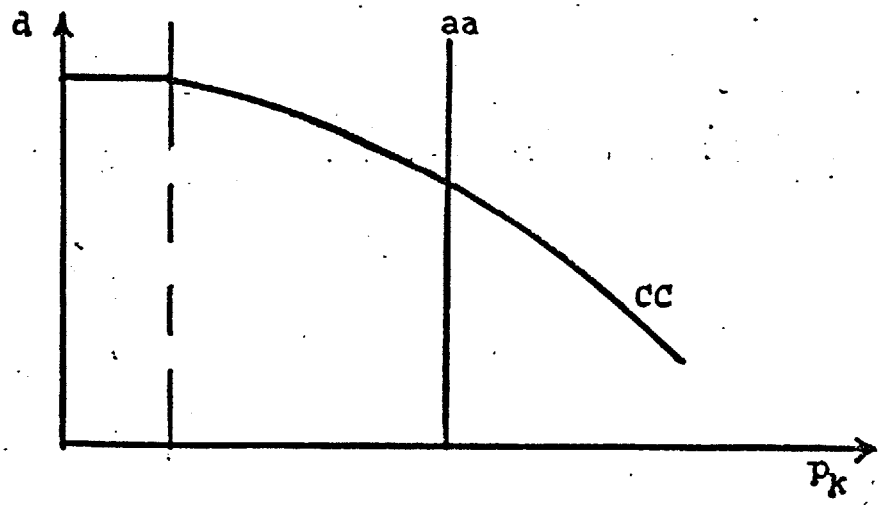
II.12°) $(he)/p_k = \beta q_I(k^T, p_k)$

The system is again defined by thirteen equations with thirteen unknowns, which describe the growth path of the economy under price stabilization through fiscal policy. A "neutral" monetary policy refers to a policy in which values of monetary variables are maintained constant.

## 2.1 Static Analysis

For the sake of simplicity, let us consider an easy workable function for the private demand for consumption goods, such as:

Fig.II.9



$$C^d = C^d\,[(1-\beta)k^T p_k + gp_m] + (1-s)[q(k^T, p_k) + (d + \pi_m g)p_m - e]$$

Then the market clearing condition becomes:

$$q_c(k^T, p_k) - (1-h)e = C^d\,[(1-\beta)k^T p_k + gp_m] + (1-s)[q(k^T, p_k) + (d + \pi_m g)p_m - e]$$

which can be solved with respect to "d"

$$\text{II.15)} \quad d = \frac{sq_c(k^T, p_k) + (h-s)e - (1-s)q_I(k^T, p_k)p_k - C^d(a)}{(1-s)p_m}$$

where: $a = (1-\beta)k^T p_k + gp_m$ = private wealth

Furthermore, the slope of II.15 in the $d, p_k$ space is: $\left.\frac{\partial d}{\partial p_k}\right|_{CC} < 0$

The assets market clearing equation is not affected by government deficit.[9] Thus, we can plot the cc and the aa schedules as shown in Figure II.9.

Again, we present the results of three simulations. First, we consider an increase in the government propensity to consume for any given level of government expenditure. Second, we take the government propensity as a constant, and we analyse the effects due to an increase in government expenditure. Third, the impact of a nationalization will be investigated.

### 2.1.1. Effects of an increase in the government propensity to consume

As shown in Figure II.10, a decrease in the government

Fig.10

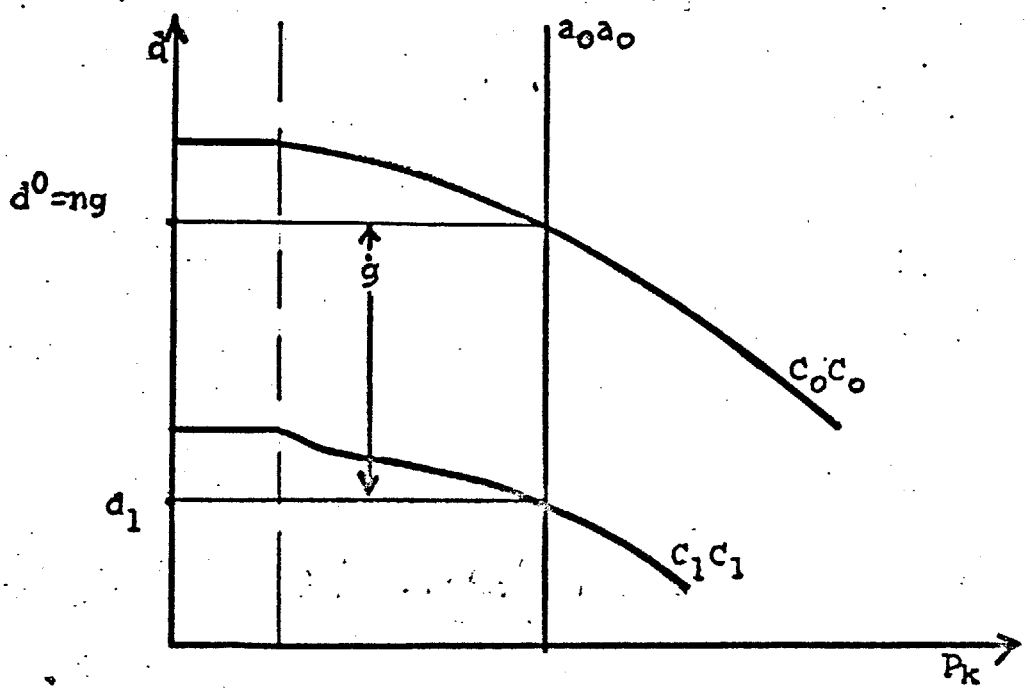
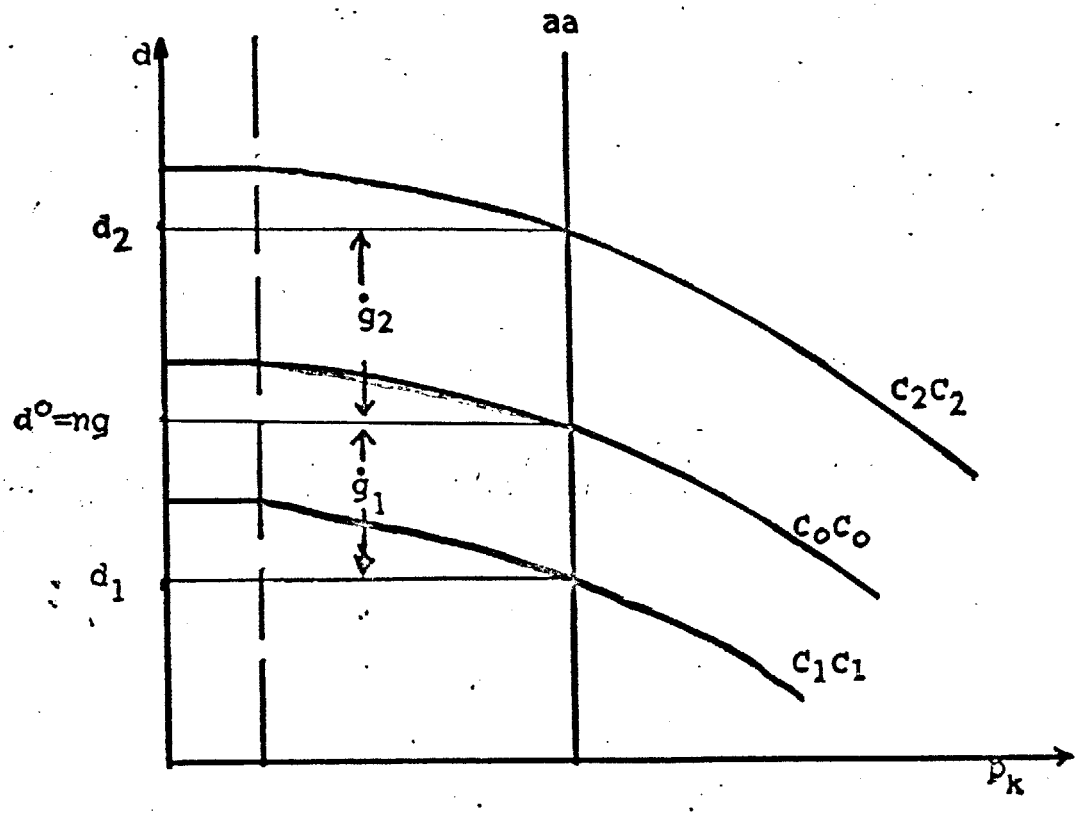


Fig.II.11



propensity to invest, h, does not affect the assets market clearing relation aa. In the consumption goods market, a higher government propensity to consume leads to a situation of excess demand. Hence, the cc schedule has to be lowered to $C_1C_1$. The government has to run a lower deficit, and $[\dot{g} = d^1 - ng]$ will be negative.

2.1.2. Effects of an increase in government expenditure

An increase in government expenditure brings no change to the asset market relation $a_oa_o$. On the other hand, the consumption goods schedule $C_oC_o$ is affected according to the difference between public and private propensity to consume. In Figure II.11, we plot the different situations, in which we have:

a) $C_1C_1$ if $(1 - h) < (1 - s) \rightarrow g_1 = (d_1 - ng) < 0$

b) $C_2C_2$ if $(1 - h) > (1 - s) \rightarrow g_2 = (d_2 - ng) > 0$

c) $C_oC_o$ if $(1 - h) = (1 - s) \rightarrow g_o = (d_o - ng) = 0$

2.1.3. Effects of an increase in the share of government owned capital

The static effect of a higher share of government owned capital determines an excess demand for capital in the assets market, and an excess supply of consumption goods. To clear the two markets, the price of capital, $p_k$, has to increase. See Figure II.12.

The new equilibrium condition implies a higher $p_k$ and either a lower or higher deficit. An interesting case could be the one given in

Fig.II.12

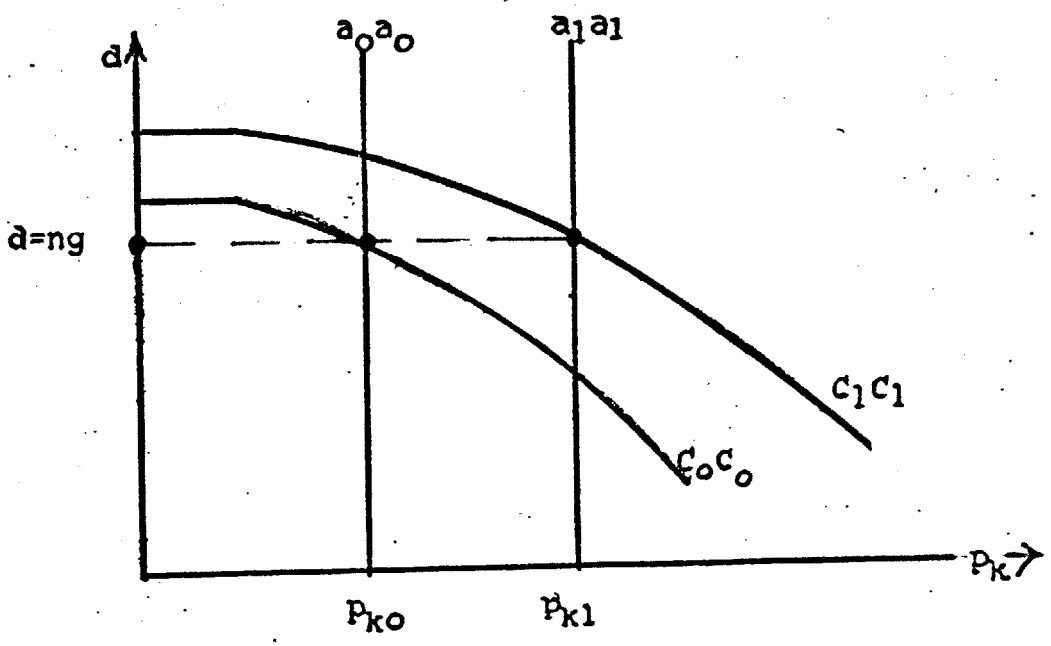


Figure II.12 in which the deficit does not move. The equilibrium condition is reached with a higher price of capital, $p_{k1}$.

## 2.2. Dynamic Analysis

Under price stabilization obtained through fiscal policy we may refer to the following dynamic relations:

$$\dot{k} = q_I(k^T, p_k) - (he)/p_k - nk \qquad \dot{g} = d - ng$$

As before, we assume condition II.12 still holds such that we can have either:

$$\dot{k} = (1 - \beta)q_I(k^T, p_k) - nk$$

or:

$$\dot{k}^G = \beta q_I(k^T, p_k) - nk^G$$

In the government debt relation we can substitute "d" by (II.15), and obtain:

$$\text{II.16)} \quad \dot{g} = \frac{sq_c(k^T, p_k) + (h-s)e - (1-s)q_I(k^T, p_k)p_k - C^d(a)}{(1 - s)p_m} - ng$$

We can prove that in the space g,k, the $\dot{k} = 0$ schedule is upward sloping since:

$$\text{II.17)} \quad \left.\frac{\partial g}{\partial k}\right|_{\dot{k}=0} = - \frac{\overset{(-)}{\frac{\partial q_I}{\partial k^T}\frac{\partial k^T}{\partial k}} + \overset{(-)}{\frac{\partial q_I}{\partial p_k}\frac{\partial p_k}{\partial k^T}\frac{\partial k^T}{\partial k}} + \frac{(1-h)e}{p_k}\frac{\partial p_k}{\partial k^T}\frac{\partial k^T}{\partial k} - n}{\underset{(+)}{(\partial q_I/\partial p_k)(\partial p_k/\partial g)} + \underset{(+)}{[((1-h)e/p_k^2)(\partial p_k/\partial g)]}} > 0$$

The $\dot{g} = 0$ may be either upward or downward sloping, since

II.18) $$\left.\frac{\partial g}{\partial k}\right|_{\dot{g}=0} =$$

$$\frac{\{s(\frac{\partial q_I}{\partial k^T}\frac{\partial k^T}{\partial k} + \frac{\partial q_I}{\partial p_k}\frac{\partial p_k}{\partial k^T}\frac{\partial k^T}{\partial k}) - (1-s)[(\frac{\partial q_I}{\partial k^T}\frac{\partial k^T}{\partial k} + \frac{\partial q_I}{\partial p_k}\frac{\partial p_k}{\partial k^T}\frac{\partial k^T}{\partial k})p_k + \frac{\partial p_k}{\partial k^T}\frac{\partial k^T}{\partial k}q_I] - R\}}{\{s(\frac{\partial q_c}{\partial p_k}\frac{\partial p_k}{\partial g}) - (1-s)[\frac{\partial q_I}{\partial p_k}\frac{\partial p_k}{\partial g}p_k + \frac{\partial p_k}{\partial g}q_I] - \frac{\partial C^d}{\partial a}\frac{\partial a}{\partial g}\}}$$

$$\gtrless 0$$

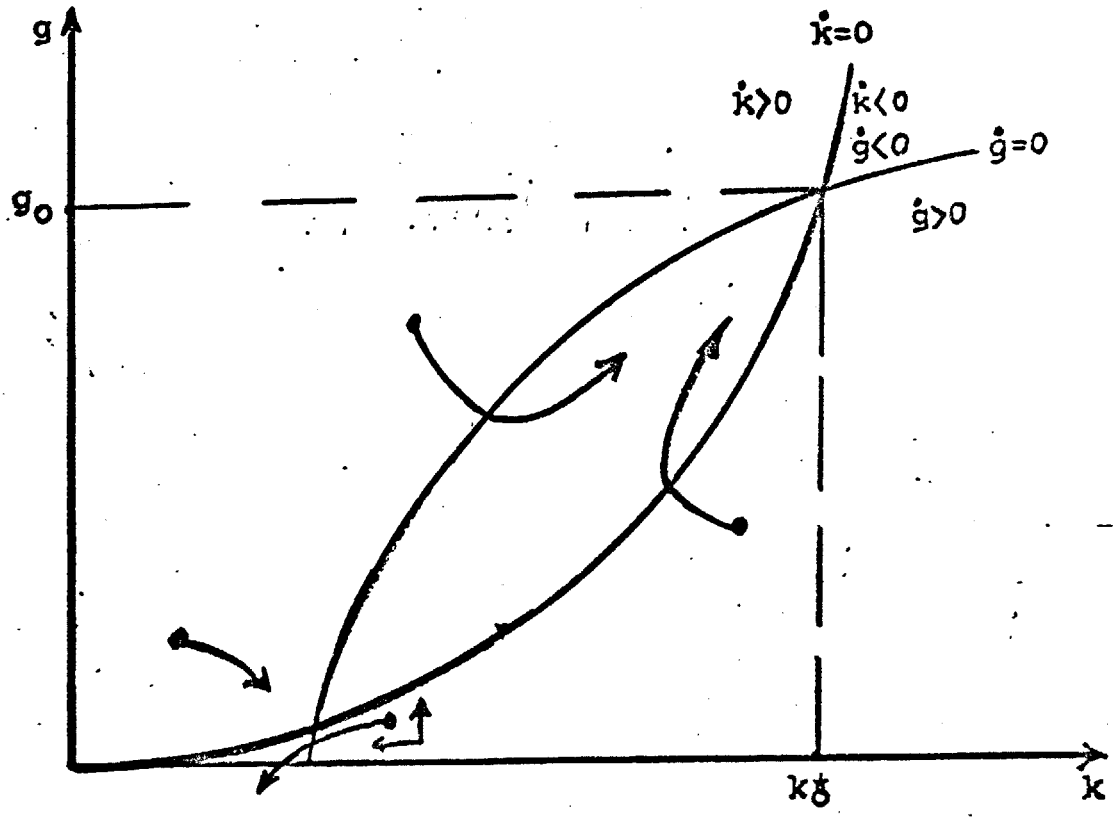
where: $$R = \frac{\partial C^d}{\partial a}\frac{\partial a}{\partial k^T}\frac{\partial k^T}{\partial k}$$

Thus, we must make the following assumptions:

- the wealth and income effect, due to an increase in g, on the price of capital, $p_k$, are in the same direction, such that $(\partial p_k/\partial g)$ is negative
- <u>either</u>: the wealth effect with respect to k in the numerator of (I.33) is smaller than all the other effects, and the wealth effect due to "g" in the denominator of (I.33) is smaller than the other effects, i.e.:

$$\left.\frac{\partial g}{\partial k}\right|_{\dot{g}=0} = \frac{(+)}{(+)} > 0$$

Fig.II.13



- or both the wealth effects with respect to k and g are strong enough to outweigh the other effects in the numerator and in the denominator of (I.33), i.e.:

$$\left.\frac{\partial g}{\partial k}\right|_{\dot{g}=0} = \frac{(-)}{(-)} > 0$$

Then, we can plot in Figure II.13, the schedule $\dot{g}=0$ as upward sloping.

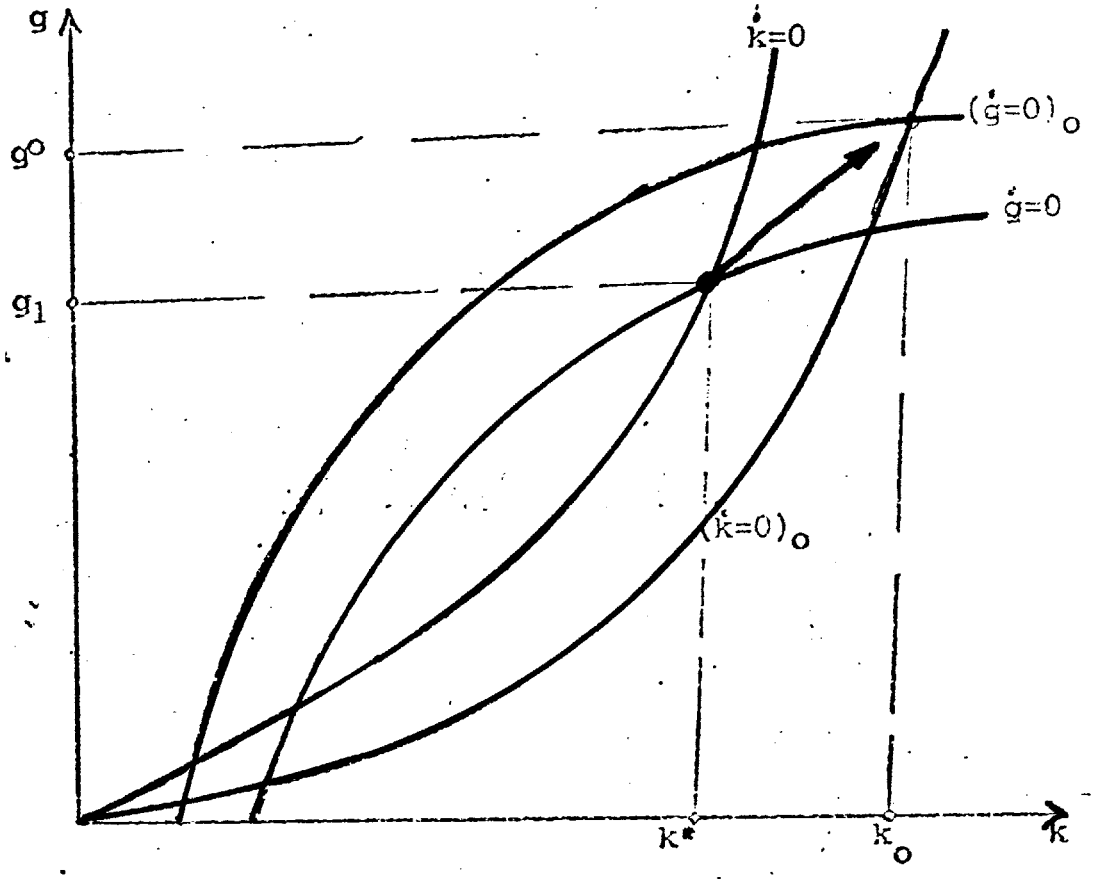
2.2.1. The effects of an increase of the government propensity to consume

If the government increases its propensity to consume both $\dot{k}=0$ and $\dot{g}=0$ will be affected. Indeed, at the previous $\dot{g}=0$, a positive rate of change in government debt will result and the new $(\dot{g}=0)_o$ will shift upward. Along $\dot{k}=0$, $\dot{k}$ is positive, $(1-h)e$ is decreased, and the curve will shift rightward to $(\dot{k}=0)_o$, as shown in Figure II.14. Thus, the system will have a higher steady state private intensity of capital and a higher stock of government debt.

2.2.2. A balanced increase in government expenditure and propensity to consume with a constant flow of government investment

Consider now that the government increases its total expenditure without increasing its demand for investment goods, i.e. an increase in e and a decrease in h cause the quantity (he) to remain constant. If this is the case, $\dot{k}=0$ does not move. Since, in the $\dot{g}=0$ schedule we have the term $(h-s)e$, at the old $\dot{g}=0$, $\dot{g}>0$, then the curve

Fig.II.14



will shift to the $(\dot{g}=0)_o$. See Figure II.15. Both the intensity of private capital and the stock of government debt will increase in the steady state conditions.

2.2.3. An increase in the share of government owned capital

The effects of an increase in the share of government capital, $\beta$, under price stabilization through fiscal policy will be analyzed using two different hypotheses.

In the first case, the government performs a nationalization increasing $\beta$, but <u>does not</u> adjust its propensity to save to the new required equilibrium. Both $\dot{k}=0$ and $\dot{g}=0$ are affected through the price of capital, $p_k$. In (I.24) an increase in $\beta$ leads to an increase in $p_k$, and in the old schedule $\dot{k}>0$. The new $(\dot{k}=0)_o$ is to the right of the old. In (II.16) an increase in $p_k$ makes $\dot{g}<0$ and the relative schedule shifts rightward, as in Figure II.16.

The shift rightward on the $\dot{g}=0$ schedule can lead to $(\dot{g}=0)_o$ or $(\dot{g}=0)_1$, i.e. it can lead to a higher or lower intensity of private capital. Consider the point on $(\dot{k}=0)_o$ corresponding to k*. At that point, the intensity of private capital is the same as in the initial situation, <u>but</u> as $\beta$ is higher, $k^T$ is also higher. Further, the increase in $\beta$ has caused an increase in $p_k$ such that the value of $\dot{g}$ depends on these results as well as on the lower g. Indeed, in (I.31) we have:

$q_C \rightarrow$ increasing by $(\partial q_c/\partial k^T)$ and decreasing by $(\partial q_c/\partial k^T)$

$q_I \rightarrow$ decreasing by $(\partial q_c/\partial k^T)$ and increasing by $(\partial q_c/\partial p_k)$

Fig.II.15

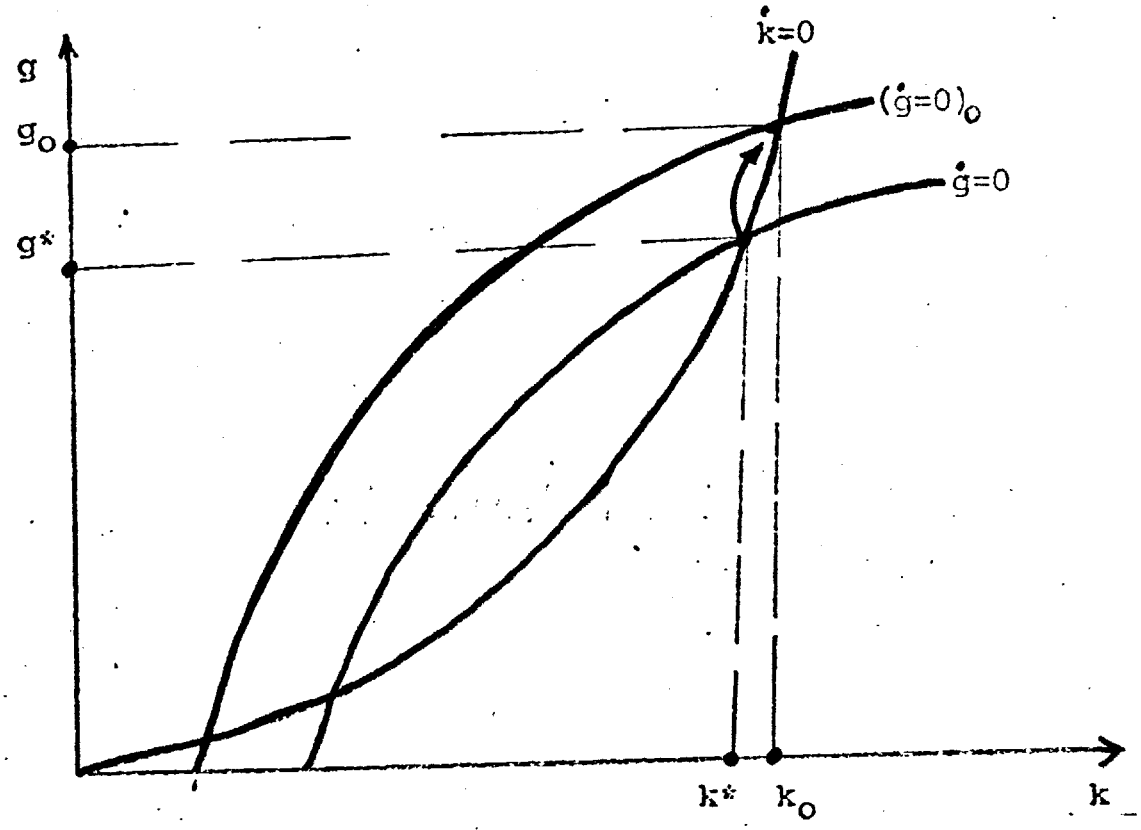
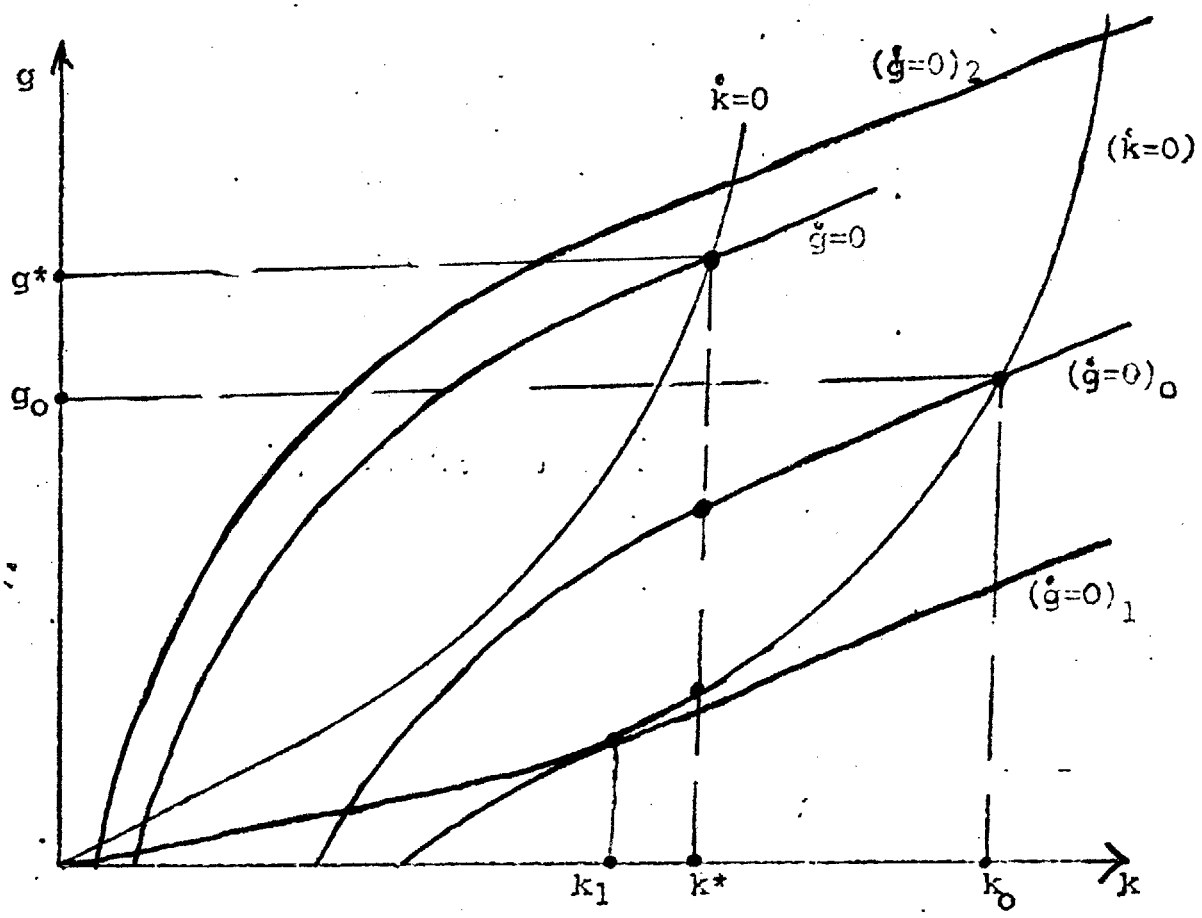


Fig.II.16



$p_k$ → increased

a → increasing with $p_k$, even if k* is not changed

g → decreased

Thus, we have:

either: $\dot{g} > 0 \rightarrow (g = 0)_o$

if $|(\partial q_c/\partial k^T)| > |(\partial q_c/\partial p_k)|$ and $|(\partial q_I/\partial p_k)| > |(\partial q_I/\partial k^T)|$

and the net difference between the two, if negative, is outweighed by the decrease in g;

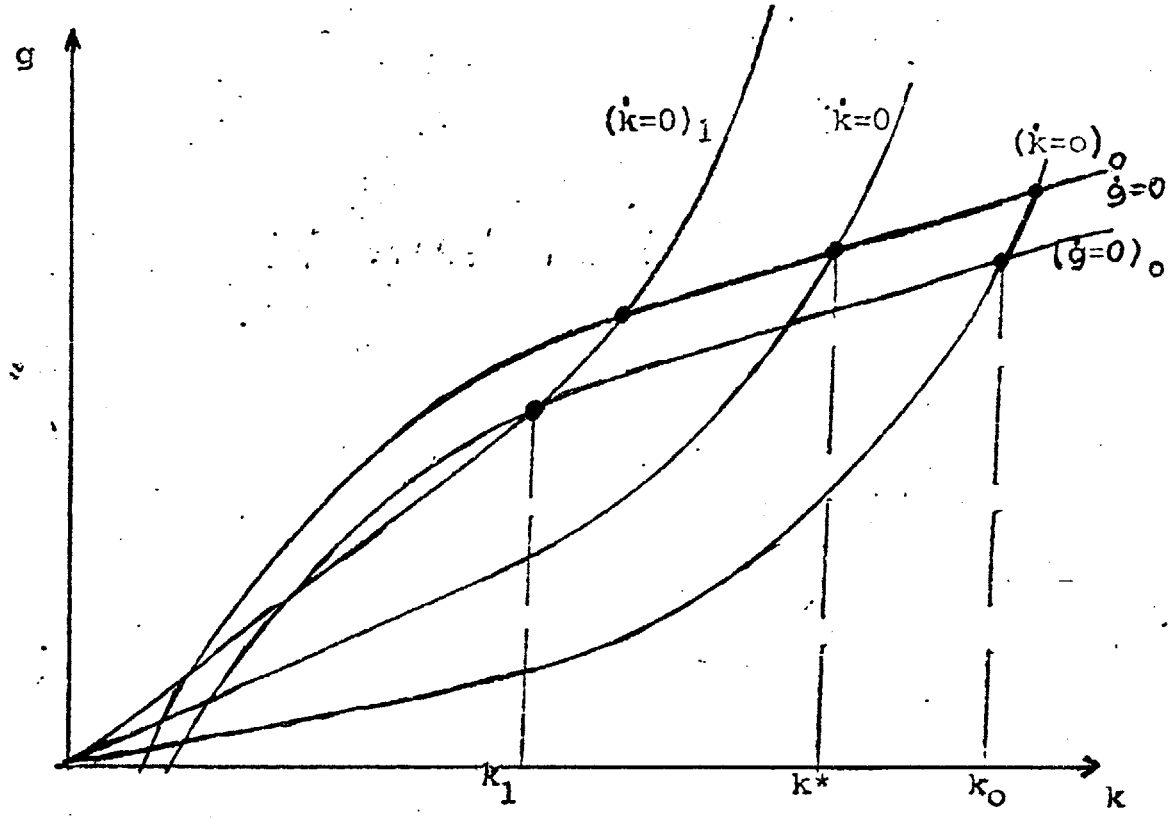
or: $\dot{g} < 0 \rightarrow (g = 0)_1$

if the effect of the increase in $p_k$ is strong enough to outweigh the effect of the increase in $k^T$ on the production of investment goods, and the related increases in $p_k$ and in $q_I$ outweigh the effects on $q_c$ and g. In any case, the inclusion of wealth in (II.16) makes $(\dot{g}=0)_o$ more likely.

In an extreme case, the wealth effect could outweigh any other effect such that $\dot{g}$ has to shift upward to $(\dot{g}=0)_2$. The steady state intensity of private capital will then increase further. The second case is the possibility of government increasing $\beta$ and adjusting h to maintain the higher share of capital in the long run.

The net effect on the $\dot{k}$ schedule depends on the increase in the production of investment goods caused by the increase in $p_k$ and by the effect on the term (he) of an increased h. As shown in Figure II.17, we can have:

Fig.II.17



$(k=0)_o$ if the production of investment goods increases more than the net increase in $(he)/p_k$ due to both h and $p_k$;

$(k=0)_1$ if the other case holds.

If the wealth effect is excluded, on the $\dot{g}$ we have a decrease in $q_c$ and an increase in $q_I$ due to the higher $p_k$. Then, if the increase in (h-s)e does not outweigh the previous effect, $\dot{g}<0$, and shifts downward to $(\dot{g}=0)_o$. The steady state intensity of private capital either increases to $k_o$ or decreases to $k_1$. The effect on g is uncertain.

Finally, to consider the wealth effect on (II.16) we should refer to the decrease of private wealth, due to the higher $\beta$, and to its increase due to the higher $p_k$. Even in this case, the new steady state solution for the intensity of privately owned capital and government debt is uncertain.

### 3. Perfectly Anticipated Inflation and Government Investment Programs

In the previous sections, we tested the performance of the model for price stabilization through monetary and fiscal policy. We turn now to consider policies stabilizing the rate of change of price, $\pi_m$. We will also test the interactions between government investment programs and the steady state conditions of the intensity of private capital and the rate of inflation.

The complete model is:

II.1*) $\dot{k} = q_I(k^T, p_k) - (he)/p_k - nk$ (a)

II.1*) $\dot{k}^G = q_I(k^G, p_k) - nk$ (b)

where we assume:

$$\text{II.12)} \quad (he)/p_k = \beta q_I(k^T, p_k)$$

Furthermore:

$$\text{II.2*)} \quad \dot{g} = d - ng$$

$$\text{II.3*)} \quad p_k = \phi(\gamma, k, \beta, \pi_m, \pi_k, x)$$

$$\text{II.4*)} \quad i = \psi(\gamma, k, \beta, \pi_m, \pi_k, x)$$

$$\text{II.5*)} \quad q_c(k^T, p_k) - (1-h)e = C^d\{[(1-\beta)k^T p_k + gp_m]\} + (1-s)$$
$$[q(k^T, p_k) + \dot{\gamma} + n\gamma - e]$$

$$\text{II.6*)} \quad \pi_m = \pi_m^* \qquad \text{II.7*)} \quad \pi_k = 0$$

$$\text{II.8*)} \quad p_m = p_m^* \qquad \text{II.9*)} \quad e = e^*$$

and according to the policy used:

<u>either</u>: II.10*) $d = d^*$ <u>or</u>: II.10*bis) $x = x^*$

We have to point out the substitution:

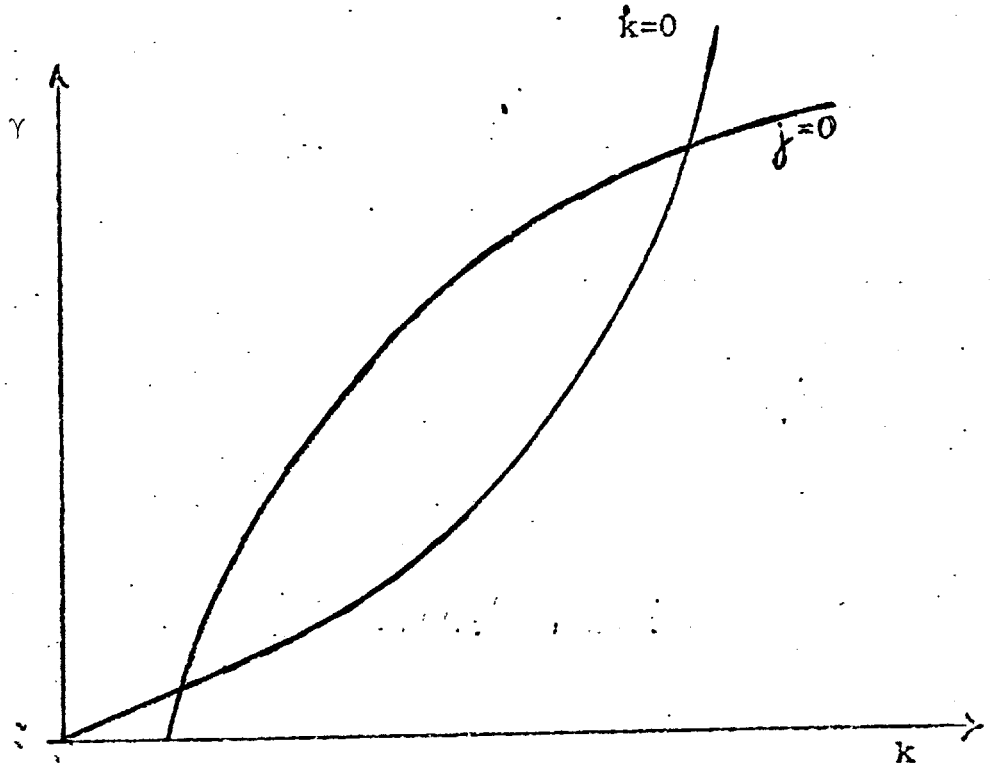
$$(d + \pi_m g)p_m = \dot{\gamma} + n\gamma$$

in the equation (II.5*), which can now be solved for $\dot{\gamma}$ :

$$\text{II.19)} \quad \dot{\gamma} = 1/(1-s)\{q_c[k^T, \phi(\gamma, k^T, \beta, \pi_m, x)] - (h-s)e - [(1-s)$$
$$q(k^T, \phi(k^T, \gamma, \beta, \pi_m, x)] - C^d(a) - n\gamma\ \}$$

Thus, through (II.1*) and (II.19) we can plot in the $\gamma$,k space the relations $\dot{\gamma}=0$ and $\dot{k}=0$. The f.o.c. are:

Fig.II.18



$$\text{II.20)}\quad \left.\frac{\partial\gamma}{\partial k}\right|_{\dot{k}=0} = -\frac{(\partial q_I/\partial k^T)(\partial k^T/\partial k)+(he/p_k^2)(\partial p_k/\partial k^T)(\partial k^T/\partial k) - n}{(\partial q_I/\partial p_k)(\partial p_k/\partial\gamma) + (he/p_k^2)(\partial p_k/\partial\gamma)} > 0$$

$$\text{II.21)}\quad \left.\frac{\partial\gamma}{\partial k}\right|_{\dot{\gamma}=0} =$$

$$\frac{\left[\frac{\partial q_c}{\partial k^T}\frac{\partial k^T}{\partial k} + \frac{\partial q_c}{\partial p_k}\frac{\partial p_k}{\partial k^T}\frac{\partial k^T}{\partial k} - (1-s)\frac{\partial q}{\partial k^T}\frac{\partial k^T}{\partial k} - \frac{\partial q}{\partial p_k}\frac{\partial p_k}{\partial k^T}\frac{\partial k^T}{\partial k} - \frac{\partial C^d(a)}{\partial k^T}\frac{\partial k^T}{\partial k}\right]\frac{1}{1-s}}{\left[\frac{\partial q_c}{\partial p_k}\frac{\partial p_k}{\partial\gamma} - (1-s)\frac{\partial q}{\partial p_k}\frac{\partial p_k}{\partial g} - \frac{\partial C^d(a)}{\partial p_k}\frac{\partial p_k}{\partial\gamma}\right]\frac{1}{1-s} - n} > 0$$

These relations can be expressed graphically as in Figure II.18.

In the next section we analyze the case in which fiscal policy is used to stabilize the rate of inflation. We leave aside the role of monetary policy, which largely follows the line of fiscal policy.

3.1 The effects of an increase in the government share of capital

A sudden increase in the government share of capital, $\beta$, through nationalization, affects our two dynamic relations (capital accumulation; stock of government debt). If an increase in $\beta$ is not followed by any change in the government propensity to consume, the effects on $\dot{k}=0$ will depend only on the increase in the price of capital, $p_k$. A higher price of capital increases the production of investment goods and decreases the government demand for investments in terms of their own price. Thus, at the previous points $\dot{k}>0$, the schedule has to shift to the right

to $(\dot{k}=0)_o$. The increase in $p_k$, due to a higher $\beta$, enters the $\gamma$-equation in three ways.

- by decreasing the production of consumption goods
- by increasing total income, g
- by increasing private wealth, a

Then $\dot{\gamma}$ becomes negative and shifts rightward to $(\dot{\gamma}=0)_o$ as in Figure II.19.

We will now verify the condition under which the $\dot{k}=0$ schedule shifts more than the $\dot{\gamma}=0$ schedule leading to a higher intensity of private capital under steady state conditions.

At the point corresponding to k* on the $(\dot{k}=0)_o$ we have:

- a higher $p_k$ due to the increase in $\beta$
- a higher $k^T$, because for the same k*, $\beta$ is increased
- a lower $\dot{\gamma}$, so that $\dot{\gamma} > 0$ at the point on $(\dot{k}=0)_o$ corresponding to k* if:
- the net effect on the price of capital, due to an increased $\beta$, and a decreased $\gamma$ is a decrease in $p_k$.

If we do not consider any wealth effect, we have:

either: an increase in the production of consumption goods, the element $n\gamma$ decreased and the total income decreased (the effect on $p_k$ is stronger than the one on $k^T$)

or: income effects are completely outweighed by the other two effects.

If the combination of all these effects is such that $\dot{\gamma}<0$ at the

Fig.II.19

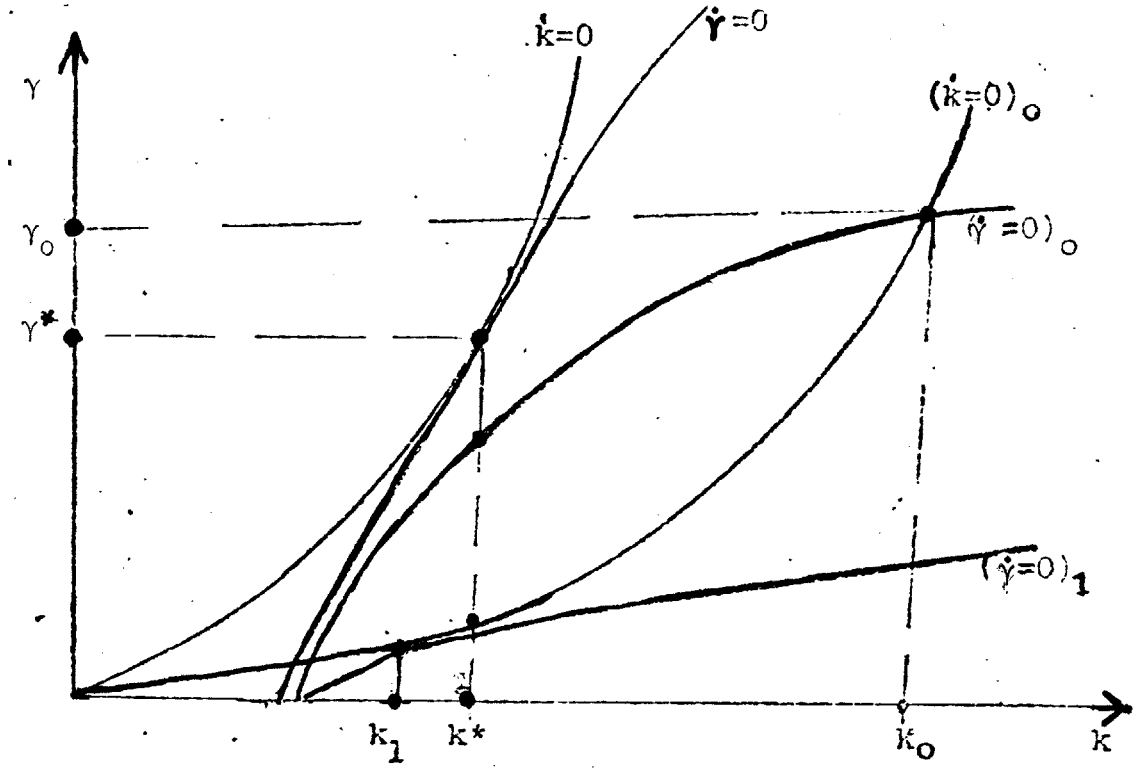
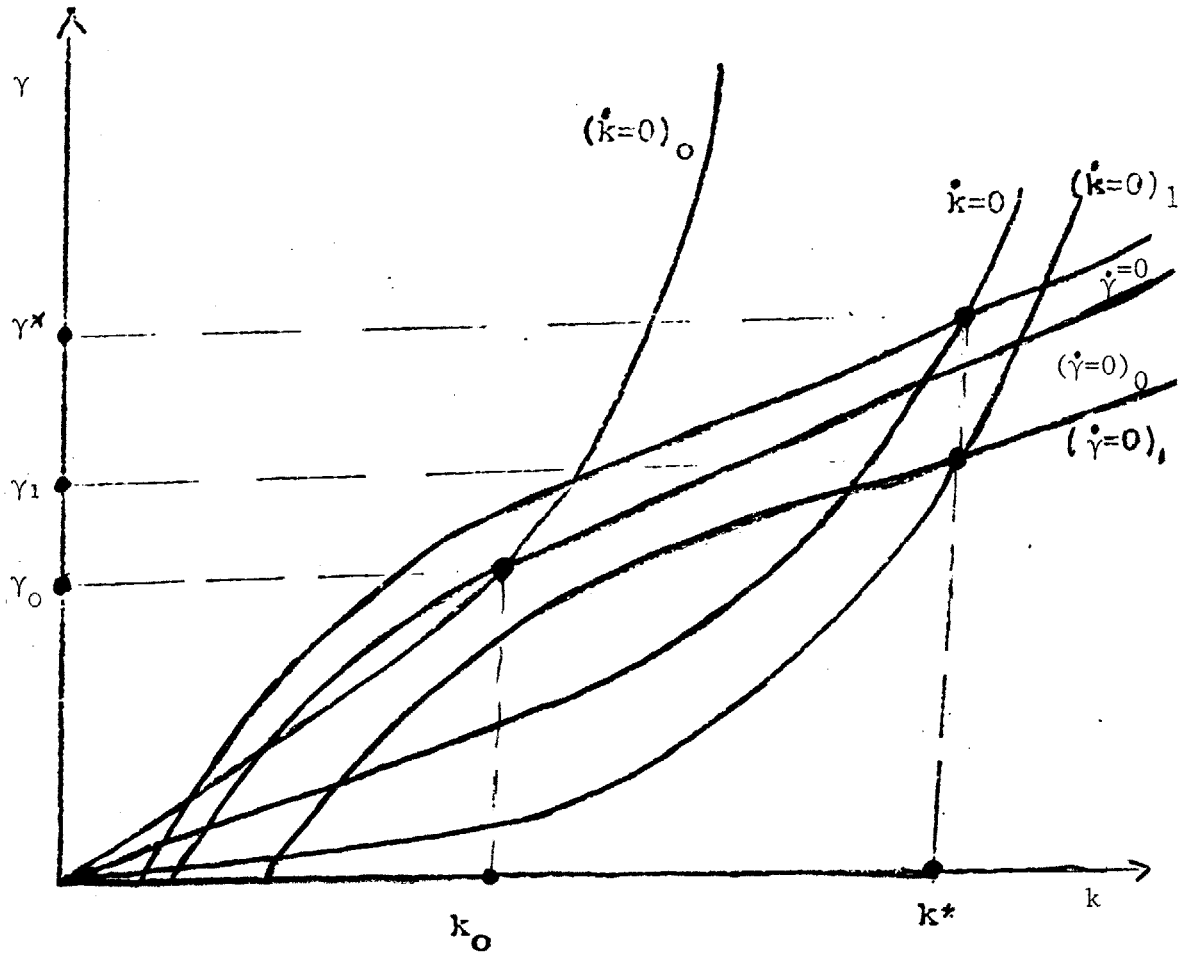


Fig.II.20


γ
$(\dot{k}=0)_0$
$\dot{k}=0$
$(\dot{k}=0)_1$
$\dot{\gamma}=0$
$\gamma^*$
$(\dot{\gamma}=0)_0$
$(\dot{\gamma}=0)_1$
$\gamma_1$
$\gamma_0$
$k_0$
$k^*$
k

point on $(\dot{k}=0)_o$ corresponding to k*, the $\dot{\gamma}=0$ schedule shifts further to the right to $(\dot{\gamma}=0)_1$, and the steady state intensity of private capital decreases. This situation becomes more likely if we take into account the wealth effect of the price of capital, $p_k$, and the total intensity of capital, $k^T$.

### 3.2. Government investment programs, inflation, and the intensity of private capital

In this section, we consider the case of government announcing a permanent increase in its propensity to invest in order to increase $\beta$ in the long run, given the target of maintaining a constant rate of inflation, $\pi_m = \pi_m^*$.

The increase in h leads to a $\dot{k}<0$ , and the new schedule shifts leftward. In the $\dot{\gamma}$ schedule, a decrease in (1-h) makes $\dot{\gamma}=0$ negative. Then it shifts to the right to $(\dot{\gamma}=0)_o$, as in Figure II.20. The intensity of private capital in the steady state condition decreases to $k_o$.

Consider now the hypothesis that the government announces an increase in the rate of inflation, i.e. a decrease in $\pi_m$. A lower $\pi_m$ makes $\dot{k}$ positive, as a result of the increase in the production of investment goods. On the other hand, the $\dot{\gamma}$ schedule is made negative, because the decrease in $\pi_m$ increases $p_k$, which leads to a decrease in the production of consumption goods, and an increase in both income and wealth. The two schedules shift rightward.

Under these hypotheses, the government can provide a program of investment, "financing" it through inflation in a way such that the long

run intensity of private capital remains unaffected. This is the case of $(\dot{k}=0)_1$ and $(\dot{\gamma}=0)_1$ in Figure II.20.

Clearly, the given result depends on:

- the size of the investment program and the size of the increase in the government propensity to invest, h
- the related level of the perfectly anticipated rate of inflation
- the relative sensitivity of the $\dot{k}$ and $\dot{\gamma}$ schedules to both the government propensity to invest, h, and the rate of deflation $\pi_m$.

As a side result, a lower steady state real value of the government debt will be obtained.

### 4. Imperfectly Anticipated Inflation and Government Corporation Investment Programs

In the previous sections, we proposed a two-sector growth model for the case of a mixed economy. Government expenditure was for both consumption and investment goods, such that a government share of physical assets could be maintained in the long-run. Under the full employment hypothesis that we considered, room for government capital was proved to be available so long as higher rates of inflation could be borne by the whole economy. Indeed, the intensity of private capital need not have been reduced if government investment programs were correctly processed together with traditional fiscal and monetary tools.

The framework developed in previous sections was limited to the

cases in which the government aimed to fully control the price of money or its rate of change, i.e. a zero or a perfectly given rate of inflation were considered. Beyond that, any change in the price of capital was not included, i.e. the possibility and the effects of capital gains in both the assets and goods market were ruled out. Although convenient for analytical purposes, such a framework cannot be considered sufficiently close to positive conditions.

Under a market economy, government agencies can take decisions that are "independent" from the rest of the system only in an ex-ante situation. Different forces and sharing of power will indeed produce ex-post solutions that are not under full government control.

Therefore, to complete the analysis for the case of a mixed closed economy we need to consider the possibility of the government using its fiscal-monetary policy tools and performing investment programs, but no longer being able to control prices, which are now determined by the market.

The first section will consider expectation rules on the price of money, $p_m$, taking the price of capital, $p_k$, as constant. Later, expectations of changes in the price of capital, $p_k$, will be introduced.

Previous solutions have already pointed out the relations between the intensity of private capital and the real value of government debt. Therefore, whatever the market behavior, we already know that the steady-state rate of inflation has to be equal to the rate of growth of per capita nominal government debt.

Indeed, a constant steady-state value of the intensity of private

capital is not sustainable under a changing "real" value of debt.

The government could always run different deficits, affecting both its own debt and its share of the capital stock until such a share, $\beta$, is led either to zero or to one.

Because the government uses fiscal and monetary tools that do not stabilize in full the price level, the price of money, $p_m$, is derived from market behavior expressed by the shifting equilibrium relations in the assets market, aa, and in the consumption market, cc. A model of expectations regarding the rate of inflation is now needed. For the sake of simplicity, we assume an adaptive expectation behavior to be followed in the market, as shown in (II.6**).

The complete model, assuming imperfectly anticipated inflation, is then given by:

II.1**) $\dot{k} = q_I(k^T, p_k) - (he/p_k) - nk$

II.1**$_{bis}$) $\dot{k}^G = \beta q_I(k^T, p_k) - nk^G$

where relation (II.12) $he = \beta p_k q_I$ is assumed to hold

II.2**) $\dot{g} = d - ng$

II.3**) $p_k = \phi(\gamma, k^T, \beta, \pi_m, \pi_k, x)$

II.4**) $i = \psi(\gamma, k^T, \beta, \pi_m, \pi_k, x)$

II.5**) $q_c(k^T, p_k) - (1-h)e = C^d[(1-\beta)k^T p_k + gp_m] + (1-s)$

$(q + \dot{\gamma} - n\gamma - e)$

II.6**) $\dot{\pi}_m = \alpha(\dot{p}_m/p_m - \pi_m)$

II.7**) $\pi_k = 0$ II.8**) $x = x^*$ II.9**) $e = e^*$

II.10**) $d = (\theta + n)g$ II.11**) $k^T = k + k^G$

Once again we have a complete system of thirteen equations with thirteen unknowns.

4.1 Static Analysis

The static performance of the model is given by the $p_m p_k$ and i values. All the other variables are taken as given. In particular:

- $k^T$, k $\beta$, g, $\pi_m$ are given by historic values
- $\pi_k = 0$ is assumed
- e, x, d are given by government decisions
- h follows condition (II.12)

Therefore, the assets market relations are:

II.22) $p_k = \phi(\gamma, k^T, \beta, \pi_m, x^*)$

II.23) $i = \psi(\gamma, k^T, \beta, \pi_m, x^*)$

The equilibrium condition, aa, can be plotted in the $p_k$,$\gamma$ space. As previously shown, such a relation is upward sloping, since $\partial p_k/\partial\gamma$ has already been proved to be positive. It is also upward shoping with respect to increases in the share of government owned capital.

On the other hand, the shape of the consumption market equilibrium relation is dependent on both the rate of deflation and the rate of growth in the nominal stock of government debt, $\theta$.

Since, in the long run, the condition $\dot{\gamma} = 0$ implies

$(\dot{g}/g) = -(\dot{p}_m/p_m)$, in the following consumption market relation:

$$\text{II.24)} \quad q_c - (1-h)e^* = C^d[(1-\beta)k^T p_k + \gamma] + (1-s)[q + (\theta+n+\pi_m)\gamma - e^*]$$

the value of the term $(\theta + n + \pi_m)$ is positive. In this situation an increase in $\gamma$ increases disposable income and leads to excess demand for consumption goods. Hence the price of capital, $p_k$, has to decrease to clear the market again. Then, the equilibrium relation will be downward sloping, as shown graphically in Figure II.21.

The role of the government share of capital, $\beta$, and of the government propensity to save, h, can easily be described. An increase in $\beta$ requires a higher price of capital to clear the assets market. If the wealth effect is ruled out, no shift will be experienced in the consumption goods market. Hence a lower money value of government debt, $\gamma$, will be produced together with a higher price of capital, as shown by the schedule of $a_1a_1$ in Figure II.22.

If wealth is included in the demand conditions for consumption goods, then a higher $\beta$, decreasing the share of private capital and wealth, leads to an excess supply. An upward movement in cc is needed and an unclear effect on the real value of debt is produced.[4]

On the other hand, the effect of a higher government propensity to invest, h, will always be determined with respect to both $p_k$ and $\gamma$. Notice, the assets market is not affected by the movement of h. In the consumption goods market, an excess supply follows from an increase in the government propensity to invest. The cc schedule shifts upward and increased values of $p_k$ and $\gamma$ will clear both markets.

Hence, the following conditions (II.25) can be stated:

$\partial p_k / \partial \beta > 0 \qquad \partial \gamma / \partial \beta < 0 \rightarrow$ if no wealth effect

$\partial p_k / \partial \beta > 0 \qquad \partial \gamma / \partial \beta \gtrless 0 \rightarrow$ if wealth effect is included

$\partial p_k / \partial h > 0 \qquad \partial \gamma / \partial h > 0 \rightarrow$

$\partial p_m / \partial h > 0 \qquad \partial p_m / \partial \beta < 0 \rightarrow$ if no wealth effect

$\partial p_m / \partial h > 0 \qquad \partial p_m \; \partial \beta \gtrless 0 \rightarrow$ if wealth effect is included

Equations II.25

Fig.II.21

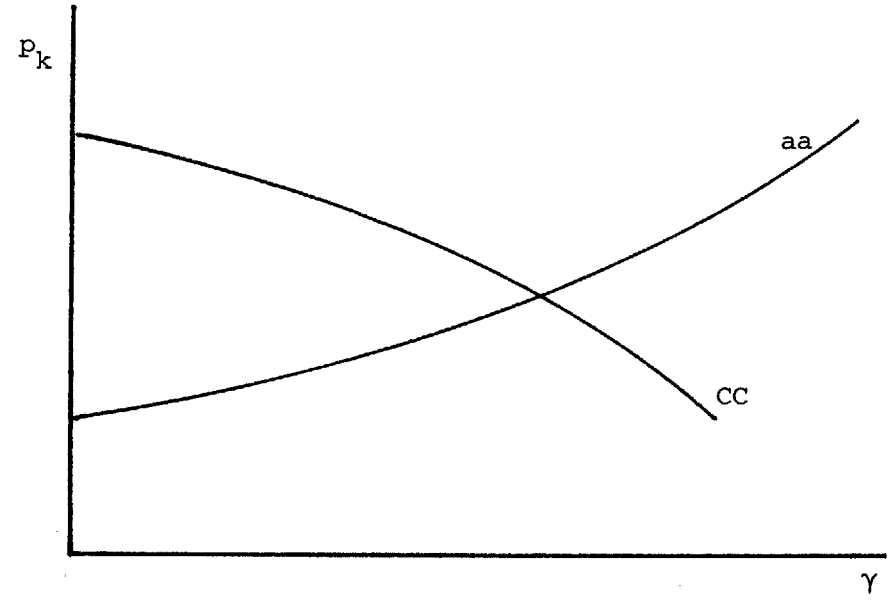
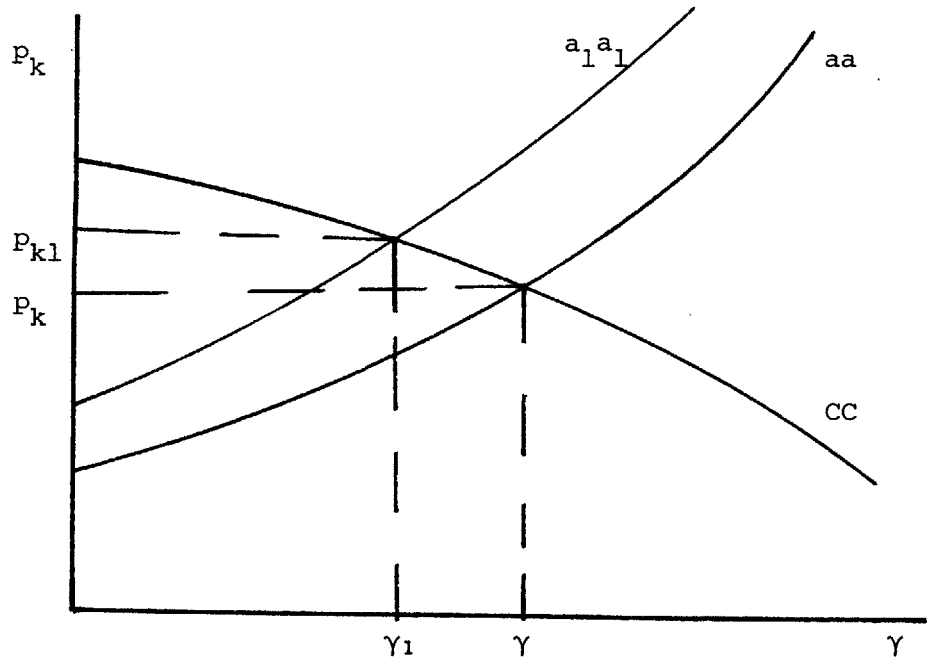



Fig.II.22



4.2 Dynamic analysis

The dynamic conditions of the complete model under imperfectly anticipated inflation are fully determined by the differential equation of the expected rate of inflation and the private capital accumulation.

By differentiating (II.22) and substituting it into (II.6**) we obtain:

$$\text{II.26)} \quad \dot{\pi}_m = \alpha[(1/\gamma)(\partial\gamma/\partial k^T)(\dot{k}/(1-\beta)) - \theta - \pi_m]/[1-\alpha(1/\gamma)(\partial\gamma/\partial\pi_m)]$$

Then, given $\beta$, $\theta^*$, $e^*$ $x^*$, the expected variation of the inflation rate $\dot{\pi}_m$ is a function of $\pi_m$ and k.

The second dynamic condition is the usual private capital intensity:

$$\text{II.27)} \quad \dot{k} = q_I(k^T, p_k) - he/p_k - nk$$

which can be expressed <u>either</u> as:

$$\text{II.27')} \quad \dot{k} = (1-\beta)q_I - nk$$

if (II.12) holds, <u>or</u> as:

$$\text{II.27")} \quad \dot{k} = q_I - nk^G - nk = q_I - nk/(1-\beta)$$

if the target is to maintain a given per capita intensity of government capital rather than a fixed share, $\beta$.

In the $\pi_m$,k space, there is no definite way of determining the shape of these functions. Hence, to work out a possible solution of the system, some further assumptions need to be made.

Along the $\dot{k}$ relation we have:

$$\text{II.28)} \quad \left.\frac{\partial k}{\partial \pi_m}\right|_{\dot{k}=0} = \frac{\frac{\partial q_I}{\partial p_k}\frac{\partial p_k}{\partial \pi_m} - \frac{he}{p_k^2}\frac{\partial p_k}{\partial \pi_m}}{\frac{\partial q_I}{\partial k^T}\frac{\partial k^T}{\partial k} + \frac{\partial q_I}{\partial p_k}\frac{\partial p_k}{\partial k^T}\frac{\partial k^T}{\partial k} - \frac{he}{p_k^2}\frac{\partial p_k}{\partial k^T}\frac{\partial k^T}{\partial k} - n}$$

which is positive or negative according to whether:

$$\text{II.29)} \quad |(\partial q_I/\partial p_k)| \lessgtr |(he/p_k^2)|$$

Therefore, given the effects of the price of capital, $p_k$, on the production of investment goods, the higher the per-capita government expenditure the more likely is it that the $\dot{k}=0$ schedule will be upward sloping. Alternatively, given "e" constant, the higher the government propensity to invest, the more likely it is that $[\partial k/\partial \pi_m|_{\dot{k}=0}]$ will be positive. As we shall see, in both these situations, the system is more likely to experience unstable conditions.

Let us turn now to analyze the $\dot{\pi}=0$ slope. Such a relation holds if:

$$(1/\gamma)(\partial \gamma/\partial k^T)(\dot{k}/(1-\beta)) = \theta + \pi_m$$

Therefore, an increase in $\pi_m$ makes $\dot{\pi}_m$ negative, both because of the increased value of the right hand variables and because of a reduced $p_k$, which decreases the production of capital goods, i.e. $\dot{k}/(1-\beta)<0$.

However, this outcome depends on the sign of the denominator in (II.26). Hence, the $\dot{\pi}_m=0$ schedule may be downward sloping if either

$\partial\gamma/\partial\pi < 0$ or, in the case that it is positive, a very small $\alpha$ moves it below one. Since $\alpha$ is the value of the speed of adjustment of expectations on $\pi_m$, with respect to actual prices, this result shows that the faster the adjustments are undertaken, the more likely it is that the $\dot{\pi}_m=0$ schedule will be upward sloping, and the more likely it is that the system will become unstable.

Now we can state:

$$\text{II.30)} \quad \left.\frac{\partial k}{\partial \pi_m}\right|_{\dot{\pi}_m=0} = -\left[\frac{\partial k}{\partial \pi} - \frac{1}{(1/\gamma)(\partial\gamma/\partial k^T)(\partial k^T/\partial k)(\partial k/\partial k)}\right] < 0$$

The two schedules and the stability conditions are presented in Figure II.23, panels a, b and c.

Some interesting findings can now be outlined. Following condition (II.29), we know that the higher the per capita government expenditure, the higher is the share of government capital, $\beta$, i.e. the higher is its propensity to buy capital goods according to (II.12), the more likely will the $\dot{k}=0$ schedule be upward sloping. But the higher the slope of the $\dot{k}=0$ schedule with respect to the $\dot{\pi}_m=0$ schedule, the more likely is it that the system will become unstable as the three panels show.

The effect on instability of the speed of adjustment of expectations, $\alpha$, seems to be minor compared to the effect of the size of government expenditure. Indeed, even if $\alpha$ is high enough to give an upward slope to the $\dot{\pi}_m=0$ relation, it does not always lead to instability, as can be seen in Figure II.23, panel d.

Fig.II.23

panel (a)

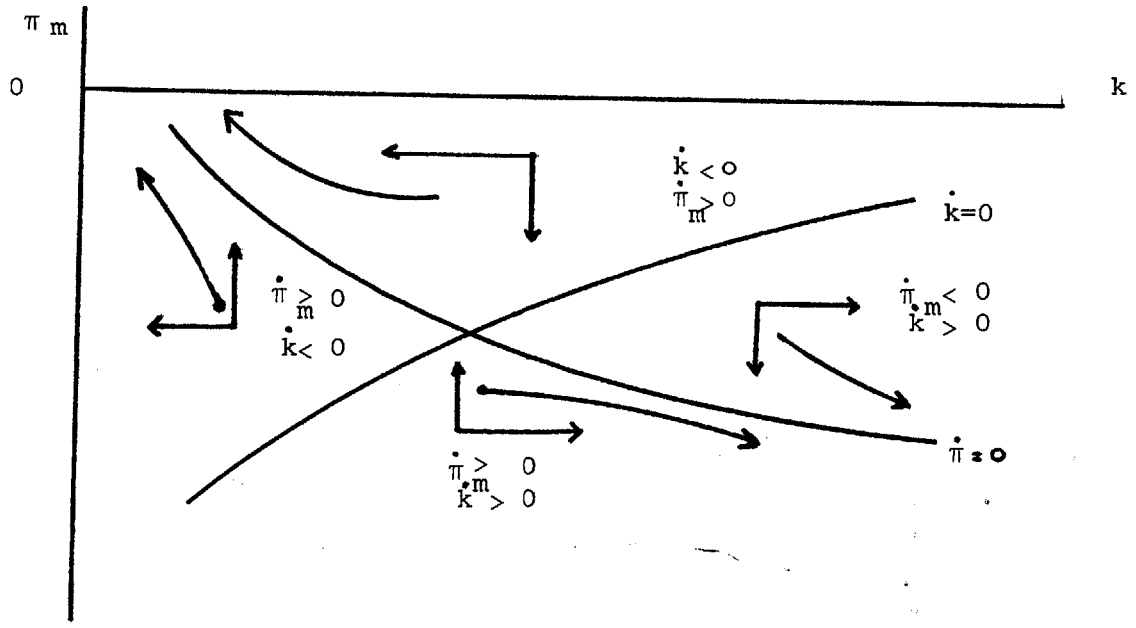


Fig.II.23 - panel (b)

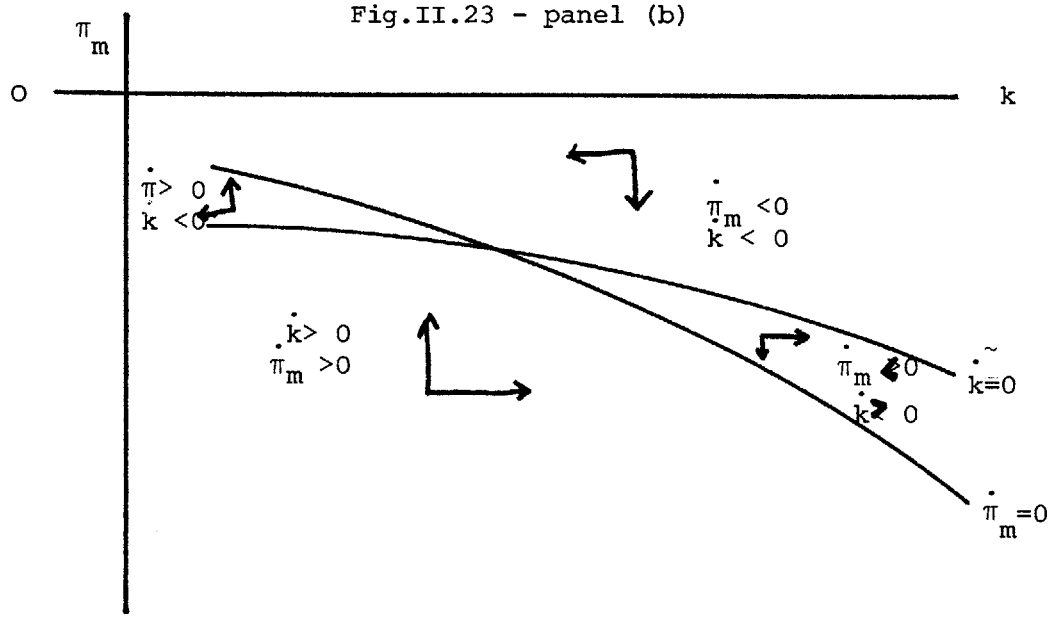



Fig.II.23 - panel (c)

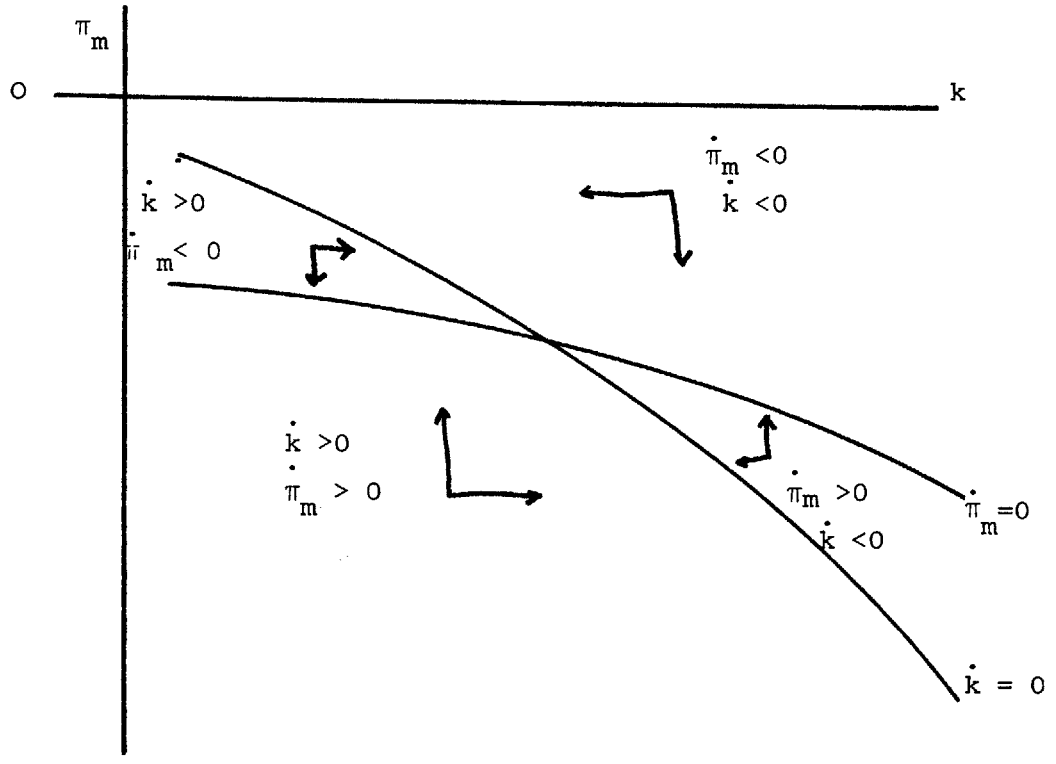
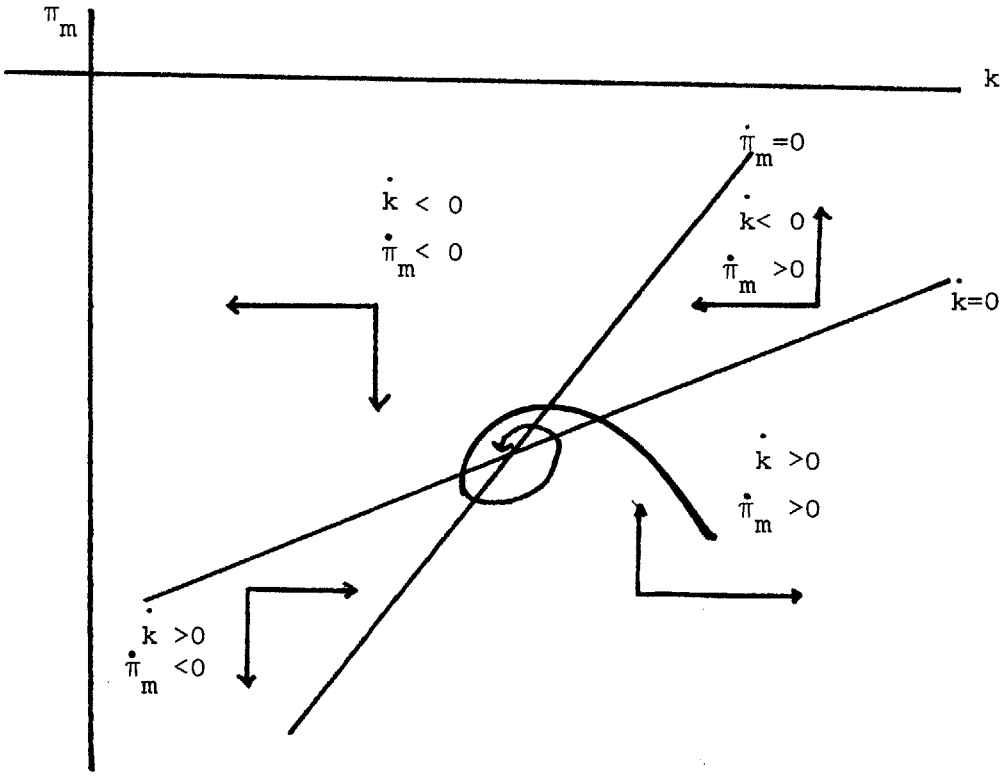


Fig.II.23 - panel (d)



4.3. Effects of an increase in the government propensity to save

An increase in the government propensity to save enters the $\dot{k}=0$ schedule without affecting the $\dot{\pi}_m=0$ relation.

Indeed, a higher government propensity to invest out of a given expenditure, e*, makes $\dot{k}<0$, and the related schedule shifts to the left, provided the negative slope case holds. As can be seen in Figure II.24, a lower intensity of private capital and a lower rate of inflation will represent the new steady-state solution.

However, as we have just seen, the higher the government propensity to invest, the more likely it is that the system will become unstable. See case $(\dot{k}=0)_2$.

4.4. Effects of an increase in the government share of capital

A once and for all nationalization leading to an instantly increased $\beta$ affects both the dynamic relations. Indeed, because the price of capital is increased by the decreased share of physical assets available to the private sector, the $\dot{k}$ schedule will show positive values at the old zero points. Hence, an upward movement will be necessary to reach the new $\dot{k}=0$. The $\dot{\pi}_m$ becomes positive, too, and an upward shift will restore it to zero value. Not surprisingly, therefore, an uncompensated nationalization may lead to an increased per capita intensity of private capital. Indeed, an excess demand of capital in the asset market will cause $p_k$ to increase, and production of investment goods will then be stimulated. In addition, a higher rate of inflation

Fig.II.24

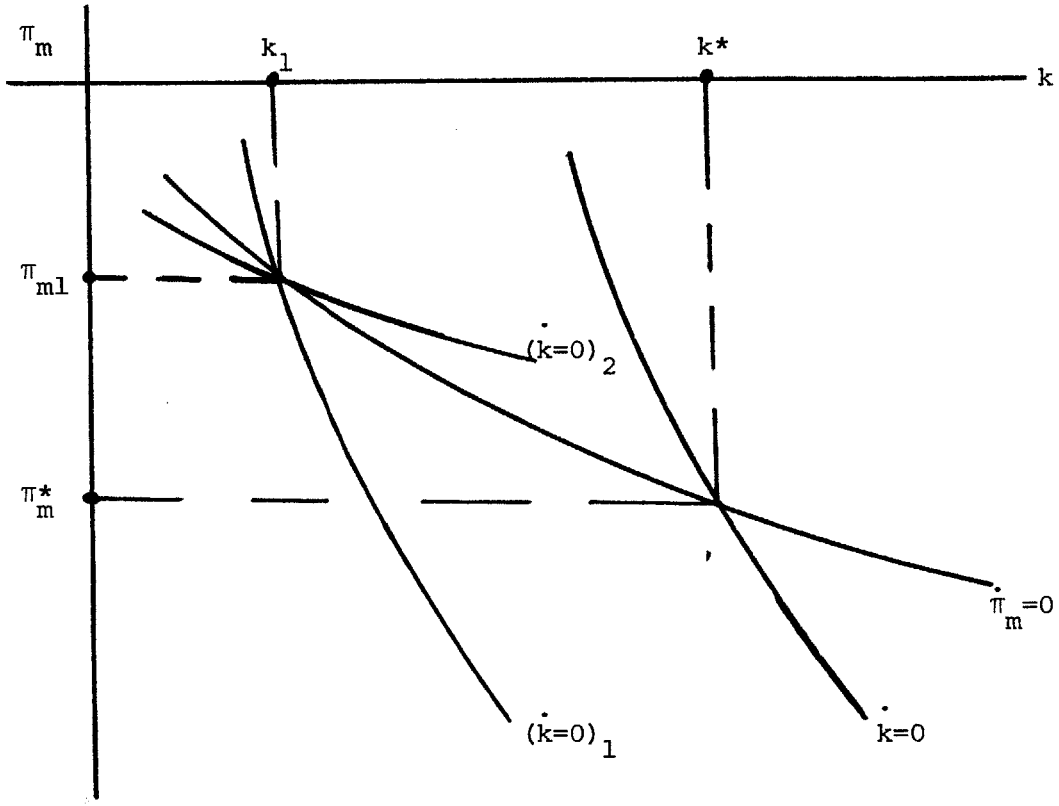
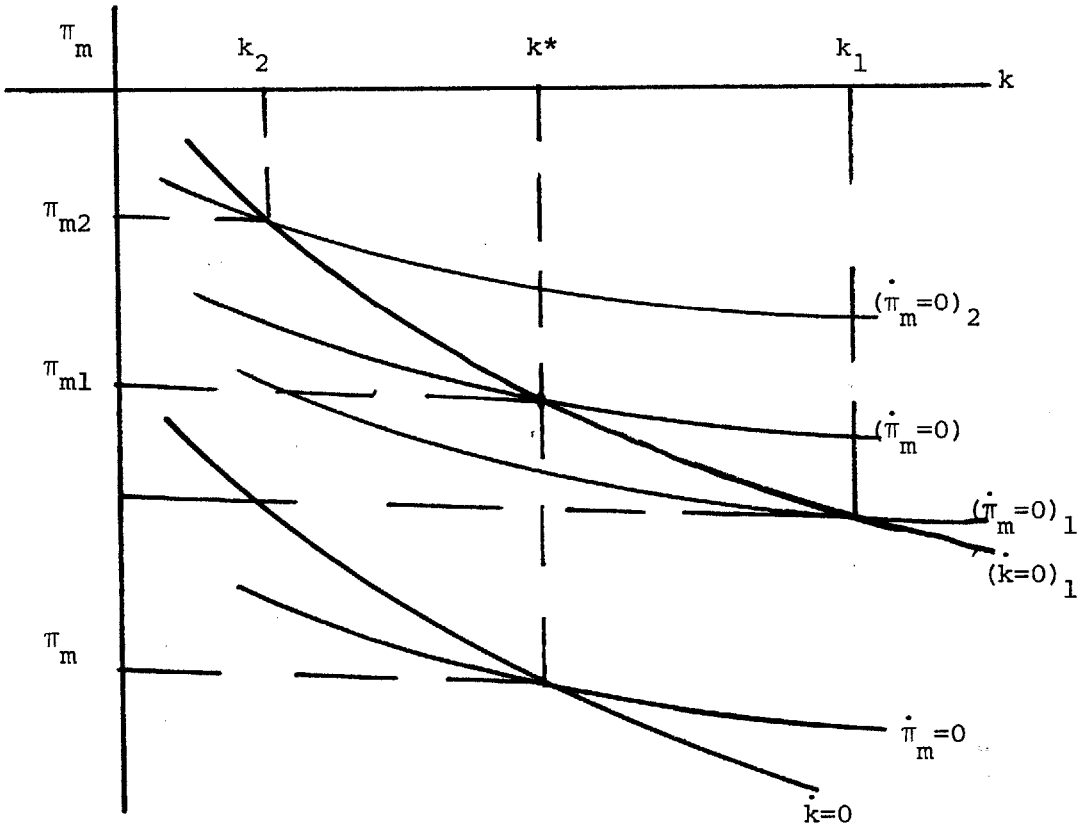


Fig.II.25


$\pi_m$
$k_2$
$k^*$
$k_1$
$k$
$\pi_{m2}$
$(\dot{\pi}_m=0)_2$
$\pi_{m1}$
$(\dot{\pi}_m=0)$
$(\dot{\pi}_m=0)_1$
$(\dot{k}=0)_1$
$\pi_m$
$\dot{\pi}_m=0$
$\dot{k}=0$

results, also contributing to the stimulation of private decisions to hold physical assets.

While such results are possible, there is still some uncertainty as case $(\dot{k}=0)_2$ proves in Figure II.25.

Let us work out such a case in some detail.

If we consider the shift in $\dot{k}=0$ , at k* in $(\dot{k}=0)_1$, we can have <u>either</u> $\dot{\pi}_m>0$, in which case the new steady state will refer to a higher intensity of private capital as in $k_1$; <u>or</u> $\dot{\pi}_m<0$ which leads to a reduced k at $k_2$.

Now, according to (II.26), since $\dot{k}=0$ at k*, $\pi_{m1}$, the sign of $\dot{\pi}_m$ will be given by:

$$\frac{-\theta-\pi_{m1}}{1-\alpha(1/\gamma)(\partial\gamma/\partial\pi_m)} \gtrless 0$$

Therefore, the intensity of private capital will be reduced. This means that $\pi_m<0$ at k*, $\pi_{m1}$, if the nominal rate of growth of the government debt is higher than the rate of inflation at k* along $(\dot{k}=0)_1$, or if the speed of adjustment of expectations, $\alpha$, is very high, making the denominator of (II.26) negative. An interesting result is related to the possibility that private capital intensity will be increased if at k*, $\pi_{m1}$, the rate $\theta$ is higher than $\pi_{m1}$, while a high speed of adjustment, $\alpha$, leads to a negative denominator such that the ratio becomes positive, i.e. the $\dot{\pi}_m=0$ schedule shifts at some $(\pi_m=0)_1$. In this situation, the intensity of private capital increases, and the rate of inflation decreases.

4.5. Government investment programs, imperfectly anticipated inflation and the intensity of private capital

We have already proved the possibility of "available room" for an investment program under perfectly anticipated inflation.

Fiscal and monetary rules to be followed in such a case were made explicit.

We will now repeat the experiment for the much more attractive situation in which the government does not have full control over the price level and the rate of inflation.

An increase in the government share of capital, $\beta$, with a contemporaneous increase in the government propensity to invest, h, in order to maintain $\beta$ at its new high level affects both relations $\dot{\pi}_m$ and $\dot{k}$.

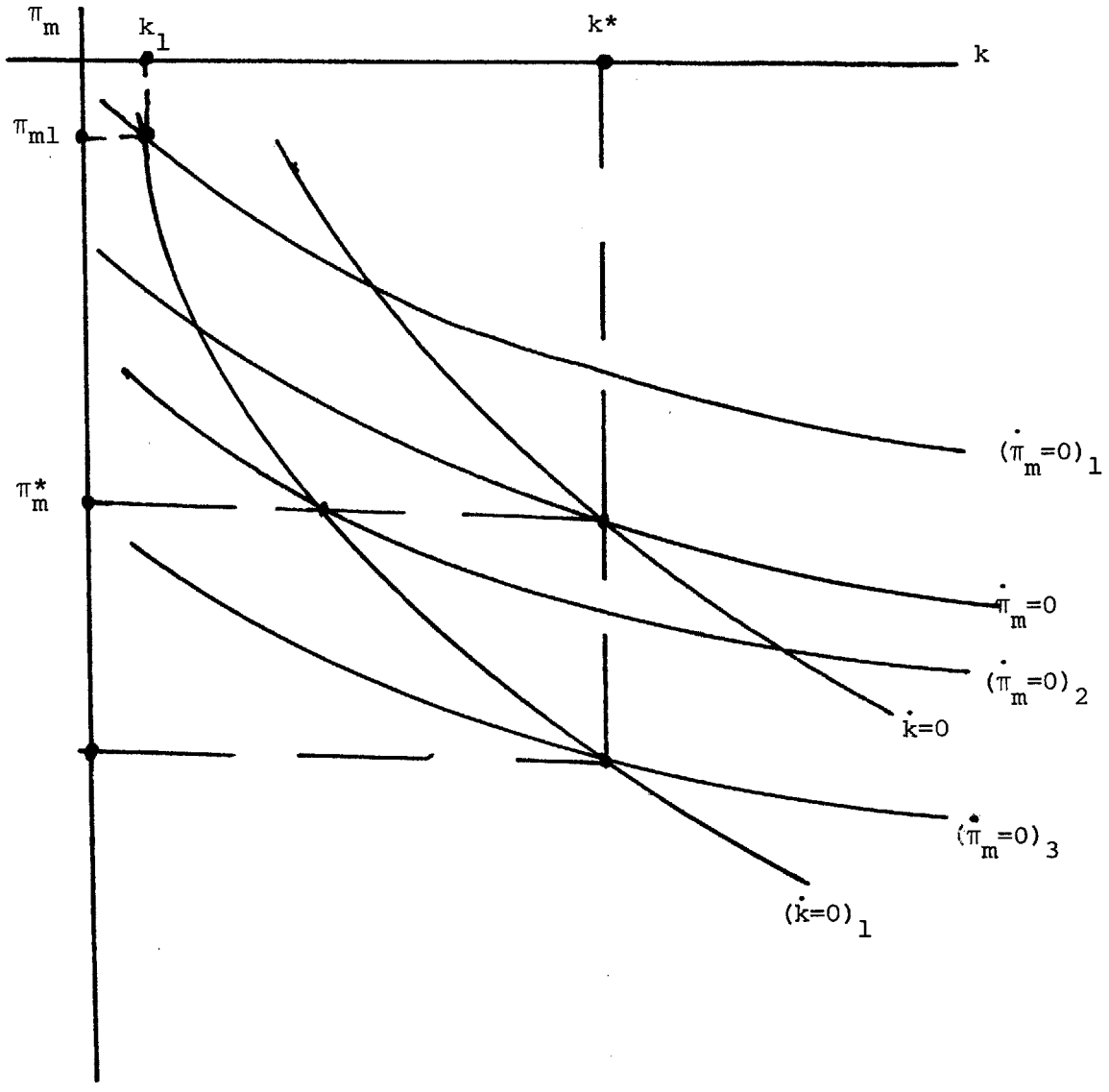
The private capital accumulation condition obtains negative values due to the increase in h. Thus, the $\dot{k}=0$ schedule shifts downward to the left. As before, an increase in $\beta$ determines a positive $\dot{\pi}_m$, and the zero values will be met at a higher level.

Figure II.26 shows the new situation.

Once again the effect is to reduce the intensity of private capital and the rate of inflation.

It is interesting to note that this effect can be avoided if the government increases the rate of growth of nominal debt, $\theta$. This will lead to an increased $\pi_m$ which, by entering the $\dot{\pi}_m=0$ schedule, will shift it downward to some $(\pi_m=0)_3$.

Fig.II.26


$\pi_m$
$k_1$
$k^*$
$k$
$\pi_{m1}$
$\pi_m^*$
$(\dot{\pi}_m=0)_1$
$\dot{\pi}_m=0$
$(\dot{\pi}_m=0)_2$
$\dot{k}=0$
$(\dot{\pi}_m=0)_3$
$(\dot{k}=0)_1$

Therefore, if the government does not control in full the rate of inflation, but general adaptive expectations are met, the possibility of performing government investment programs without affecting private capital intensity is open as it was in the case of a perfectly anticipated inflation. However, between government investment and a higher rate of inflation, a trade-off still has to be borne.

5. Expectations on Capital Gains

The last working assumption we must remove in order to complete the test of the full model presented in Chapter 1 is the exclusion of capital gains.

Expectations of changes in the price of capital, $p_k$, are clearly limited to short run analyses. In fact, once a steady state is reached, a given $p_k$ will hold and zero capital gains will be expected. However, as we have seen in the previous section, the inclusion of the expectation element affects the long run solution. This is mainly due to the stability conditions of the steady state growth.

To simplify the analysis, let us consider a price level stabilization target met by the government through the use of monetary and fiscal policy.

From previous solutions, we may state the assets market equilibrium conditions as:

II.31) $p_k = \phi(\gamma, k^T, \beta, \pi_m, \pi_k, x)$ where $\partial p_k/\partial \pi_k > 0$

II.32) $i = \psi(\gamma, k^T, \beta, \pi_m, \pi_k, x)$ where $\partial i/\partial \pi_k \lesseqgtr 0$

and the consumption market equilibrium condition as:

$$\text{II.33)} \quad q_c - (1-h)e = C^d[(1-\beta)k^T p_k + gp_m] + (1-s)[q + (d + \pi_m g)p_m - e + \pi_k p_k k^T(1-\beta)]$$

The standard slopes of the two schedules still apply. (See Figure II.27).

In such a situation, the effects of the government carrying out a once and for all nationalization, increasing $\beta$ without affecting h, refer to both schedules. The consumption goods market is affected through reduced income and wealth. Hence, a situation of excess supply has to be matched. Therefore, the price of capital increases and the cc schedule shifts upward.

In the assets market, an excess demand of physical capital follows an uncompensated nationalization. There, too, the price of capital has to be raised. Therefore, the new equilibrium is reached at an increased level of the price of capital. An uncertain effect on the price of money is the result.

More complex is the case of a government pursuing a higher share of capital through a higher propensity to invest out of expenditure.

Within the consumption goods market, such an operation affects both demand and supply. If we exclude the wealth effect, the final result depends on the following conditions:

II.34) (a) $(1-h'+h)e = \pi_k p_k k^T(1-\beta'+\beta) \rightarrow$ No effect

(b) $(1-h'+h)e = \pi_k p_k k^T(1-\beta'+\beta) \rightarrow$ Excess supply

(c) $(1-h'+h)e = \pi_k p_k k^T(1-\beta'+\beta) \rightarrow$ Excess demand

Fig.II.27

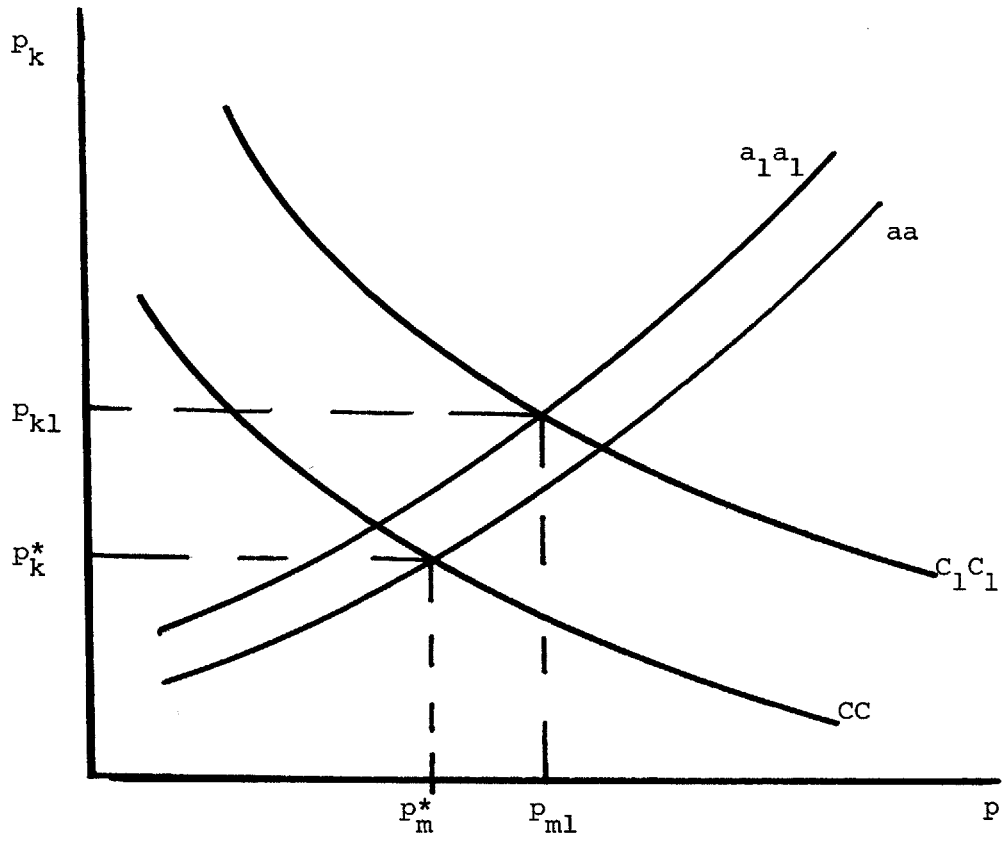
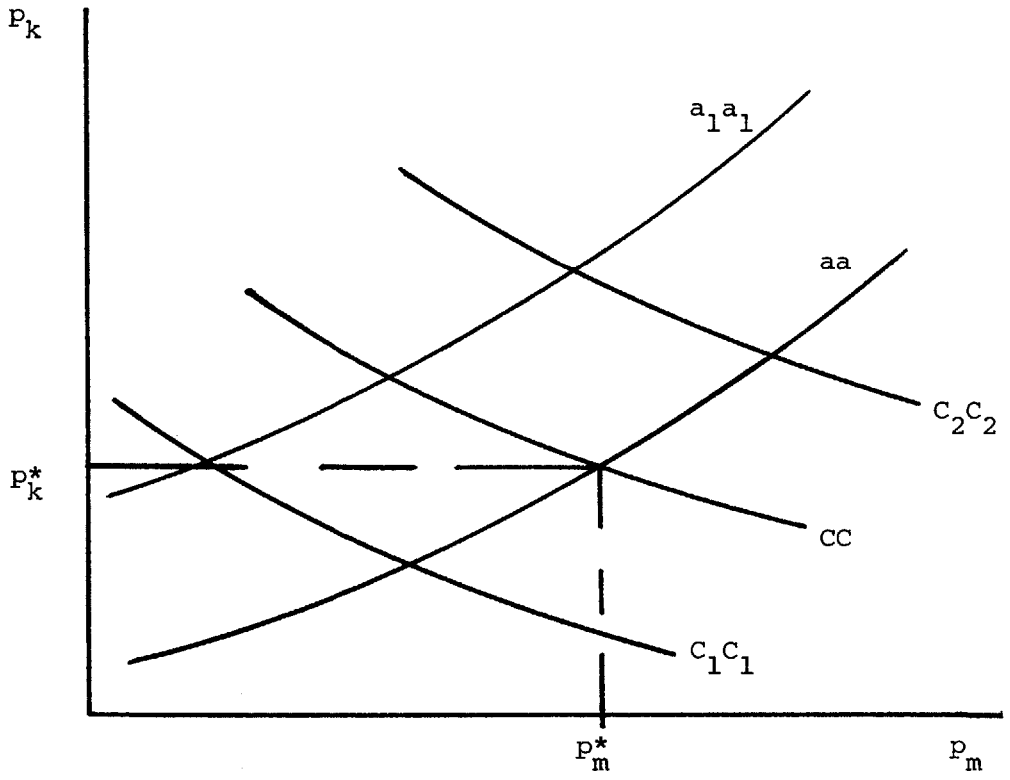


Fig.II.28



where h', $\beta$' are the new policy variables.

Therefore, the cc schedule can shift in either direction or even not move at all. The aa schedule will, instead, have to make a unique movement upward to fill the excess demand of capital.

Thus, as presented in Figure II.28, many solutions are possible.

Under the $c_1c_1$ case, $p_m$ decreases, and $p_k$ may either decrease or increase. An opposite situation will occur if the cons-mption market clearing equation moves upward to match the excess supply. The price of capital will this time increase, while $p_m$ will still be subject to an uncertain result.

5.1. Stabilization policy through monetary and fiscal tools

Once monetary policy is used to stabilize the price of money at $p_m$*, the price of capital $p_k$ will no longer be determined within the assets market, but will be fixed by the conditions of the consumption goods market. If we reconsider Figure II.39 as referring to the uncompensated nationalization leading to a higher $p_m$, from $p_m$* to $p_{m1}$, in order to stabilize the price of money, the government has to perform an open market purchase to move the assets market clearing relation to $a_2a_2$. In this case, a lower "i" will lead individuals to demand more capital, and a higher $p_k$ at $p_{k2}$ will be needed to meet such excess demand. We refer to such a case in Figure II.29, adapted from Figure II.27.

As shown, the new equilibrium level of $p_{k2}$ is determined by the shape of the consumption market clearing equation cc.

Fig.II.29

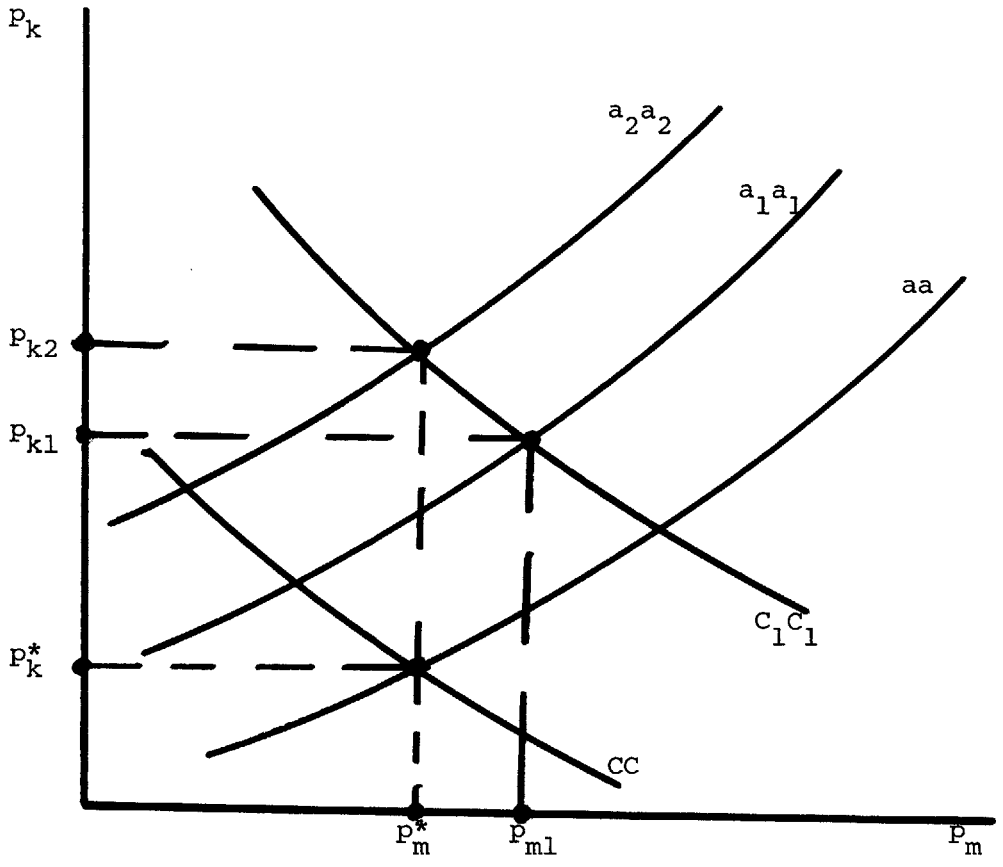
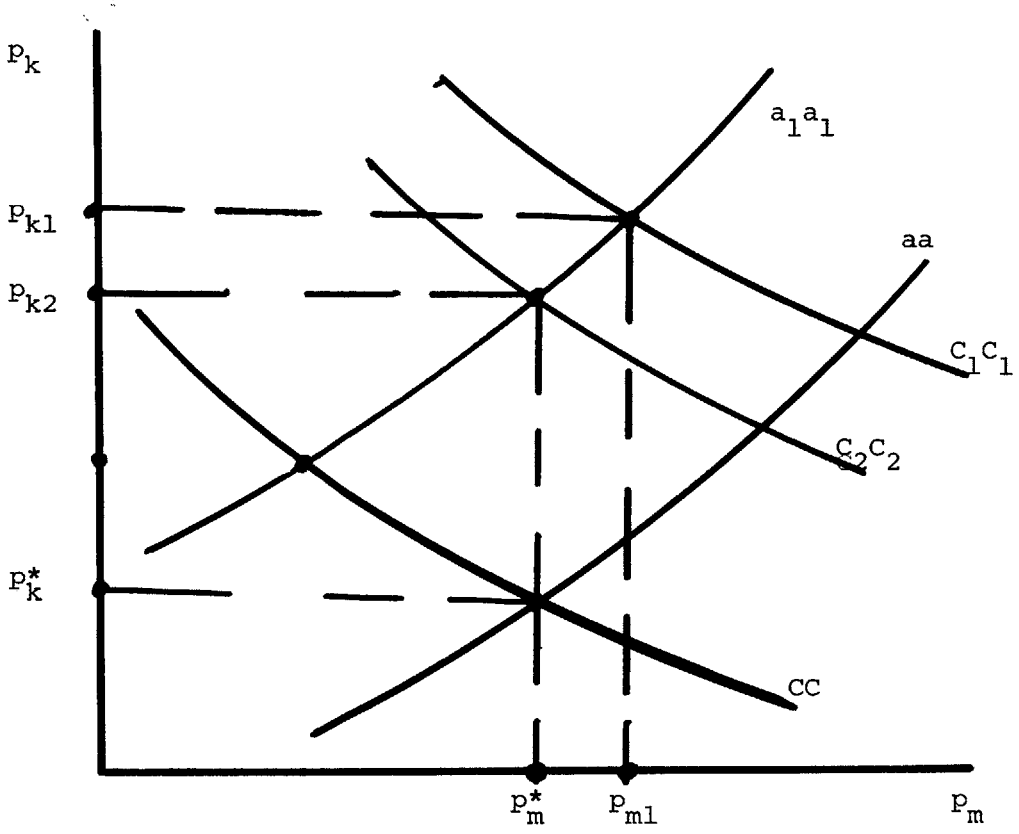


Fig.II.30



Therefore, the new equation (II.35) has to substitute the previous relation for the price of capital:

II.35) $p_k = \zeta(k^T, \beta, \pi_k, g^*p_m^*, e)$

where we can state

II.36) (a) $\partial\zeta/\partial\beta > 0 \rightarrow$ under uncompensated nationalization or while (II.34b) holds

(b) $\partial\zeta/\partial\beta \gtrless 0 \rightarrow$ if (II.34c) holds

Some uncertainty is clearly attached to the operation the government needs to perform. Indeed, if $a_1a_1$ is above the $a_2a_2$ schedule, an open market sale will be necessary.

Under a fiscal policy stabilization used to meet the situation in Figure II.27, the government manages the consumption market schedule.

In Figure II.30, it is shown that the impact effect will lead to $p_{k1}, p_{m1}$ on the $c_1c_1$ and $a_1a_1$ schedules. Therefore, to reestablish the price of money at $p_m^*$, a higher government expenditure is needed to move cc back to $c_2c_2$.

5.2. Some dynamics under fiscal policy stabilization

Dynamic conditions for a system including capital gains or loss expectations may be worked out with the following two differential equations:

II.37) $\dot{k} = q_I(k^T, p_k) - he/p_k - nk$

II.38) $\dot{\pi}_k = b(\dot{p}_k/p_k - \pi_k)$

where once again adaptive expectations are considered to be met in the capital markets.

Under a balanced budget fiscal policy to stabilize the price of money, and given the level of $\beta$, the price of capital will be a function of only k and $\pi_k$. Hence, we have:

$$\text{II.39)} \quad p_k = \phi(\gamma^*, k, \beta^*, \pi_k, x^*)$$

which can be differentiated and substituted into (II.37) and II.38):

$$\text{II.37')} \quad \dot{k} = q_I(k^T, \phi) - he/\phi - nk$$

$$\text{II.38')} \quad \dot{\pi}_k = \frac{b\{(1/p_k)(\partial\phi/\partial k^T)[q_I(k^T,\phi) - he/\phi - \pi_k]\}}{[1-\beta(1/p_k)(\partial\phi/\partial\pi_k)}$$

In the $k,p_k$ space, the two schedules can be proven to be both increasing and crossing one other at $\pi_k=0$.

Indeed, along the $\dot{k}=0$ schedule, an increase in k reduces its rate of change by:

- reducing the output of investment goods, since the hypothesis of higher intensity of capital is met in the production of consumption goods
- reducing $p_k$ and therefore the production of investment goods
- requiring a higher production of investment goods to be self sustained

Hence, if k increases, even $\pi_k$ needs to increase to keep $\dot{k}$ equal to zero.

In (II.38), an increase in k increases $\dot{\pi}_k$. Because of (II.20'), $\pi_k$ has to increase to reach $\dot{\pi}_k=0$ again. This proves that $\dot{\pi}=0$ is increasing in the $k,\pi_k$ space.

Finally, they cross each other at $\pi_k=0$ because in (II.38), $\dot{\pi}_k=0$ and $\dot{k}=0$, then $\pi_k$ must also be zero.

Stability of the system requires $\dot{k}=0$ to be steeper than $\dot{\pi}_k=0$. This result is more likely to be obtained if b is small, i.e. if expectations do not adjust rapidly.

## 5.3. The role of government owned capital and expectations of capital gains

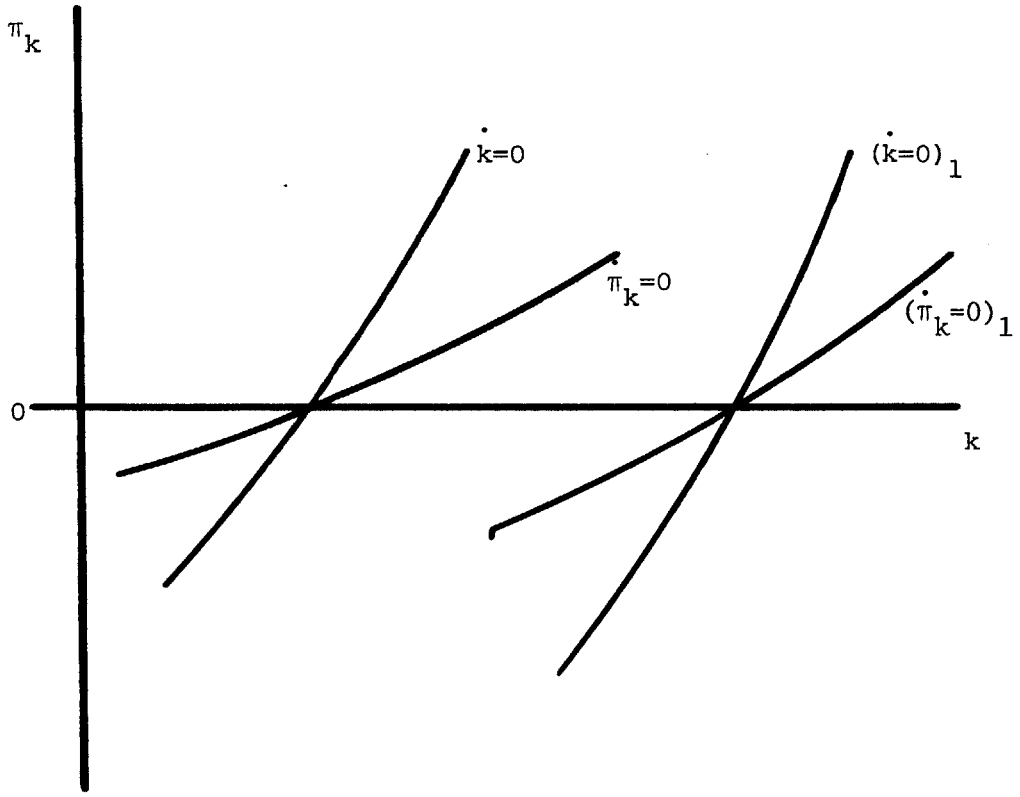
The model we have investigated can now be used to verify the impact of a government managing physical assets under price change expectations.

A nationalization, i.e. an increase in $\beta$, will move the two dynamic schedules to the right. Indeed, a higher $\beta$ will cause both $\dot{k}$ and $\dot{\pi}_k$ to be positive. Hence, the intensity of private capital will increase in the steady state solution, as shown in Figure II.31.

If an increase in the government propensity to save, h, follows the increase in $\beta$, the previous result is not certain anymore.

Indeed, if the effect of the increased $\beta$ in the term $[\partial k^T/\partial k = 1/(1-\beta)]$ and $\phi$ is smaller than the effect in the term he, the two schedules might even shift to the left, leading to a lower k. If such a case holds, $\dot{\pi}_k$ becomes negative, and a leftward movement will be needed to clear the market under the new condition.

Fig.II.31



## Chapter III - GOVERNMENT INVESTMENT PROGRAMS IN THE OPEN-ECONOMY CASE

In the previous chapters we dealt with the management of government investments in a closed economy framework. In the two sector growth model with which we worked, we focused on the existence of a trade-off between government corporation investments and the intensity of privately owned capital. This trade-off was proved to be "manageable" if a higher steady rate of inflation were supported. The trade-off is then between an additional investment process and the economic and social costs of ever higher price levels.

The need to coordinate the traditional tools of fiscal and monetary policies with the management of the government corporation growth process was also emphasized.

What we will do now, is to extend our model to include the case of an open economy. Within such an economy, we will explore both the limits and opportunities open to government investment behavior. If international trade and capital movements are introduced into the analysis, the accumulation process, given the long run growth conditions of the economy, is no longer constrained by the domestic production of physical capital. Indeed, the demand for investment goods can always be satisfied by import flows. A new constraint may, however, be met because of the necessity of balancing foreign accounts, at least in the long run.

International trade and monetary theory clearly points out the importance of the relative size of the economy. The cases of a "small

country" and "two-equal-sized-countries" are now very well established in the literature.[1]

In this section we will examine both models and explore our main target which is testing the conditions under which government corporations represent an additional tool of policy, filling either one of the traditional targets of internal and external stability, or meeting a "third" goal, like capital growth or welfare optimization.

We first re-elaborate a standard two-country model, including the case of the assets market relations. Then, we work out the long run growth path for this economy. Finally, we examine the effects of government investments in both countries.

In the second part of the Chapter, we examine the case of the "small" open economy, and also examine the effects of governments' investment decisions made within an international competitive framework.

## 1. A Two Country Model of International Trade and the Effects of Government Investment Programs

The model presented in Chapter I, modified along the line proposed by Foley and Sidrausky,[2] provides the basis for our analysis. We maintain the hypothesis needed to include a government making competitive decisions in the market.

Two goods, investments and consumption, are produced under the same technology by two equal sized countries. The two goods are internationally traded at a fixed exchange rate. The assets market consists of money, bonds and physical capital. The last two are freely traded,

while, because of a fixed exchange rate system, money supply satisfies only domestic demand in each country. The two governments are allowed to use fiscal and monetary tools which in turn affect the whole system, given the existence of open channels between the two economies. As we shall see more clearly later, many policy paths then lead to the same stability target. Therefore, the distribution of the burden of monetary policy leads to the final allocation of international reserves, while the distribution of the burden of fiscal policy determines wealth and/or income consumption distribution.

The major issue we aim to emphasize is the ability to manage government expenditure for investment goods in order to increase the domestic and world rate of accumulation, allowing the whole system to move toward higher per capita consumption. Thus, the main point is that there are different ways of sharing both the burden of fiscal and monetary policy, and the increases in wealth. For the sake of simplicity, we allow only one government, for instance Italy, to manage competitive corporations. The other country, say West Germany or France, or alternatively the European Economic Community, follows the standard pattern of no direct intervention in competitive market. The new tool of government investment management needs, however, to be coordinated with fiscal and monetary measures. Because the economies are open, both countries must agree on the instrumental use of government investments, just as they had to do in the simpler framework of indirect intervention through the traditional policy mix.[3]

The possibility of the independent use of government investments

may widen the range of targets the government might aim to pursue. As we shall see in the following chapter, a welfare maximization goal can be reached by using government investments to push the economy toward the optimal path of capital accumulation, with monetary and fiscal tools guaranteeing internal and external stability.

So far we have tried to sketch the possibilities open to government investments. Several constraints, however, may also be met. They are clearly related to the meaning we gave to government corporations. Since they enter the government budget, the critical feature is then given by the endogeneity of either the government propensity to invest or the government share of capital.[4]

In the last case, any long run interest in government corporations would obviously be lost. The first case would instead imply the possibility of switching government expenditure from consumption to investments goods. This possibility may not even exist in real economies where government demand is often rigid. In any case, at least one constraint is always met. The government propensity to invest out of expenditure cannot exceed unity, and it ultimately competes with private demand for capital goods, pushing toward an undesirably low intensity of private capital. In this case, there may be a tendency toward a full planned economy, eliminating the "mixed economy."

1.1. The production sector and the conditions of capital growth

Production processes in the two economies are undertaken with the same technology following a production function, which is homogenous to

the first degree. The consumption goods sector is supposedly the most capital intensive. Factor price equalization occurs and leads to the same remuneration of inputs wherever they happen to be located. Specialization paths are therefore ruled out.

In such a world, the previous conditions of production still hold:

III.1) $q_I(k^w, p_k)$ = production of investment goods; small letters refer to per capita values referred to world population; superscript w indicates world values.

III.2) $q_c(k^w, p_k)$ = production of consumption goods

Standard signs on the derivatives also apply here:

$$\partial q_I/\partial k^w < 0 \qquad \partial q_I/\partial p_k > 0 \qquad \partial q_c/\partial k^w > 0 \qquad \partial q_c/\partial p_k < 0$$

The law of capital accumulation follows the technological conditions given by the production functions. At a world level, new additions to the stock of physical assets are given by the world production of investment goods:

III.3) $\dot{k}^w = q_I(k^w, p_k) - nk^w$

The allocation of this production to the two countries depends on their demand for capital, competing in the world market for the available supply of goods. In the case of market clearing we have:

III.4) (a) $\dot{k}^E = \phi^E(q^E, p_k\ p_m, i) - nk^E$

(b) $\dot{k}^{TI} = \phi^I(q^I, p_k, p_m, i) + (he/p_k) - nk^{TI}$

where total capital belonging to economy "I" is owned both by private and governmental groups according to:

(c) $\dot{k}^I = \phi^I(q^I, p_k, p_m, i) - nk^I$

(d) $\dot{k}^G = (he/p_k) - nk^G$

We may therefore define an accumulation law of world "private" capital as:

III.3') $\dot{k}^{wp} = q_I(k^w, p_k) - (he/p_k) - nk^{wp}$

As can easily be seen, in an open economy framework, the government demand of investment goods does not compete directly with the domestic private demand of capital. The last can always be met by imports. However, in a two country world, it constrains "world" accumulation of private capital. The following definitions may then be set out:

III.5) (a) $k^w = k^E + k^{TI}$ (b) $k^{wp} = k^E + k^I$

(c) $k^{TI} = k^I + k^G$

where (III.5d) $k^G = \beta k^{TI}$ can be resumed as done previously.[5] Therefore:

III.6) (a) $\dot{k}^w = \dot{k}^E + \dot{k}^{TI}$ (b) $\dot{k}^{wp} = \dot{k}^E + \dot{k}^I$

(c) $\dot{k}^{TI} = \dot{k}^I + \dot{k}^G$

The law of physical capital accumulation here refers to the ownership of capital rather than to physical localization within each country. Indeed, in a perfect world market, investors are completely indifferent between localizations of capital.[6] Thus, we have ignored so far the behavior of residential capital. Within a small country framework, this uncertainty has been resolved.[7] A simple way to deal with such uncertainty in a two country world may be related to the condition of the labor market. Within the two countries considered, there is to be a population of equal size and rate of growth. However, the growth process would require either labor migration or capital movements between the two systems. Then, if some once and for all migration cost is attached to labor, while capitalists still remain perfectly indifferent to localization patterns, the hypothesis that capital moves wherever labor forces happen to grow, may be outlined. It would depend not on the demand conditions for investments goods, $\theta$'s, but on relative factor supply. We then have:

$$\text{III.7)} \quad \text{(a)} \quad \dot{k}_R^E = q_I(k^w,\ p_k)\ \frac{N^E \exp.(n^E + \alpha^E)t}{N^w \exp.(n + \alpha)t} - n^E k_R^E$$

$$\text{(b)} \quad \dot{k}_R^I = q_I(k^w,\ p_k)\ \frac{N^I \exp.(n^I + \alpha^I)t}{N^w \exp.(n + \alpha)t} - (he/p_k) - n^I k_R^I$$

$$\text{(c)} \quad \dot{k}_R^G = (he/p_k - nk_R^G$$

where the subscript refers to "residential" capital, i.e. located within each country.

In this respect, the demand for investment goods of the government affects private demand, since it directly competes "within" the country for residential capital. As we noted before, private demand might always find a foreign supply, but it has, in any case, to compete with domestically located government capital. In (III.7) we obviously included the case of a differential rate of population growth. Such differentials may result from a different rate of growth of factor supply or differences in their productivity. For the case of labor-augmenting technical progress, a parameter $\alpha$, can also be included.

Therefore, we have two different ways of approaching capital accumulation: one refers to ownership and one to location. Only by chance would they give the same result. Within an open economy, it is then possible to verify that if domestic demand for capital lags behind the growth of the labor force, an increasing share of foreign-owned capital will enter the economy. The full employment target is always assumed to be met in this framework; it may also be reached with a different share of ownership between domestic and foreign capitalists. Under our simple assumption, government corporations can affect such a share. Indeed, if private demand for capital falls short of the given growth of residential capital, government corporation demand can, fully or partially, fill the gap.

Within the competitive framework we assumed, the dynamic relations of the model will be referred to as ownership of capital. We overlook the need to verify the physical location of capital or labor migration.

So far we have dealt only with the investment goods sector. But

what about the consumption goods market? With a unique technology, world production of consumption goods is given by:

$$\text{III.8)} \quad q_c(k^W\ p_k)$$

For the sake of simplicity, demand conditions are here limited to the linear income relationship. Available income in each country is given by:

$$\text{III.9)} \quad y_E = w(p_k) + r(p_k)k^E + i(b^E - b_E)p_m + ib_E p_m - T^E p_m$$

$$\text{III.10)} \quad y^I = w(p_k) + r(p_k)k^I + i(b^I - b_I)p_m + ib_I p_m - T^I p_m$$

where the interest flows refer to net holding of bonds, which in turn are given by the difference between total bonds owned minus the bonds issued by the domestic government. The value of these bonds is determined through the budget constraint. In (III.10), clearly the return on government capital, $rk^G$, does not appear explicitly, since it is already included in the government budget constraint.

The world consumption market clearing equation, including government demand for consumption goods, is then given by:

$$\text{III.11)} \quad q_c(k^W,\ p_k) = (1-h)e + (1-s_E)y_E + (1-s_I)y_I$$

where $s_E, s_I$ are the private propensities to save.

1.2. The Assets Market

Since bonds and capital are considered as perfect substitutes and each country's money remains within the issuing economy, four equilibrium relations are needed to clear the assets markets. Two of them are given by:

$$\text{III.12)} \quad p_k k^{TI} + J^E + J^I = p_k \bar{k}^E + p_k(1-\beta)\bar{k}^{TI} + p_k \beta \bar{k}^{TI} = p_k k^w$$

$$\text{III.13)} \quad H^E + H^I = p_m \bar{b}^E E + p_m \bar{b}^I$$

where:

$$J^E = J^E(a^E,\ q^E,\ \pi_m,\ i+\pi_m,\ \frac{r(p_k)}{p_k} + \pi_k p_k k^E)$$

$$J^I = J^I(a^E,\ q^E,\ \pi_m,\ i+\pi_m,\ \frac{r(p_k)}{p_k} + \pi_k p_k k^E)$$

$$H^E = H^E(a^E,\ q^E,\ \pi_m,\ i+\pi_m,\ \frac{r(p_k)}{p_k} + \pi_k p_k k^E)$$

$$H^I = H^I(a^E,\ q^E,\ \pi_m,\ i+\pi_m,\ \frac{r(p_k)}{p_k} + \pi_k p_k k^E)$$

are respectively the European and the Italian demands for capital and bonds, expressed as a function of private wealth, income, and rates of return. Previous signs of the derivatives also apply here.

Now, by the Walras law, the system is assured world equilibrium in the money market. Such a condition does not, however, refer to the equilibrium within each market.

We know only that excess demand for money in one country will necessarily correspond to excess supply in the other. A reserve asset

is therefore needed. We call it $z_m$ . Only governments are allowed to own this asset. Private operators are obliged to exchange it for local money. To facilitate this latter operation, the government guarantees a fixed rate of exchange. Therefore, to the two previous equilibrium conditions, two money market clearing relations have to be added:

$$\text{III.14)} \quad (g^E/x^E)p_m + z_m{}^E = L^E(a^E,\ q^E,\ \pi_m,\ i+\pi_m,\ \frac{r(p_k)}{p_k} + \pi_k p_k k^E)$$

$$\text{III.15)} \quad (g^I/x^I)p_m + z_m{}^I = L^I(a^I,\ q^I,\ \pi_m,\ i+\pi_m,\ \frac{r(p_k)}{p_k} + \pi_k p_k k^E)$$

with $z_m{}^E = -z_m{}^I$ since the international stock of reserves considered fixed at $\bar{z}$ has been previously allocated between the two countries at a level $\bar{z}^E$ and $\bar{z}^I$ respectively.

To the four equilibrium conditions, we may relate the following wealth constraints:

$$\text{III.16)} \quad a^{wp} = a^E + a^I \qquad \text{total private world wealth}$$

$$\text{III.17)} \quad a^E = p_k k^E + p_m b^E + p_m m^E = p_k k^E + p_m(b^E - b_E) + p_m g_E$$

$$\text{III.18)} \quad a^I = p_k(1-\beta)k^{TI} + p_m b^I + p_m m^I = p_k(1-\beta)k^{TI} + p_m(b^I - b_I) + p_m g_I$$

which represent a system of two independent definitions.

Thus, only two equations of the (III.12) - (III.15) are independent.

As in the previous cases, assets market clearing relations can be shown graphically in the $p_k$,i space for any value of $p_m$. Consider the bonds and capital market as the independent equations. The world money market is in equilibrium at their crossing point, but the money market clearing equation of each country may not be in equilibrium.

The shaded area in Figure III.1 can be excluded as a possible solution for the bond market clearing equation. The latter has to cross the kk relation somewhere between points A and B, say C. At that point, $p_k$* and i* will determine equilibrium in both the bonds and physical assets markets. As Figure III.1 shows, reserve flows are needed to clear the money markets. Hence the two "m" relations shift until they cross one another at c. Such an equilibrium position may also be reached without any reserve flows, if there is a sudden exchange rate movement. However, so long as the excess supply of money lasts in one of the countries, then a continuing devaluation is needed. In such a case, bonds must be indexed to consumption good units. Otherwise, expectations on the rate of exchange devaluation might introduce market instability, as in the case of capital gains.

We will now perform two simulations on the assets market. First, we will try to measure the effects of what we have called an uncompensated nationalization. Then we will simulate a "government take-over", balanced by the issue of either money or bonds or both.

When the share of government owned capital is increased, a situation of excess demand appears on the capital market. Indeed, the supply of physical assets to the private sector is decreased by the increase

Fig.III.1

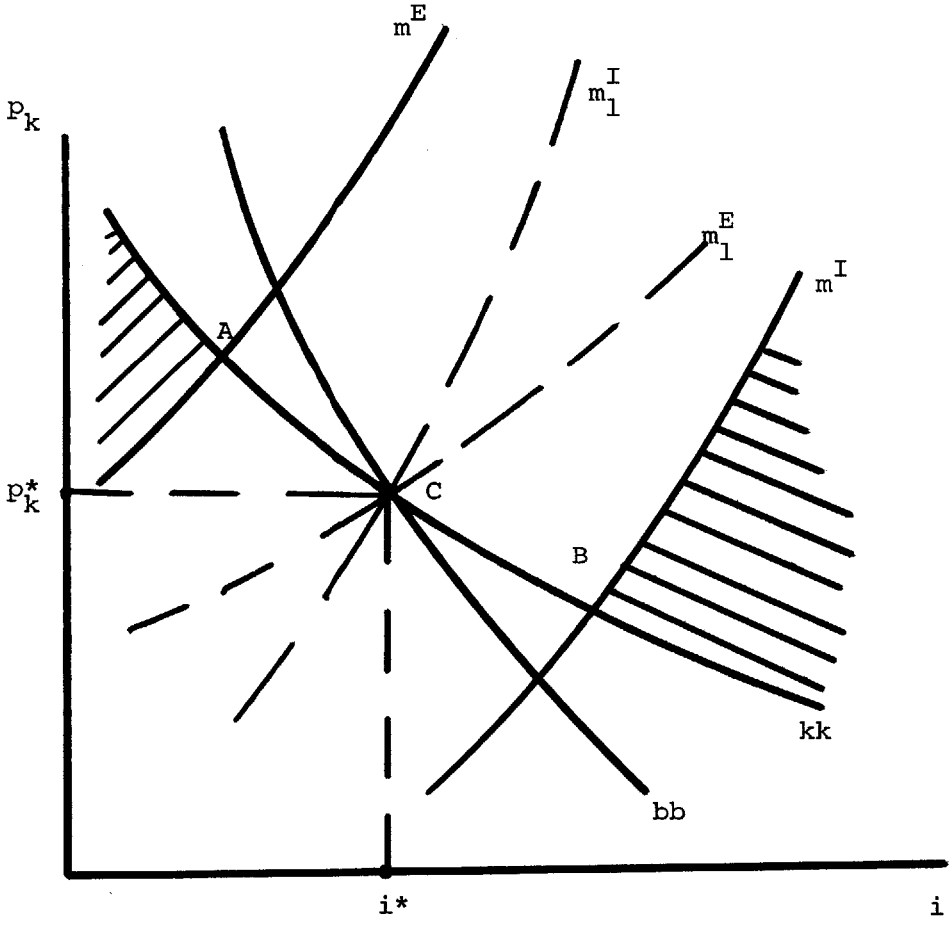
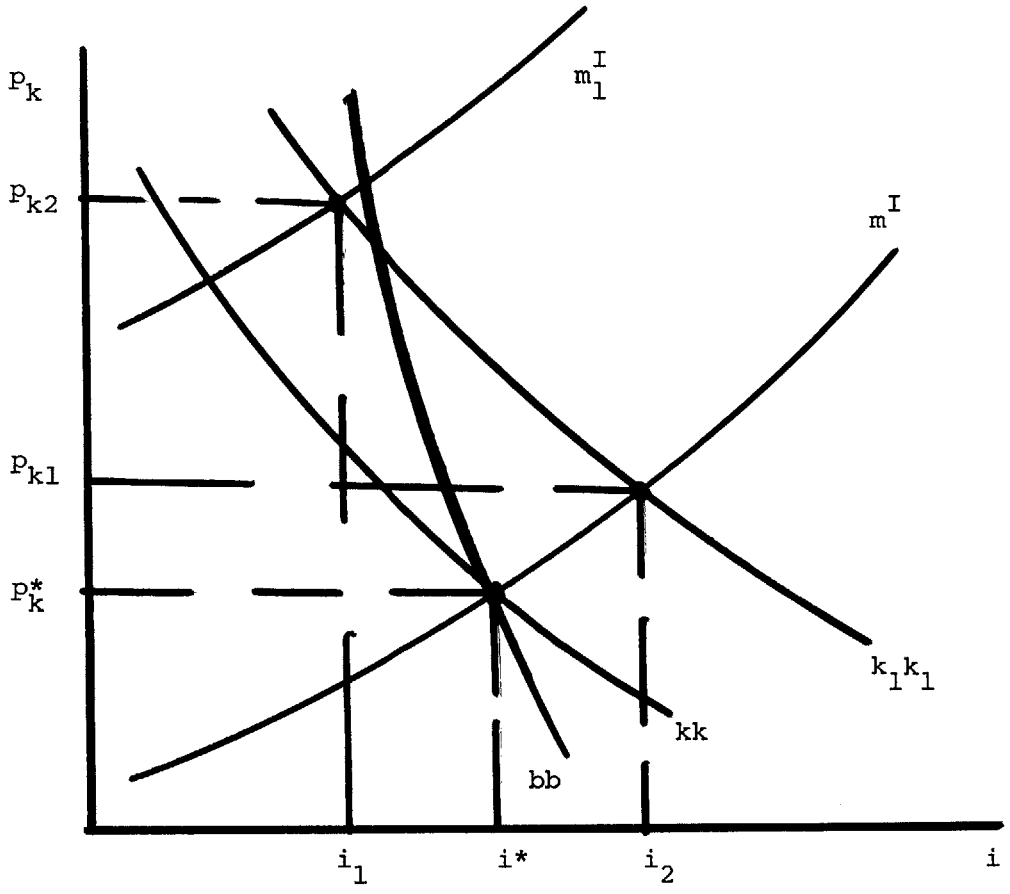


Fig.III.2



in $\beta$, while wealth effects decrease the demand according to $\partial J/\partial a$ which we proved to be less than unity. The kk schedule shifts upward to clear the market again.

In the money market of economy, E, nothing happened to shift the relation. In economy, I, the money market shows an excess supply due to the wealth effect in $L^I$. Clearly, if the nationalization is compensated by issuing money, an even higher excess supply of money will be produced, and similar results would therefore follow. The $m_1^I$ schedule shows the new clearing condition in Figure III.2. An increased price of capital will then be the result, while an uncertain effect on i would be produced. Indeed, the reserve flows will affect the $m_1^I$ and $m^E$ until they cross one another. At that point, a new equilibrium level of the interest rate, between $i_2$ and $i_1$, will be found.

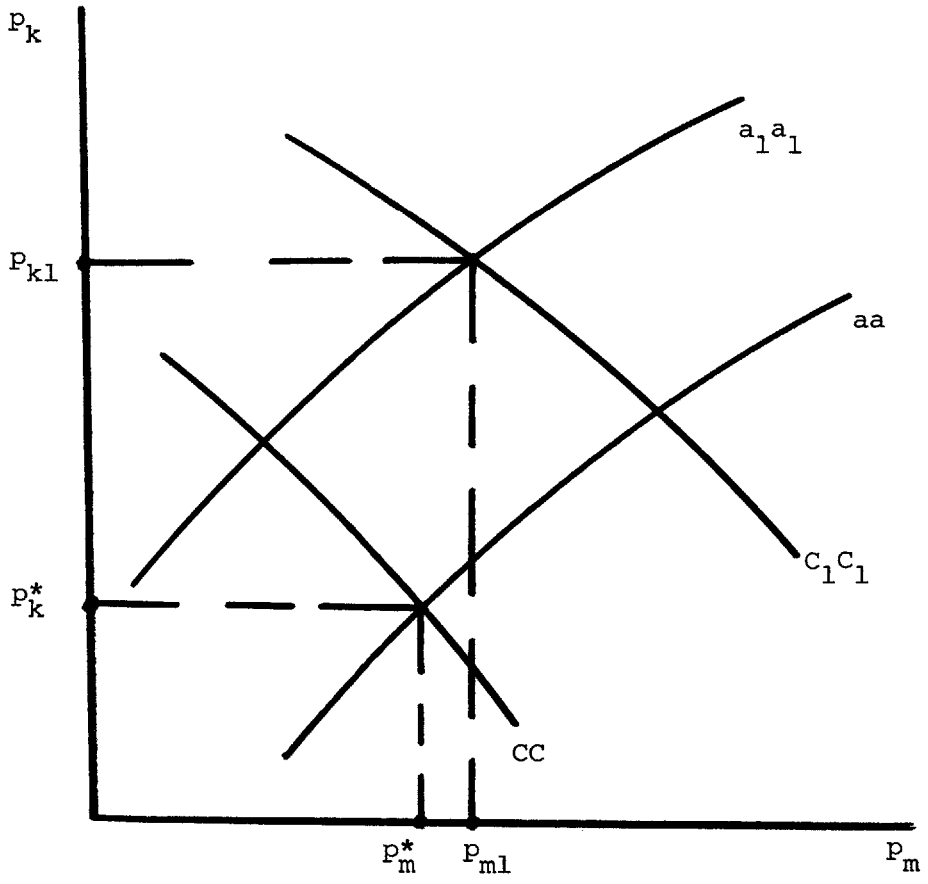
If the compensated nationalization is done through the issue of bonds, then even the bb curve might move upward to clear the excess supply of bonds. As can be seen from Figure III.2, the effects on the price of capital, $p_k$, would not change. But, an increase rather than a decrease in the interest rate is now likely to appear.

1.3. The complete model - statics

Equation (III.11), together with two equations from (III.12) - (III.15), forms a complete static model in the space $p_k, p_m, i$. The stock variables are given and the government propensity to invest, h, still follows condition (II.12).

As noted previously, the consumption market clearing equation

Fig.III.4



can be shown in the space $p_k, p_m$ as a decreasing relation meeting an upward asset clearing equation. See Figure III.3.

Therefore, the experiments of increasing the government share of capital, $\beta$, and its propensity to invest, h, move both schedules upward. If the two countries agree on pegging the price of money, as they should if a fixed rate of exchange, E, is given by the relation:

$$p_m^I = E\, p_m^E$$

then, <u>either</u> economy, I, managing $\beta$ and h, has to adjust its own fiscal and monetary policy, <u>or</u> both have to negotiate again. In any case, an increase in the price of capital has to be accepted. If this does not happen, the schedule might move back to its original position. A simple conteracting fiscal monetary mix will allow the government share of capital to increase. This will lead to the redistribution of reserves through a tighter monetary policy, and to lower private wealth through a tighter fiscal policy.

### 1.4. The balance of payments

In this model, the balance of payments conditions are derived as a simple identity. The peculiar feature to note here is that as long as the model overlooks the problem of capital location and does not distinguish between the purchasing of physical assets and equities, the flows related to investments goods may represent trade as well as capital movements.

For economy, I, the balance of payments would then be:

III.19) TRADE $[q_c^I(k^w, p_k) - (1-h)e - (1-s^I)y_I] +$

$[p_k q_I^I(k^w, p_k) - he - p_k\phi(k, i)] +$

TRANSFERS $[r(\underbrace{k^{TI} - k_R^G - k_R^I}_{\text{net profits}}) + i(\underbrace{b^I - b_I}_{\text{net interests}})] +$

CAPITAL MOVEMENTS $[p_m(\dot{b}_I + nb_I) - p_m E(\dot{b}^E + nb^E)] +$

RESERVE MOVEMENTS $[\ \dot{z}_m\ ] =$

0 = as an accounting identity

1.5. The complete model - dynamics

We already noted the problem of defining a residential capital law of accumulation. Both countries' investment demands are, however, completely indifferent between locations E and I.

At the world level, the additions to the stock of capital are given by the total production of investment goods. Therefore, the world level of capital accumulation is:

III.20) $\dot{k}^w = q_I(k^w, p_k) - nk^w$

while the private capital dynamic condition is:

III.21) $\dot{k}^{wp} - q_I(k^w, p_k) - (he/p_k) - nk^{wp}$

and government capital in I is:

III.22) $\dot{k}^G = (he/p_k - nk^G$

where: $\dot{k}^w = \dot{k}^{wp} + \dot{k}^G$

Equations (III.20) or (III.21) directs the growth of capital stock toward its steady state solution.

The other dynamic rules that the economies have to follow concern wealth accumulation:

III.23) $\dot{a}^E = s_E y_E - na^E$

III.24) $\dot{a}^I = s_I y_I - na^I$

III.25) $\dot{a}^G = he - n\beta k^{TI} p_k - dp_m + nbp_m + nm_I p_m = \dot{k}^T - \dot{g}$

Equations (III.24) and (III.25) have to add up to:

III.26) $\dot{a}^G + \dot{a}^I = \dot{a}^{TI}$

Equations (III.20), (III.23) and (III.24) completely define the dynamics of our two-country-two-sector system.

The equilibrium in the world consumption market, given a $p_k^*$ determined by the assets market, is given by:

III.27) $q_c(k^w, p_k^*) = (1-s_E)y_E + (1-s_I)y_I + (1-h)e =$

$(1-s_E)[w(p_k^*) + r(p_k^*)k^E + ib^E p_m - T^E] +$

$(1-s_I)[w(p_k^*) + r(p_k^*)(1-\beta)k^{TI} + ib^I p_m - T^I - r\beta k^{TI}]$

$+ (1-h)e$

where:

III.27') $T^E = t^E p_m$ and $T^I = t^I p_m$

Within this framework, economy, E, can only adjust the tax level $T^E$, while economy, I, can move the tax level, $T^I$, and its propensity to invest, h. If (he) is considered given, then to enforce a given $p_m^*$, the fiscal policy of the two countries has to be coordinated, and the related burden split through $T^E$ and $T^I$.

Now, relation (III.27) can be rewritten as:

III.28) $$(s_E-1)t^E + (s_I-1)\left(t^I + \frac{r\beta k^{TI}}{p_m}\right) + (1-h)e =$$

$$(1/p_m^*)\{q_c(k^w, p_k^*) - (1-s_E)\,[w(p_k^*) + r(p_k^*)k^E$$

$$+ ib^E p_m] - (1-s_I)[w(p_k^*) + r(p_k^*)k^{TI} + ib^I p_m]\}$$

$$= -\sigma$$

The definition of $\sigma$ implies one restriction on $t^I$, $t^E$, h. But this restriction is not sufficient to fix all three values.

The splitting of the burden, $\sigma$, between economy, E, and I, may then be represented by the variable $\mu$ so that:

III.29) (a) $$(s_E-1)t^E = \mu\sigma$$

(b) $$(s_I-1)\left(t^I + \frac{r(p_k^*)k^{TI}\beta}{p_m}\right) + (1-h)e = (1-\mu)\sigma$$

From III.29) the instrumental use of government investments within economy, I, is then clear. The fiscal tools "e" and "t", and the investment propensity "h" can be managed within any given share of the burden, $\sigma$.

This finding may be of interest to international economic agencies. Quite often, the IMF, the EEC or similar organizations relate the availability of BOP deficit finance to given conditions of domestic fiscal and monetary policy. Relation (III.29) shows that such lines might be incorrect in particular cases. The final destination of the financing should also be taken into account. In fact, for a given amount of government expenditure, the more it comes from corporate investments, the lower is the need for tax revenue, i.e. the more willing should international agencies be to allow a government deficit.

As we shall see later, this result is due to the effect of government investments on the world rate of accumulation, i.e. government investments contribute to the increase in the world wealth frontier.

Reconsidering our formal analysis, (III.27) can be substituted:

either: $q_c(k^w, p_k) = \mu\sigma p_m + (1-s_E)(w + rk^E + ib^E p_m) + (1-s_I)y_I + (1-h)e$

and therefore:

$$\text{III.30)} \quad (1-s_I)y_I = (1-\mu)q_c + \mu(1-s_I)(w + rk^I + ib^I p_m) - (1-\mu)$$

$$(1-s_E)(w + rk^E + ib^E p_m) - (1-h)e$$

or: $q_c = (1-s_E)y_E + (1-\mu)\sigma p_m + (1-s_I)(w + rk^I + ib^I p_m)$

Then:

$$\text{III.31)} \quad (1-s_E)y_E = \mu q_c + (1-\mu)(1-s_E)(w + rk^E + ib^E p_m) - \mu(1-s_I)(w + rk^I + ib^I p_m)$$

If we now set

$$\text{III.32)} \quad P = (1-s_E)(1-\mu)(w + rk^E + ib^E p_m) - \mu(1-s_I)(w + rk^I + ib^I p_m)$$

we can obtain:

$$\text{III.33)} \quad y_I = [(1-\mu)q_c - P - (1-h)e] \,/\, (1-s_I)$$

$$\text{III.34)} \quad y_E = (\mu q_c + P) \,/\, (1-s_E)$$

The full dynamic system can therefore be rearranged in terms of total (private plus government) flows as:

$$\text{III.20)} \quad \dot{k}^W = q_I(k^W, p_k) - nk^W$$

$$\text{III.35)} \quad \dot{a}^{TE} = [s_E \,/\, (1-s_E)]\,[\mu q_c + P] - na^{TE}$$

$$\text{III.36)} \quad a^{TI} = [s_I \,/\, (1-s_I)][(1-\mu)q_c - P] - \frac{e(s_I-h)}{1-s_I} - na^{TI}$$

While private wealth accumulation follows:

$$\text{III.37)} \quad \dot{a}^E = [s_E / (1-s_E)] [q_c + P] - na^E$$

$$\text{III.38)} \quad \dot{a}^I = [s_I / (1-s_I)] [(1-\mu)q_c - P - (1-h)e] - na^I$$

Once the price of capital is given, the world accumulation of physical assets is completely determined. As we shall see, however, the management of the government propensity to invest can lead the two countries to agree on a higher $p_k$. In this case, the steady state capital intensity will be higher, and, consequently, the world wealth will be increased.

The problems of wealth and income distribution, have already been investigated in the full private economy.[8] Here we explore how government investments play a role in such distributions.

If we set $\dot{a}^{TE} = \dot{a}^{TI} = 0$, solve (III.35) and substitute it into (III.36), we can easily verify that:

$$\text{III.39)} \quad q_c(k^w, p_k) - \frac{e(s_I-h)}{s_I} = n \left[a^{TE} \frac{(1-s_E)}{s_E} + a^{TI} \frac{1-s_I}{s_I}\right]$$

which shows the wealth distribution frontier between country, E and I. It is interesting to note that the entire frontier expands or contracts according to:

$$\text{III.40)} \quad h \gtrless s_I$$

Indeed, if the two governments agree on a given $p_k^*$, the steady state intensity of world capital is determined at $k^{w*}$. Hence, the

production of consumption goods is given. However, in such a situation, the accumulation process in I can be increased through governments investment programs.

The slope of the frontier is still dependent on the relative propensity to save in the two countries. Figure III.4 shows graphically how the system behaves.

Consider AA as the case given by $s_I = h$, i.e. the wealth frontier where government investments do not alter wealth accumulation. Then CC refers to the case $h > s_I$, and BB to $h < s_I$.

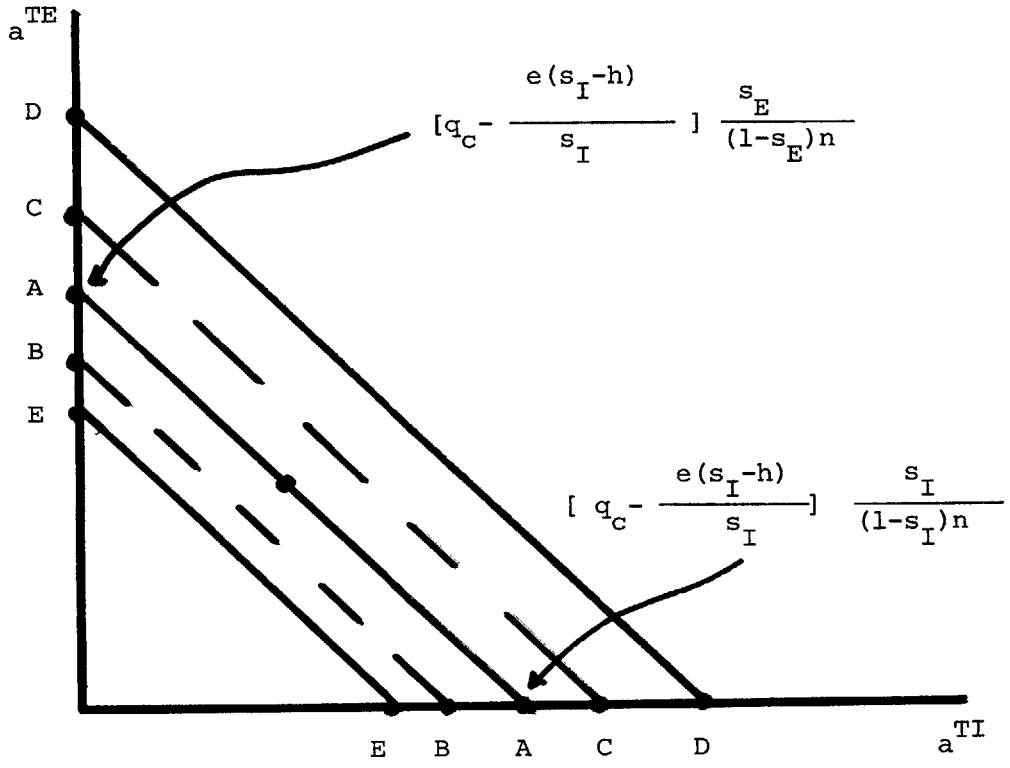
It seems appropriate here to investigate more deeply the role of the government propensity to invest, h.

As far as total wealth (government plus private), is concerned, it should be clear that the government propensity to invest maximizes world wealth once it reaches unity. In such a case, the frontier reaches its maximum, ceteris paribus, including fiscal and monetary policy. This situation is met at DD. On the other hand, if a minimum is reached at EE, the world economy has to bear the brunt of government expenditure "e", allocated in full to consumption. At the maximum "h", the steady state solution for the government share of capital is given by condition (II.12) as:

$$\text{III.41)} \qquad \beta = \frac{e}{p_k \phi^I + e}$$

which shows that the private demand for investment goods plays the major role. Indeed, $\beta$ can approach either zero or one according to $\phi^I$ approaching infinity or zero, i.e. a "mixed" economy can make its way

Fig.III.4



back to a purely competitive private economy or converge toward a fully centralized economy according to the private behavior of investment goods. Once h approaches unity, then only the standard fiscal tools remain to be used. As we saw for the closed economy case, a trade-off between inflation and private capital intensity then appears. Moreover, for the large open economy, the other country has to be involved and the result of the new bargaining is uncertain.

In the simple model to which we refer, per capita consumption is proven to be linearly dependent on per capita private wealth once a steady state is reached. Indeed, if $\dot{a}^E = \dot{a}^I = 0$, then:

III.42) (a) $0 = sy_E - na^E$ (b) $y_E = na^E / s_E$

(b) $0 = sy_I - na^I$ (c) $y_I = na^I / s_I$

then:

III.43) (a) $c_E = (1-s_E)\, na^E / s_E$

(b) $c_I = (1-s_I)\, na^I / s_I$

Beside the total wealth, it is also interesting to investigate the private wealth frontier. As we did before to obtain (III.39), we may consider (III.37) - (III.38), and obtain:

$$(III.44) \quad q_c - (1-h)e = n \left[ a^E \frac{(1-s_E)}{s_E} + a^I \frac{(1-s_I)}{s_I} \right]$$

which shows that any government expenditure reduces the world private wealth frontier. But the higher is h, the smaller is such a reduction, and it would disappear for a unitary government propensity to invest. Indeed, any government expenditure, financed by taxes, reduces private disposable income. Therefore, the main parameters are the increased total wealth in the world and the effects on the private sector in both countries.

An important issue that still remains to be discussed is the role of the allocation of burden between the two countries. We may ask which sign would have to be taken by:

$$\partial a^E / \partial \mu \qquad \text{and} \qquad \partial a^I / \partial \mu$$

for any given value of h.

From (III.37) we have $a^E$ in steady state, then:

$$\text{(III.45)} \quad \partial a^E / \partial \mu = (s_E/n(1-s_E))p_m{}^*\sigma \lesseqgtr 0 \quad \text{as } \sigma \gtreqless 0$$

which is the same result obtained by Foley-Sidrausky for a purely private economy.

A further interesting approach is to enquire into the effects of movements in h and, consequently, in the steady state government share of capital. There are several cases. We might consider $\mu\sigma$ constant in (III.29a). Hence, the effects of an increased $\beta$ need to be outweighed by other parameters in (III.29b). From:

$$\text{(III.29')} \quad R = e - n\beta p_k k^{TI} - (1-s_I)t^I - (1-s_I)(r\beta k^{TI}/p_m) = \overline{(1-\mu)\sigma}$$

we must obtain:

$$(III.46) \quad \partial R/\partial \beta + \partial R/\partial t^{I} + \partial R/\partial e = 0$$

which represents the constraint on government corporations investment programs if no new international agreements are sought.

However, a constant value of the product, $\mu\sigma$, can be obtained only by adjusting $\mu$ with respect to a change if any in $\sigma$ (due to the increased government propensity to invest), or by taking $\mu$ as constant and outweighing in $\sigma$ the effects of the increased h. From (III.28) we know that:

$$\sigma = (1-s_E)t^E + (1-s_I)(t^I + \frac{r\beta k^{TI}}{p_m}) - (1-h)e$$

or in steady state:

III.47)
$$\sigma = (1-s_E)t^E + (1-s_I)(t^I + \frac{r\beta k^{TI}}{p_m}) - e + p_k \beta k^{TI}$$

hence:

$$\partial\sigma/\partial\beta = (1-s_I)(rk^{TI}/p_m) + p_m k^{TI} = 0$$

and

$$(III.48) \quad \rho^{TI} = p_m / (1-s_I)$$

where: $\rho^{TI} = \frac{r(p_k)}{p_k}$ . Therefore, if $\mu$ and $\sigma$ are both constant,

then: $\partial a^{TE} / \partial\beta = \partial a^{E} / \partial\beta = 0$

and the total increase in the wealth frontier will be taken up by country I.

We have just shown how a movement in the government share of capital increases the wealth of the entire economy, but, under particular hypotheses. All this increase can be directed to one country. The main parameters of the analysis are given by the private propensity to save, the private demand for investment and the government propensity to invest. We can now express this analysis in graphical terms. We know that:

$$(III.49) \qquad a^{I} = a^{TI} - p_k \beta k^{TI} + p_m(b_I + m_I)$$

which shows that $a^{I} = a^{TI}$ if:

$$(III.50) \qquad p_k \beta k^{TI} = p_m(b_I + m_I)$$

but, since in steady state:

$$he = p_k \beta k^{TI} \quad \text{and} \quad (III.51) \quad d = np_m(b_I + m_I) = ng$$

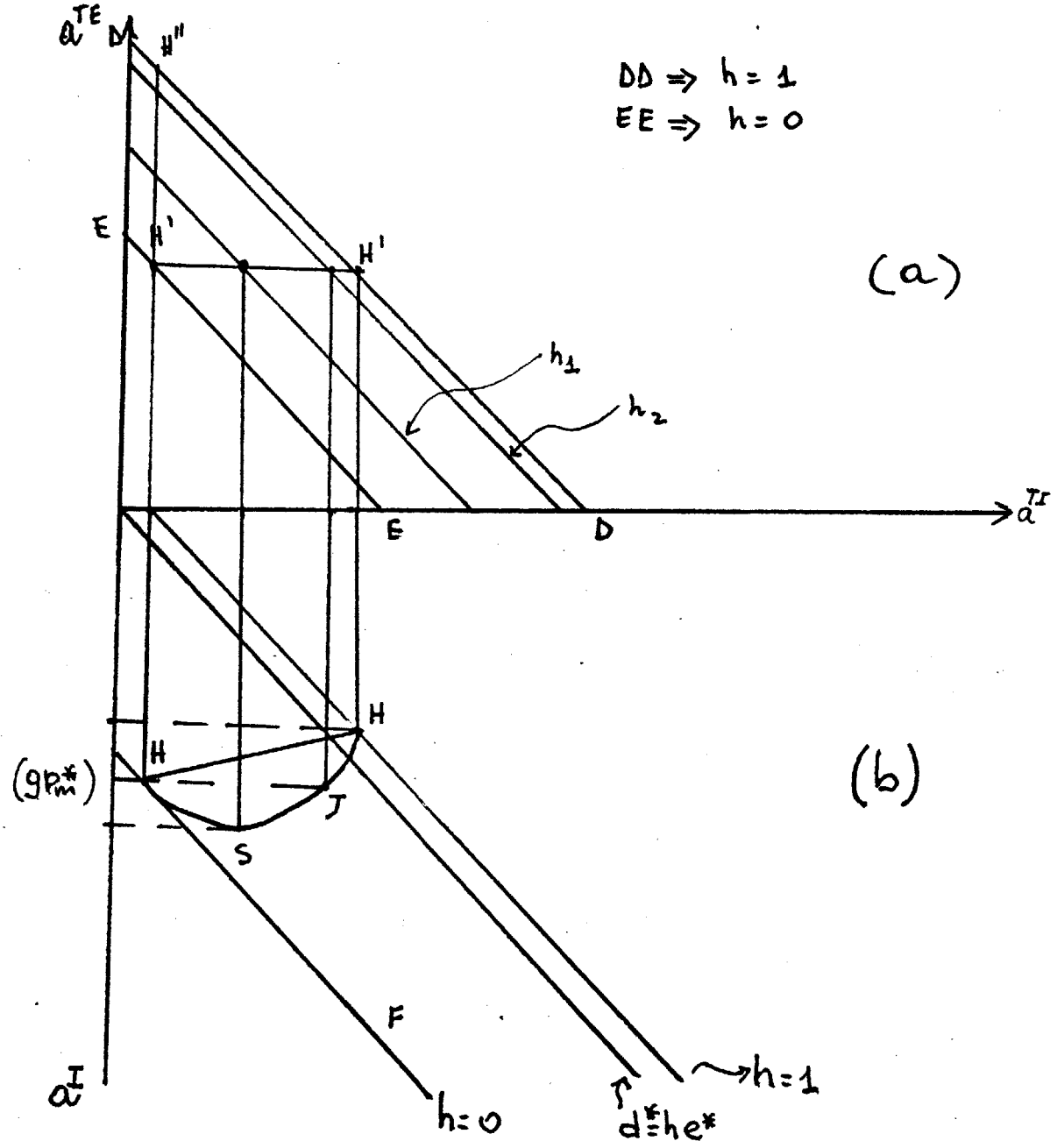
we also have condition (III.50) as:

$$III.52) \qquad he = d$$

Therefore, in Figure III.4, we can add relation (III.49) and obtain Figure III.5, where the wealth frontiers for the case of h=0 and h=1 are reported as line EE and DD. If condition (III.52) holds, a 45 degree line represents the relation between total and private wealth in economy I. Therefore, if:

$$h = 0, \text{ then } \beta = 0 \quad \text{and} \quad a^{I} = a^{TI} + p_m(b_I + m_I) = a^{TI} + gp_m$$

Fig.III.5



Then, the line given by $(gp_m^*)$-F will be the new private wealth relation.

On the other hand, if:

$$h=1, \quad \text{then} \quad \beta = \frac{e}{np_k k^{TI}}$$

and $a^I = a^{TI} - (e/n) + gp_m$

Now solutions along H'H' in panel (a) will lead to solutions HH in panel (b). The form of this line is determined by the relation between the effect of the increased wealth frontier and the upward shift on the relation between private and total wealth in panel (b). Both are due to an increased government propensity to invest. Consider line HSJH to be the solution. Now several targets may be pursued, each of them depending on the appropriate choice of h. For instance, if we aim to maximize private wealth, then $h_1$ has to be chosen, and point S will be reached in panel (b). If total wealth is instead to be maximized with respect to a non-diminishing private wealth constraint, then $h_2$ will be the new frontier, and J will be the solution in panel (b).

For the sake of simplicity, we introduced two assumptions which need to be clarified. First, we draw Figure III.5 for the case of $s_E=s_I$ , i.e. a 45 degree wealth frontier was considered. If $s_E>s_I$ then the frontier is steeper, and given the same initial wealth distribution in H', there will be far fewer possibilities to increase wealth in country I. Second, we assumed that economy I counteracted perfectly the effects of a movement in h and $\beta$ in order to leave the product $\mu\sigma$ unchanged, i.e. line H'H' is followed. Such a hypothesis can not necessarily be met. Country E can always ask to rearrange the allocation of the bur-

den trying to move along line H'H". In this case, country E takes full advantage of government investment programs carried out by country I.

## 2. The Case of a Small Open Economy

Within the framework of a large open economy, the management of government corporations has been shown to represent an interesting additional tool for economic policy. Conditions leading to the sharing of the effects of government investment programs within a two country world have also been explored.

We now turn to the case of a single economy whose size is too small to influence the rest of the world. It operates within the international markets, and to some extent it has to accept world parameter conditions.

Several cases of fiscal and monetary policy in a small economy have been proposed. Some authors have emphasized trade; some capital movements; some have referred to a barter economy; some have introduced money and physical assets. The existing literature is fairly broad. We need therefore only to reorganize a small open economy model to introduce the case for government investments, and to focus on the possibilities and limitations of such programs.

### 2.1. The assets market

The three assets world we refer to for the case of a closed economy needs to be slightly modified. We consider both domestic money and physical capital to be owned by residents. Only bonds are traded internationally, on the assumption that they are of short term maturity.

Therefore, we consider four different assets to exist in such a world: foreign bonds, money, domestic bonds and physical capital. They are all supposed to be imperfect substitutes, so that their onw returns, although related to each other, do not necessarily equalize.

Supply and demand conditions are as before. Hence, assets market equilibrium conditions are:

III.53) Money - $(g/x)p_m + \int \dot{F}R \cdot R = L \{[ k^T(1-\beta)p_k + (m+H)p_m + b^f \cdot R];$

$(q_c + q_I p_k + \bar{i} b^f R - e + (\dot{d}+\pi_m)p_m;\ \pi_m;$

$(\pi_m+i);\ (\bar{i} + \frac{\dot{R}}{R});\ (\frac{rp_k}{p_k} + \pi_k)\}$

III.54) Bonds - $(1-1/x)gp_m = H\{\cdot\} + F\{i - (\bar{i} + \frac{\dot{R}}{R})\}$

III.55) Physical Capital - $p_k k^T (1-\beta) = J\{\cdot\}$

where:

$R = p_m/p_m^w$ = rate of exchange

$\dot{R}_f$ = 0 under the fixed exchange rate case

b = foreign bonds owned by residents

$\bar{i}$ = international interest rate

$p_m^w$ = world level of price

H = demand of domestic bonds by residents = TH - FB

TH = Total demand of bonds by residents

FB = demand of foreign bonds by residents

$F$ = demand for domestic bonds by foreigners

$b_d$ = domestic bonds owned by residents

$b^f$ = foreign bonds owned by residents

$b_f$ = domestic bonds owned by foreigners

$FR$ = international reserves

$NI$ = national income = $[q_c + q_I p_k + \bar{i}\, b^f R - i b_f]$

$\rho = \bar{i} + \dot{R}/R$

At any given moment, national wealth is allocated fully to the four assets, and the following constraint is met:

$$\text{III.56)} \quad a = L + H + FM + J = K^T(1-\beta) + (m+b)p_m + b^f R$$

Gross substitution hypothesis allows us to verify the following derivative signs. See Figure III.5a.

Under a fixed exchange rate system, based on purchasing power parity, we have the internal price of money, $p_m$, fixed by:

$$\text{III.57)} \quad p_m = p_m^w R$$

The accumulation of foreign reserves is endogenous and, by entering (III.53), it makes the money supply an endogenous variable.

Therefore, by using (III.56), we can express the assets market by two independent equations in $p_k$, $i$, $\dot{FR}$. From equilibrium conditions, we can derive:

$$\text{III.58)} \quad p_k = \phi(\gamma,\ k^T,\ \beta,\ \pi_m,\ \pi_k,\ x,\ \bar{i},\ R)$$

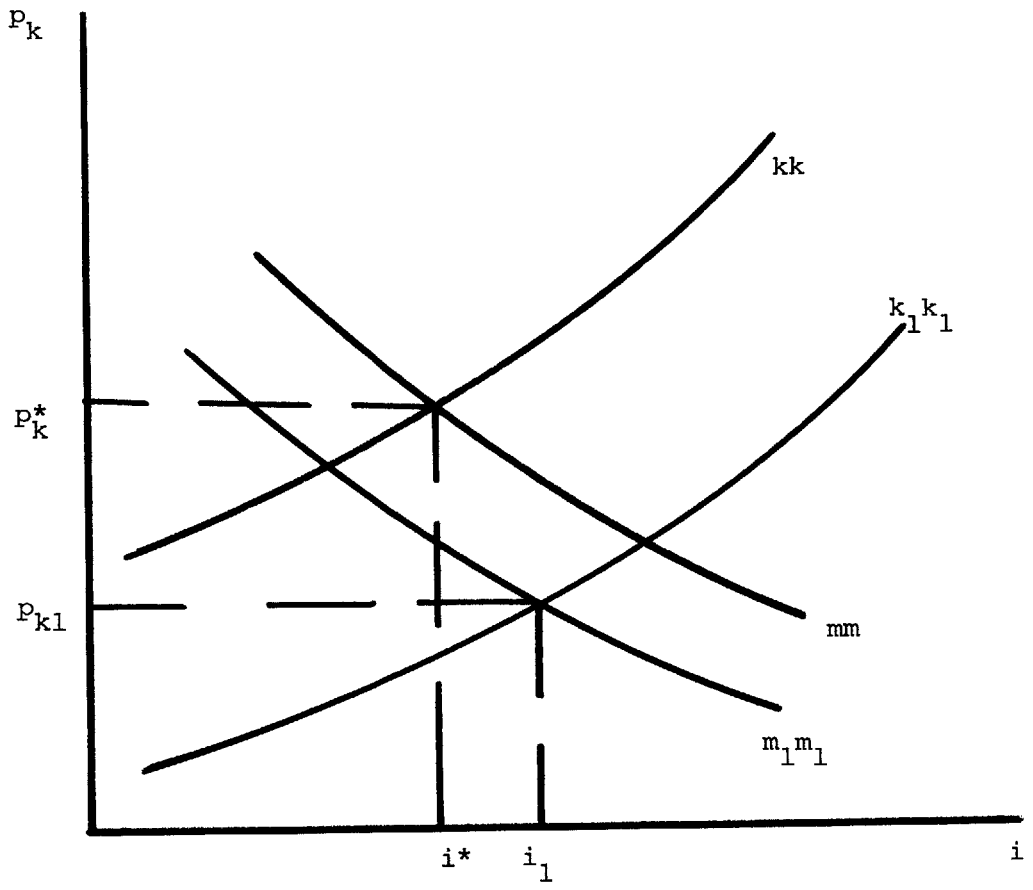
| | | | | | | |
|---|---|---|---|---|---|---|
| | $1 \geq \partial L/\partial \alpha \geq 0$ | $\partial L / \partial NI \geq 0$ | $\partial L / \partial \rho_m > 0$ | $\partial L / \partial \rho_b \leq 0$ | $\partial L / \partial \rho_f \leq 0$ | $\partial L / \partial \rho_k \leq 0$ |
| | | $\partial H / \partial NI \leq 0$ | $\partial H / \partial \rho_m \leq 0$ | $\partial H / \partial \rho_b \geq 0$ | $\partial H / \partial \rho_f \leq 0$ | $\partial H / \partial \rho_k \leq 0$ |
| | | $\partial FB/\partial NI \leq 0$ | $\partial FB/\partial \rho_m \leq 0$ | $\partial FB/\partial \rho_b \leq 0$ | $\partial FB/\partial \rho_f \geq 0$ | $\partial FB/\partial \rho_k \leq 0$ |
| | $1 \geq \partial J/\partial \alpha \geq 0$ | $\partial J / \partial NI \leq 0$ | $\partial J/\partial \rho_m \leq 0$ | $\partial J / \partial \rho_b \leq 0$ | $\partial J / \partial \rho_f \leq 0$ | $\partial J / \partial \rho_k \geq 0$ |
| $\Sigma$ | 1 | 0 | 0 | 0 | 0 | 0 |

$\partial F / \partial_i > 0$

$\partial F / \partial_R < 0$

Figure III.5a

Fig.III.6



III.59) $\quad i = \psi(\gamma,\ k^T,\ \beta,\ \pi_m,\ \pi_k,\ x,\ \bar{i},\ R)$

where all the signs of the derivative previously proposed still remain valid, and:

$\partial p_k/\partial R < 0$ and $\partial i/\partial R \gtrless 0$ depending on whether wealth and income effects are smaller than the effects due to $(i + \dot{R}/R)$ and $\dot{F}R$

Following our previous analysis, we can prove this condition in the $p_k$,i space.

Let us indicate KK and mm as the capital and money market equilibrium conditions leading to an equilibrium level at $p_k^*$ and i*, in Figure III.6. Now, an increase in R moves both schedules down, since wealth and income effects create excess supply in the capital and money markets. Hence, the price of capital has necessarily to move down. The domestic interest rate can move both ways, up or down.

2.2. Flow demand and supply conditions

The government budget constraint can here be resumed unchanged:

$$T + rK^T\beta + p_m d = \rho_m b p_m + e$$

On the other hand, the private sector identity needs to be modified to include flows of interests on foreign bonds and domestic bonds owned by foreigners:

III.60) $\quad rK^T(1-\beta) - T + ib_d p_m + \bar{i}b^f R = q_c + q_I p_k - ib_f R - e + dp_m$

The goods market refer to both consumption and investments. Supply is clearly due to domestic production and imports as:

$$\text{III.61)} \quad q_c + m_c IM - (1-h)e = C^d \{[(1-\beta)K^T p_k + (m+H)p_m + b^f R]\}$$

$$+ (1-s)\,[q + (d+\pi_m g)p_m - e + \bar{i}b^f R) + I$$

$$\text{III.61a)} \quad q_I p_K + m_I IM - he = I(r, p_K, i)$$

where:

$(m_c+m_1) = 1$ are respectively the proportion of consumption and of investment with respect to net imports[9]

Private demand for investment goods is here related to technology, r.

Now, ruling out wealth from the consumption demand, flow equilibrium requires that:

$$q_c + (1-m_I)IM - (1-h)e + q_I p_k + m_I IM - he = (1-s)[q + (d+\pi_m g)p_m$$

$$- e + \bar{i}b^f R] + I$$

which can be expressed in the usual form, in which private and government savings equate investment and balance of trade deficit:

$$\text{III.62)} \quad I - IM = s(q + (d+\pi_m g)p_m - e + \bar{i}b^f R) - (d+\pi_m g)p_m$$

Therefore, we have $p_k$ and i being determined by the two independent assets market relations. Hence, the third unknown $\dot{FR}$ is given by the consumption market equilibrium condition. This makes the net flow of

imports an endogenous variable which fills the target of a BOP balance.

2.3. Balance of payments

Trade deficit in the BOP is given by:

III.63) $tr = IM(NI,R)$

with: $\partial tr/\partial R > 0 \qquad \partial tr/\partial NI < 0$

Transfer payments surplus is:

III.64) $st = \bar{i}b^{f}R - i[(1-1/x)gp_{m} - H]$

or: $st = st(i,\dot{i},R,\dot{R},NI,\pi_{m},\pi_{k},r(p_{k})/p_{k})$

with: $\partial st/\partial \bar{i} > 0 \quad \partial st/\partial i < 0 \quad \partial st/\partial r \gtrless 0 \quad \partial st/\partial \dot{R} \gtrless 0$

$\partial st/\partial NI < 0 \quad \partial st/\partial \pi_{m} < 0 \quad \partial st/\partial \pi_{k} < 0 \quad \partial st/\partial p_{k} > 0$

The capital movement deficit is:

III.65) $\dot{cb} = DTH - D[(1-1/x)gp_{m}] + DF \quad$ where $D = \frac{d}{dt}$

Hence, the total surplus is

III.66) $BOP = st - \dot{cb} - IM = \dot{FR}$

Now we can show that:

$\partial \dot{cb}/\partial \beta < 0$

but, since $\partial st/\partial \beta < 0$, the initial effect of an uncompensated nationalization would reduce the BOP deficit, but the long run effect might

increase it.[10] The total effect would be given by:

$$(\partial \dot{cb} / \partial \beta) - (\partial st / \partial \beta)$$

2.4. The complete model

In the previous sections, we presented a complete model for a small open economy, where the government operates within competitive markets.

The complete model can be reassumed as:

III.53*) (a) $\dot{k} = I(i,r,p_k) - nk$ (b) $\dot{k}^G = he - nk^G$

(c) $\dot{k}^T = I(i) + he - n\dot{k}^T$

III.54*) $\dot{g} = d - ng$

III.55*) $p_k = \phi$

III.56*) $i = \psi$

III.57*) $q_c + (1-m)IM(q^d,R) - (1-h)e = C^d(a) + (1-s)NI$

III.58*) $\pi_m = 0$ III.59*) $\pi_k = 0$ III.60*) $p_m = p_m{}^W E$

III.61*) $\dot{FR} = tr + st - \dot{ch}$ III.62*) $e = e^*$ III.63*) $k^T = k + k^G$

Under a fixed exchange rate system, $\dot{R} = 0$, then, given $R,e,h,k^T$, $\beta,\gamma,b^f,s,m_c,\pi_m,\pi_k,x,\bar{i}$, exogenously, we remain with three equations with the three unknowns, $p_k,i,\dot{FR}$.

If we instead refer to a flexible exchange rate system, we have:

$$\dot{FR} = 0$$

and the rate of exchange becomes an endogenous variable.

Now, in steady state, the flow of international reserves has to be equal to zero. Therefore, we have from (III.60) that:

III.67) $$IM = st - \dot{cb}$$

We can substitute (III.67) into (III.56) and solve it for d, which can be substituted into (III.54):

III.54) $$\dot{g} = \frac{q_c + (1-m_I)(st - cb) - (1-h)e - (1-s)g + (1-s)e}{(1-s)p_m} - ng$$

Therefore, (III. 68)) and (III.53) form a complete dynamic system in the space g,k. The slope of the two relations can be proven as follows:

III.68) $$\left.\frac{\partial g}{\partial k}\right|_{\dot{k}=0} = -\frac{\overbrace{\underbrace{\frac{\partial I}{\partial i}}_{(-)}\underbrace{\frac{\partial i}{\partial k}}_{(\pm)}}^{(+\,-)} + \overbrace{\underbrace{\frac{\partial I}{\partial r}}_{(+)}\underbrace{\frac{\partial r}{\partial p_k}}_{(+)}\underbrace{\frac{\partial p_k}{\partial k}}_{(-)}}^{(-)} + \overbrace{\underbrace{\frac{\partial I}{\partial p_k}}_{(-)}\underbrace{\frac{\partial p_k}{\partial k}}_{(-)}}^{(+)} - n}{\underbrace{\underbrace{\frac{\partial I}{\partial I}}_{(-)}\underbrace{\frac{\partial i}{\partial G}}_{(\pm)}}_{(+\,-)} + \underbrace{\underbrace{\frac{\partial I}{\partial R}}_{(+)}\underbrace{\frac{\partial r}{\partial p_k}}_{(+)}\underbrace{\frac{\partial p_k}{\partial g}}_{(+)}}_{(+)} + \underbrace{\underbrace{\frac{\partial I}{\partial p_k}}_{(-)}\underbrace{\frac{\partial p_k}{\partial g}}_{(+)}}_{(-)}}$$

Therefore:

$$\left.\frac{\partial g}{\partial k}\right|_{\dot{k}=0} \gtrless 0$$ according to the different combinations we may have on (III.67)

III.69) $$\left.\frac{\partial g}{\partial k}\right|_{\dot{g}=0} = -\frac{(1-m_I)\overbrace{\frac{\partial st}{\partial K}}^{(+\,-)} - \overbrace{\frac{\partial \dot{cb}}{\partial K}}^{(-)}}{(1-m_I)\underbrace{\frac{\partial st}{\partial g}}_{(-)} - \underbrace{\frac{\partial \dot{cb}}{\partial g}}_{(-)} - n}$$

hence:

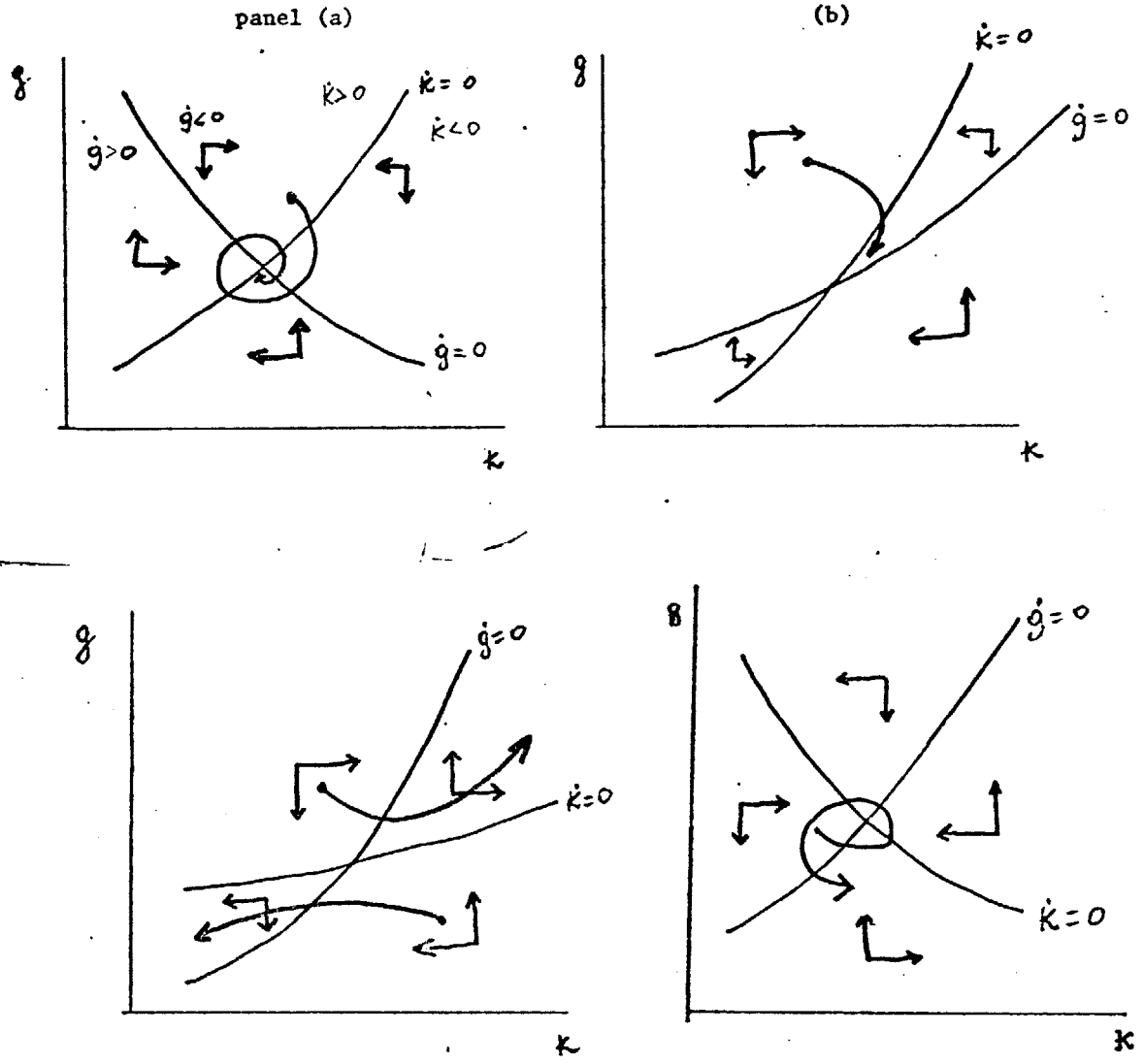
$$\left.\frac{\partial g}{\partial k}\right|_{\dot{g}=0} > 0 \text{ if } \frac{\partial st}{\partial K} > 0 \text{ and } \frac{\partial \dot{c}}{\partial g} > \frac{\partial st}{\partial g} - \frac{n}{(1-m_I)}$$

or:

$$\left.\frac{\partial g}{\partial k}\right|_{\dot{g}=0} < 0 \text{ if } \begin{cases} \text{a) } \frac{\partial st}{\partial K} > 0 \text{ and } \frac{\partial \dot{cb}}{\partial g} > \frac{\partial st}{\partial g} - \frac{n}{(1-m_I)} \\ \text{b) } \frac{\partial st}{\partial K} < 0;\ \left|\frac{\partial st}{\partial K}\right| > \left|\frac{\partial \dot{cb}}{\partial K}\right|;\ \frac{\partial \dot{cb}}{\partial g} > \frac{\partial st}{\partial g} - \frac{n}{(1-m_I)} \end{cases}$$

The crucial relation to determine the slope of (III.69) is then shown to be the relative size of the effects of k and g on the transfer payment and capital flows components of the BOP. The larger the effect on the capital flow, the more likely is the $\dot{g}=0$ schedule to be upward sloping. Therefore, even if we assume a positive slope for $\dot{k}=0$, several solutions

Fig.III.7



on the g,K space can be met. Obviously the conditions of a stable steady state equilibrium cannot always be found. In Figure III.7, we show two cases of stability, panels (a) and (b), and two cases of instability, panels (c) and (d). For the sake of simplicity, we consider the case of an increasing $\dot{k}=0$ schedule and a decreasing $\dot{g}=0$ schedule, as in Figure III.7, panel (a).

## 2.5. Government investments as a policy tool for a small open economy

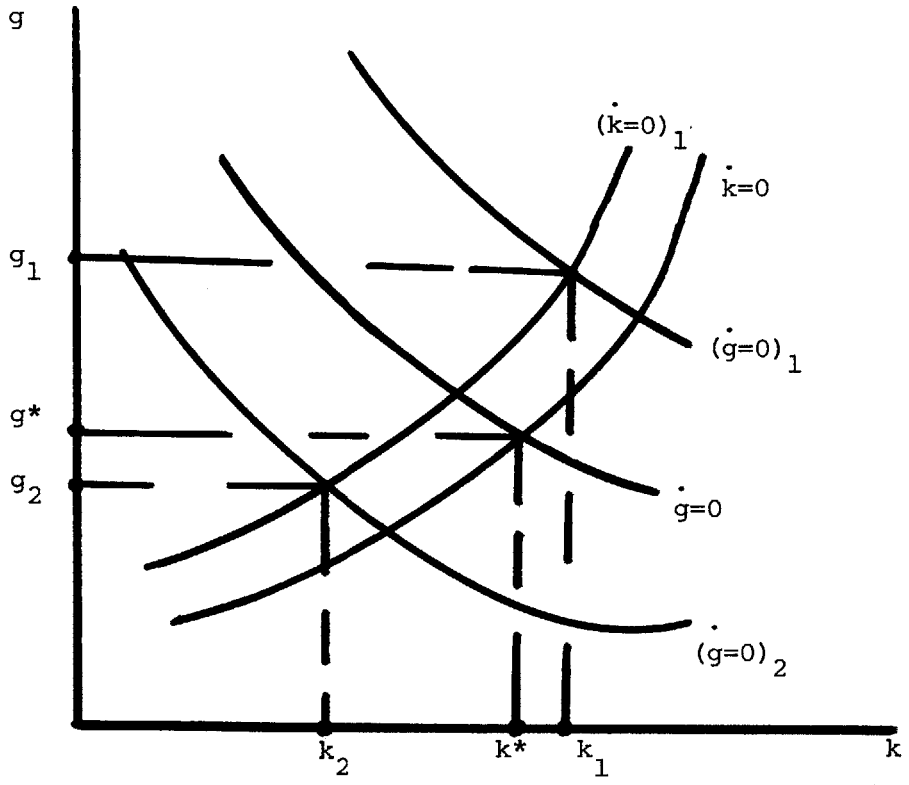
In this section we analyze the effects due to an uncompensated or a compensated nationalization, i.e. an increase in β followed or not by an increase in h.

Once β is increased, an increase in $p_k$ will follow while there is an uncertain result for i. If the interest rate increases, we are assured that investment will decline; hence, a $\dot{k}<0$ will appear, and the $\dot{k}=0$ schedule has to move upward at some $(k=0)_1$. (See Figure III.8)

On the $\dot{g}=0$ schedule, the impact of an increase in β depends on $\partial st/\partial\beta$ and $\partial\dot{cb}/\partial\beta$. As we have shown before, the initial effect is an increase of the BOP surplus, i.e. an upward shift of the $\dot{g}=0$ schedule is needed. The final result is then an increased intensity of private capital, k, as shown by $(\dot{g}=0)_1$ and $(\dot{k}=0)_1$. However, if the long run effect is considered, then the final position of the $\dot{g}=0$ schedule will depend on:

$$\partial\dot{cb}/\partial\beta - \partial st/\partial\beta$$

Fig.III.8



We can then refer to a situation like $(\dot{g}=0)_2$, in which both the private intensity of capital and the government debt decrease.

On the other hand, if an increase in $\beta$ is followed by an increase in h, the movement of $\dot{k}=0$ will not be affected, but the case of a $\dot{g}>0$ will be more likely. Therefore, an increased intensity of private capital may more easily be obtained, i.e. $(\dot{g}=0)_1$ is more likely.

This result brings us back to the issue that a government investment program may make an additional contribution to the accumulation of physical capital, without completely crowding out private capital. This result can be obtained only if the government propensity to save out of its expenditure can and actually is adjusted coherently.

# Chapter IV - "THE"OPTIMAL GROWTH PATH FOR THE ECONOMY AND OPTIMAL POLICIES FOR GOVERNMENT INVESTMENTS

Several studies[1] have shown that efficient government management of demand can lead the economy toward a given steady state growth path. Our own results confirm those findings. However, it is also known that perfect demand management through fiscal and monetary tools is not always practicable. Hence, government corporations can be assigned appropriate targets. We have already shown that "room" for government investment programs can be made available only by coordinating it with monetary and fiscal policies. Without coordination, either the growth path converges back to a purely competitive economy, or alternatively, the government assumes full ownership of the capital stock.

Thus far, we have not compared the different alternatives with respect to welfare parameters. It is always difficult to compare social and private benefits and costs of different target functions. In fact, "social efficiency" is still a very broad and inadequately defined concept.

Thus, we limit our analysis here to the possibilities open to government corporations for pursuing different growth paths, where purely competitive market conditions are not consistent with optimal growth.

1. Optimal Growth Path for a Mixed Economy

The social welfare function is a hotly debated issue. Nevertheless, we will here review some fairly well-known results.

Let us assume consumption is the final target for the society. Intermediate targets may, and actually must, include capital accumulation left over from one period to another.

Government social welfare functions will, therefore, refer to per capita total consumption,[2] and it might be expressed as the sum of its utility over either a finite or an infinite time span:

$$\text{IV.1)} \quad W = \int_o^{\infty} U(q_c(\tau))e^{-\delta\tau}d\tau$$

where we assume, for the sake of simplicity that U is a C.E.S. function, such that $U' > 0$ and $U'' < 0$. We also allow a positive social discount rate, $\delta$, and overlook the population weight debate which might well enter the value of $\delta$ itself.[3]

Our standard laws of capital accumulation remain as:

$$\text{(IV.2)} \quad \text{a)} \ \dot{k}^T = q_I - n\dot{k}^T \qquad \text{c)} \ \dot{k}^G = \frac{he}{p_k} - nk^G$$

$$\text{b)} \ \dot{k} = q_I(k^T, p_k) - \frac{he}{p_k} - nk$$

Initial conditions in the stock of capital are also given as:

$$\text{(IV.3)} \quad k^T(0) = k_o^T \qquad k(0) = k_o \qquad k^G(0) = k_o^G$$

Then, we restore the assumption of the government stabilizing the price of money through fiscal and monetary tools.

Therefore, the problem is reduced to working out the levels of the price of capital which will lead, through (IV.2) to a growth path maximizing (IV.1).

To find such an optimal path, an empirical method is used.

Let us consider the case in which one unit of current consumption is given up to increase investments which will allow higher consumption frontiers in the future.

The loss of utility due to the loss of one unit of consumption is:

$$(IV.4) \qquad U'[q_c(k^T(t),\ p_k(t))]$$

Now, since factor payments are always equal to the value of output, we have:

$$(IV.5) \qquad w(p_k) + r(p_k)k + r(p_k)k^G = q_c(k^T,\ p_k) + p_k q_I(k^T,\ p_k)$$

then:

$$(IV.6) \qquad q_c(k^T,\ p_k) = w(p_k) + r(p_k)k^T - p_k q_I(k^T,\ p_k)$$

Because of the unit increase in $k^T$, a higher production of investment goods is needed to maintain the new level of capital. Hence, the consumption we have, in the future, for a unit increase in $k^T$ is:

$$(IV.7) \qquad \partial q_c / \partial k^T = r(p_k) - np_k$$

and the increase in welfare is:

$$(IV.8) \qquad (1/p_k) \int_t^{\infty} [r(\tau) - np_k(\tau)]\ U'\ [q_c(\tau)]\ e^{-\delta(\tau-t)} d\tau$$

Therefore, along this growth path we have to verify that:

$$(IV.9) \qquad U'(q_c(t)) = (1/p_k) \int_t^{\infty} [r(\tau) - np_k(\tau)]\, U' [q_c(\tau)\ e^{-\delta(\tau-t)}\, d\tau$$

Time differentiation of (IV.9) will lead us to:

$$(IV.10) \qquad -U''\dot{q}_c = -(1/p_1) \Big( [r(t) - np_k(t)]\, U' [q_c(\tau)]c - [\delta - (\dot{p}_k/p_k)] \cdot \int_t^{\infty} [r(\tau) - np_k(\tau)]\, U' (q_c(\tau)]\, e^{-\delta(\tau-t)}\, d\tau \Big)$$

Then, by using (IV.9)

$$- U''\dot{q}_c = [\ -(1/p_k)(r(t) - np_k(t)) - (\delta - (\dot{p}_k/p_k))\ ]\ U'$$

or:

$$(IV.11) \quad [\ (r(p_k))/p_k + \dot{p}_k/p_k\ ] = n + \delta + \sigma\ \dot{q}_c/q_c$$

[where: $\sigma = -U''q_c/U'$ = elasticity of marginal utility of consumption]

This is the standard result which states the rule that the optimal rental price of capital is given by the rate of growth of population, plus the social discount rate, plus the rate of change in marginal utility. The last term clearly disappears in the steady state solution. Further, if $\delta$ tends to zero, the golden rule is also approached.

Since private and government capital productivity are here considered to be equal, i.e. no differential enters the utility function, such a general rule applies regardless of ownership of capital.

Under the constraint that the government aims to maintain its own share of capital by adjusting its propensity to save, equation IV.2b

becomes:

(IV.2b') $\dot{k} = (1-\beta)q_I - nk$

which, together with (IV.11) forms a complete dynamic system in the $k,p_k$ space. As is well known, such conditions are necessary but not sufficient, because several non optimal paths may satisfy them. Therefore, given initial conditions in the stock of capital, we need to look for "the" optimal values of $p_k^*$ which will tell us "the" optimal path.

As in the very first sections of this study, the $k,p_k$ space takes the form shown in Figure I.1, where dotted lines $\bar{p}_k$ and $\underline{p_k}$ represent the limits of non-specialization areas and the initial condition corresponds to $(1-\beta)k_o^T$ .

The $\dot{k}=0$ schedule, is upward sloping in the $k,p_k$ space. The $\dot{p}_k=0$ schedule, referred to in (IV.11) is also upward sloping. Further, we may note that when both are zero in steady state, we have from (IV.11):

(IV.11') $r(p_k) / p_k = n + \delta$

and

(IV.2") $(1-\beta)q_I (k^T, p_k) = nk$

Therefore, there is only one level of $p_k$ which can satisfy (IV.11'). Then, such a level of $p_k$ can be substituted into (IV.2"), which can now be solved for k. This proves that there is only one intersecting point, actually a tangent one, between the two dynamic schedules, as presented in Figure IV.1.

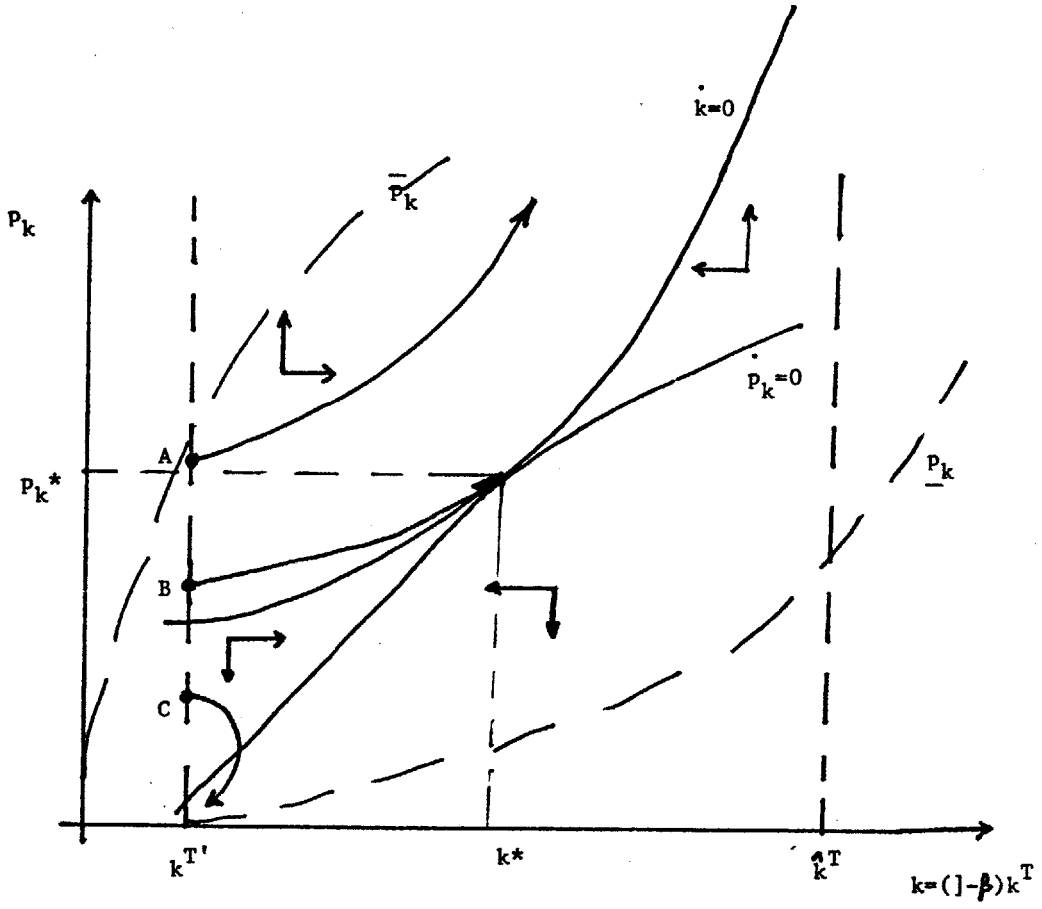



Fig.IV.1

What is now left to be proved is the uniqueness of the optimal path, i.e. the path B in Figure IV.1. Let us confine ourselves to the case of $k<k^*$. Clearly, if the initial $p_k$ is kept higher than $p_k^*$, then the price of capital will always increase and a path like A will occur. On the other hand, if the initial price of capital is taken at some level below the $\dot{k}=0$ curve, then it will decrease, with k increasing, until the $\dot{p}_k=0$ schedule is traversed. After that point, both $p_k$ and k will decrease, as shown in C. Therefore, there must be an initial level of $p_k$, above the $\dot{k}=0$ schedule, for which the price and the intensity of capital will increase. When $p_k$ reaches $p_k^*$, at the same time k reaches $k^*$.

The value of the price of capital is below $p_k^*$ along the optimal path B. Thus, we have the condition:

$$r(p_k) \; / \; p_k > \delta + n$$

Further, we may not that k always increases along such a path, since $k<k^*$. Hence, the production of consumption goods always increases along the optimal path. Exactly the opposite case is met if we start from $k>k^*$.

## 2. Optimal Fiscal and Monetary Policy

Within our closed economy framework, two targets must be met: a constant price of money $p_m^*$, and a level of the price of capital, $p_k$, such that the latter leads the system toward "the" optimal path.

If we assign fiscal policy to control the equilibrium condition

in the goods market, we have to ensure that:

$$(IV.12) \quad q_c(k^T, p_k) - (1-h)e = (1-s)(q_c + p_k q_I + dp_m^* - e)$$

where we exclude wealth effects on the consumption function, and we consider $\pi_k = \pi_m = 0$. Now, solving (IV.12) by d, we find:

$$(IV.13) \quad d = [sq_c - e(s-h) - (1-s)q_I p_k] \; / \; [(1-s)p_m^*]$$

where: $\partial d / \partial k^T > 0$ $\qquad$ $\delta d/\delta p_k < 0$

$\partial d / \partial e < 0$ $\qquad$ if $s > h$

$\partial d / \partial e > 0$ $\qquad$ if $s < h$

$\partial d / \partial h > 0$

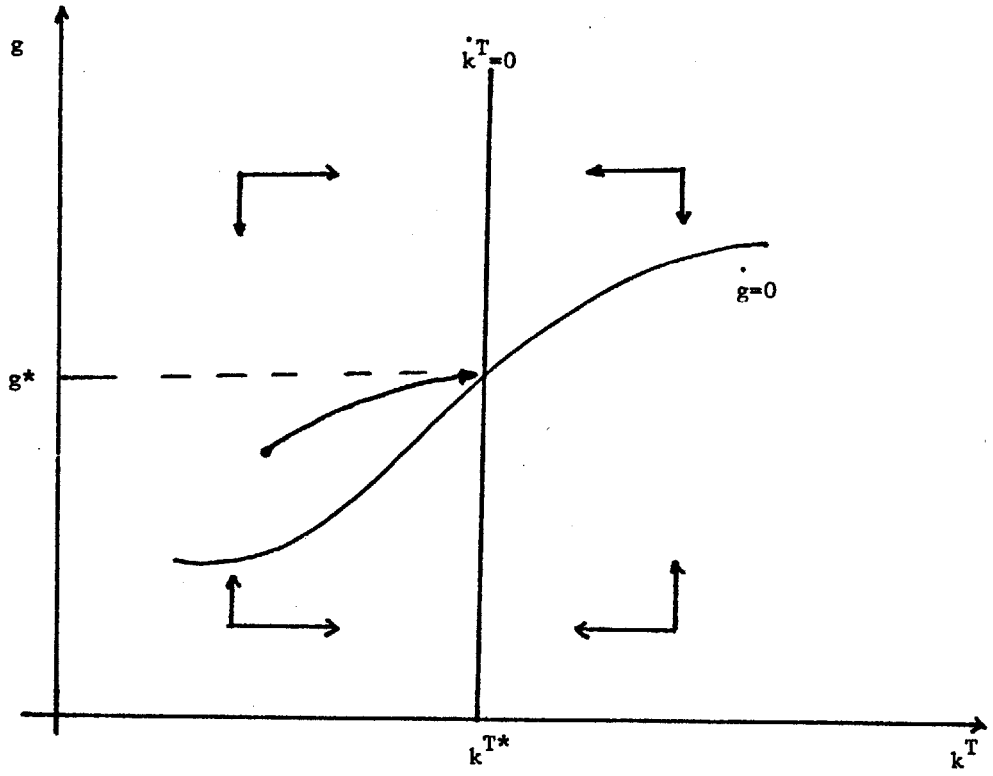
The relation between the government deficit and debt is still $\dot{g} = d - ng$. Hence:

$$(IV.14) \quad \dot{g} = d(k^T, p_k, e, h) - ng$$

Therefore, if we consider h as given by (II.12) and $\beta$ fixed at any level, $\beta^o$, and if we use traditional deficit policy to control the consumption goods market, we find the optimal solution in terms of the dynamic relations of government debt and capital accumulation.

In the $g, k^T$ space, we have a vertical line representing the locus of points in which $\dot{k}^T = 0$, while the $\dot{g}=0$ schedule may have different paths, not necessarily limited to positive values of government debt. Given the arrows pictured in Figure IV.2, it is easy to verify that an

Fig. IV.2



optimal path is available, and that the steady state solution for g is a stable one.

At this point, monetary policy can be used to fix the level of the price of capital which leads to the optimal welfare solution, i.e. in the asset market relation:

$$p_k = \phi(gp_m^*,\ k,\ \beta,\ \pi_m,\ \pi_k,\ x)$$

the debt/money ratio "x" has to be adjusted to maintain the optimal path for $p_k$.

Within this closed economy framework, we have more tools than targets. Indeed, we can manage the deficit, d, the government propensity to invest, h, and the debt/money ratio, x, to fix $p_m$ at $p_m^*$ , and move $p_k$ along the optimal path. Such an excess of tools may, however, be avoided if an additional target is given for the economy. As we shall see in the next section, a foreign account balance may be introduced into the analysis. But, let us now consider that some rigidity fixes the government expenditure at a level e*. Traditional fiscal policy can no longer be used. The government propensity to invest and its share of capital have to be used to balance the consumption goods relation. The government deficit is instead moved to keep $\dot{g} = 0$ in steady state. The complete model under such assumptions is:

(IV.1) (a) $\dot{k} = q_I - he/p_k - nk$ (b) $\dot{k}^G = he/p_k - nk^G$

(c) $\dot{k}^T = \dot{k} + \dot{k}^G$

2) $\dot{g} = d - ng$

3) $p_k = \phi(\gamma, k, \beta, \pi_k, \pi_m, x)$

4) $i = \psi(\gamma, k, \beta, \pi_k, \pi_m, x)$

5) $q_c(k^T, p_k) - (1-h)e = C^d\,[(1-\beta)k^T p_k + gp_m] + (1-s)[q+(d+\pi_m g)p_m - e + \pi_k p_k k]$

6) $\pi_m = 0$ 7) $\pi_k = 0$ 8) $p_m = p_m^*$

9) $p_k = p_k^*$ 10) $e = e^*$ 11) $d = d^*$

12) $k^T = k + k^G$

Where monetary policy in (IV.3) and (IV.4) moves $p_k$ along the optimal values, and $\beta^*$ and/or $h^*$ lead toward the optimal $k^*$ through (IV.5). Since all else is given, we can represent the cc and $\dot{k}=0$ dynamic schedules in the $\beta, p_k$ space. Once we accept condition (II.12), it is possible to verify that:

(IV.12) $$\partial\beta/\partial k\,\big|_{cc} = \frac{\overset{+}{-(\partial q_c/\partial k^T)}\overset{+}{(\partial k^T/\partial k)} - \overset{-}{(\partial q_I/\partial k^T)}(\partial k^T/\partial k)\beta p_k^* + (\partial c^d/\partial a)\,p_k^*}{\underset{+}{-q_I p_k^*} / e^* + (\partial c^d/\partial a)k^T p_k^*} > 0$$

provided <u>either</u>:

$$(\partial q_c/\partial k^T)(\partial k^T/\partial k) < [(\partial q_I/\partial k^T)(\partial k^T/\partial k)\ \beta p_k^* + (\partial c^d/\partial a)\ p_k^*]$$

and $(\partial c^d/\partial z)\ k^T p_k^* > q_I p_k^* / e^*$

that is: (+) / (+) > 0

<u>or</u>, both numerator and denominator in (IV.12) are negative:

(-) / (-) > 0

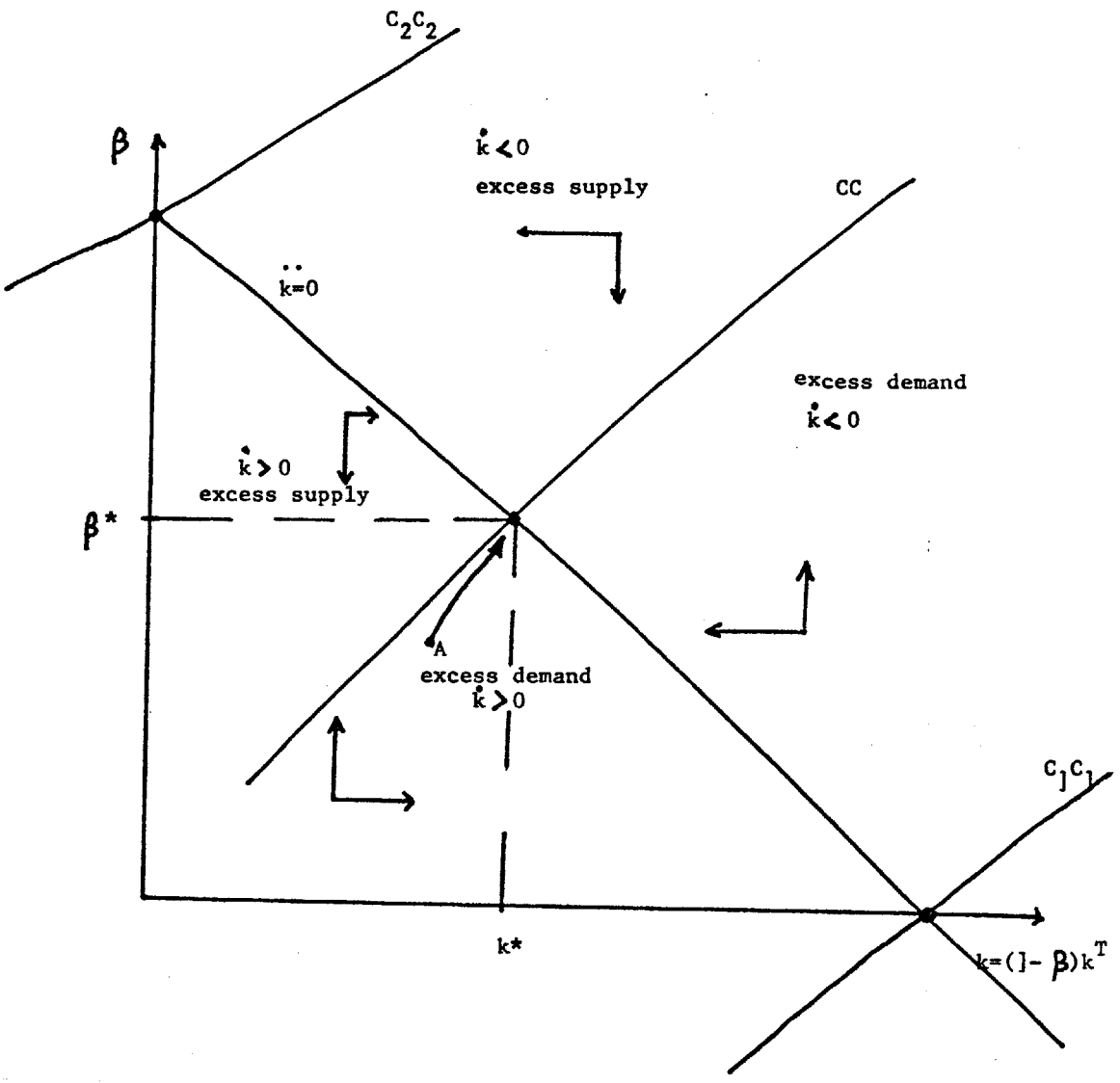
A negative slope applies to the $\dot{k}=0$ schedule since:

$$(IV.13) \qquad \partial\beta/\partial k\big|_{\dot{k}=0} = -[(-q_I) / \underset{(-)}{(\partial q_I)/(\partial k^T - n)}] < 0$$

Where the $\dot{k}=0$ schedule crosses the $\beta$ axis, the government share of capital is one, while at the point it crosses the k axis, no capital is owned by the government.

Now, the dynamic equilibrium condition depends on the position of the cc schedule. Indeed, as we show in Figure IV.3, there is no certainty that it will cross the $\dot{k}=0$ schedule within the range of values 0-1 for $\beta$. Some consumption market equilibrium relation could be at $c_2c_2$, or even above it. In this case, the consumption market will always be in an excess demand condition, i.e. the level of government expenditure is so high that it takes the whole production of investment goods, and a share of consumption goods which leaves private demand unsatisfied. Therefore, the total government expenditure "e" <u>must</u> be reduced.

Fig. IV.3


$C_2C_2$
$\beta$
$\dot{k}<0$
excess supply
CC
$\dot{k}=0$
excess demand
$\dot{k}<0$
$\dot{k}>0$
excess supply
$\beta^*$
A
excess demand
$\dot{k}>0$
$C_1C_1$
$k^*$
$k=(1-\beta)k^T$

The opposite case is met with the $c_1c_1$ schedule, i.e. the level of government expenditure is too low to keep $\beta$ positive. Note, finally, that the value of $\beta$ is not always directly related to that of h. Indeed, the level of per capita government expenditure has to be considered, too. From (II.12) we may note that when the government takes over investment goods production, i.e. $\beta \to 1$, its propensity to invest is given by the level of e. Thus:

$$\beta q_I p_k = he \qquad \text{or} \qquad h = q_I p_k / e$$

However, the equilibrium relation for the consumption goods market, by a once and for all jump in government expenditure, may be located at some cc. Then an optimal path for both $\beta$ and h is determined, and the steady state solution at $\beta^*$, $k^*$ and $k^{T*} = k^*/1-\beta^*$ is also a stable one.

Once the values of $\beta^*$ and $k^*$ are found, equation (IV.5) is left only with the monetary variable, x, to support the optimal path for $p_k$.

Several paths of $\beta$ and k can lead to an optimal steady state. Therefore, the sign for open market operations is uncertain. For instance, in path A, both $\beta$ and k are increasing. Since $\partial p_k/\partial\beta > 0$ and $\partial p_k/\partial k < 0$, the increasing share of government capital tends to increase the price of capital, while the increasing intensity of private capital tends to decrease it. Therefore, if the first effect prevails, $p_k$ is increasing. Then the value of $p_k$, along the optimal path has to be controlled. Open market sales have to be performed so long as the optimal value of the price of capital remains above the actual level. Alternatively, open market purchases are needed so long as it is below it.[4]

### 3. Optimal Policies for Government Investment in the Open Economy Case: Three Targets - Three Guns

The well known debate on how to manage an open economy focuses on the means of reaching external and internal equilibrium either through fixed or flexible exchange rates. C.P. Kindleberger and F. Modigliani[5] are associated with two opposing views. In short, the first author supports the idea of fixed parity, and proposes that the entire domestic economy should be adjusted through fiscal-monetary policy, such that no outflows of capital are produced. The second position stresses the point that in Kindleberger's proposal, the domestic economy, although maintaining an external and internal equilibrium, loses its power to reach a target path for capital accumulation. Within the CPK prescription, this path, indeed, is endogenously determined. Therefore, Modigliani proposes a greater flexibility in exchange rates, together with occasional use of specific taxes and incentives to modify the relative cost and return of domestic versus foreign uses and sources of funds.

This debate can be meshed with the analysis we have presented. Indeed, in the previous section we encountered the case of optimal fiscal and monetary policies leading the economy toward a welfare maximizing path, dependent on efficient management of the price of capital and of the accumulation of physical assets, under complete price stability.

But that was the case of a closed economy. In an open economy, we need to consider foreign account balances as an additional target. Therefore, through traditional fiscal and monetary policy, under a fixed

exchange rate, we can only fulfill two of the three targets. Indeed, if foreign accounts are introduced into the analysis, the price of capital can no longer be freely managed. It would be subject to international market conditions. Therefore, fiscal and monetary policy can be assigned to maintain internal and external equilibrium, but, given the international price of capital, the accumulation process will be only by chance an optimal one.

There is, however, the possibility of using government investment as a "third" tool. This was shown to be redundant in the closed economy framework, but is possibly very useful in an open economy.

In line with Modigliani's position, we too focus on the possibility of maintaining external and domestic equilibrium while running an optimal path of capital accumulation. However, differing from his position, we do not consider specific taxes and incentives as a means to keep investments along the optimal path. Instead, we analyze the role that direct government investment might play. Clearly, our analysis is similar to Modigliani's model in so far as additional direct government investments can be substituted by private investment, increased as a result of incentives. What remains is to assess the relative costs of the two policies. What level of incentives must be provided, or how much government investment is needed?

In the first section of Chapter III, we analyzed the possibilities and limits of government investment programs for a two country model of international trade.

We argued that government investments can be plugged into such a

framework, but they need first to be coordinated with fiscal and monetary policies, and second to be subject to international agreements. When the domestic economy grows along the optimal path under internal and external stability, what it maximizes is its own social welfare function. There is no assurance that the other country's welfare is also maximized, or that the other country agrees with such a policy. Therefore, not only does fiscal and monetary policy need to be agreed upon by the two countries, but also any kind of optimal path has to be internationally arranged. This is mainly due to the fact that government investment demand does not compete directly with private domestic demand for investment goods, since imports can always satisfy both. However, competition is present at world market levels where the world production of investment goods is given for any level of the price of capital. Hence, the "world" is affected by one country's government investment, and may react accordingly. This is not the case for a small open economy, where investment demand can always be satisfied by domestic production and imports. The latter, however, are too small to produce any reaction in the world market or in any other country.

Let us now re-examine the previously presented small country model:

*(IV.1) (a) $\dot{k} = I(i, p_k, r) - nk$ (b) $\dot{k}^G = he - nk^G$

(c) $\dot{k}^T = \dot{k} + \dot{k}^G$

*2) $\dot{g} = d - ng$

*3) $p_k = \phi(\gamma, k, \beta, \pi_k, \pi_m, x, \bar{i}, R)$

*4) $i = \psi(\gamma, k, \beta, \pi_k, \pi_m, x, \bar{i}, R)$

*5) (a) $q_c + (m_c)\ IM(q^d, R) - (1-h)e = c^d(a) + (1-s)[q^d]$

(b) $q_I + (m_I)\ IM(q^e, R) - he = I(R, i, p_k)$

*6) $\pi_m = 0$ *7) $\pi_k = 0$ *8) $p_m = p_m^w E$

*9) $\dot{FR} = q_c(k^T, p_k) - (1-h)e - (1-s)[q^e] + p_k q_I - he - p_k I(i, p_k, r)$

$+ \bar{i}\, b^f R - i(F-b) + \lambda(FR - b^f - cb) = -IM(q^d, R) + st + ib$

*10) $e = e^*$ *11) $k^T = k + k^G$

where, again a flexible exchange rate system removes condition (IV.8) and substitutes it by:

$(IV.8_{bis})\ \dot{FR} = 0$

and NDI = $q^d = q_c + q_I p_k + dp_m - e + \bar{i} b^f R$ = national disposable income

To consider a true small economy, we assume that the price of capital, $p_k$, and the level of the interest rate are given. Therefore, the domestic rate of interest must be equal to the world rate, which under a competitive market, will be equal to the world rental rate of capital, given by the world production technology, i.e.:

$$i = \bar{i} = r^w(p_k) \,/\, p_k^w$$

Now, the domestic rental rate will be exactly equal to the interest rate, if a non-specialized path is considered.[6]

Therefore, both i and $p_k$ are given in the system (IV.1) - (IV.11). Monetary policy can then manage the debt/money ratio, x, in order to have stock equilibrium in the assets market at the world level of $p_k$ and i. Fiscal policy manages the amount of deficit, d, keeping the balance of payments in equilibrium. However, as we anticipated, the accumulation process in physical assets, once $p_k$ is fixed, is endogenously given, unless the government propensity to invest, "h", can be managed, or the private investment function ,"I", can be shifted through direct taxes or incentives. At this point, the last step to be checked is the "optimal" rate of return of government investments.

Two cases may here be considered: first, where private investment depends only and exclusively on the world rental rate; and second, where the function ,"I", can be influenced by government shares of capital. Indeed, where governments enter competitive markets, they may cause a complete shift in the private investment schedule. This movement will be toward decreased investment for any given level of $p_k$, if government intervention is considered "harmful" in terms of expectations about future institutional arrangements. Alternatively, they may also increase private investments if government intervention is considered "helpful". In a perfectly competitive world capital market, the two cases are analogous. A closer analysis, however, should consider what resources are shifted from private use into government investment, or into government expenditures in general.

These resources may come from consumption and/or from savings. But savings can be invested either in physical capital, with a return equal to the world rental price, or in debt, either domestic or foreign. And, so far as the interest rate equalizes rentals, any dollar of private saving used to finance government investments, has an opportunity cost equal to the world private rate of return.

If this rate turns out to be socially optimal, then government investment should be evaluated by reference to this private rate. If, instead, there are differentials between the social marginal rate of transformation from present to future consumption and the marginal rate of substitution of individuals, then the question about the correct rate of return on government investments enters the still open debate on optimal decisions in a second-best world.

Before entering this debate, we will consider, in the following appendix, the case of both government consumption and investments entering the welfare functions, and the optimal policies to be pursued under such conditions. In Chapter V we will investigate the rate of return issue.

## Appendix to Chapter IV: OPTIMAL GROWTH PATH FOR A MIXED ECONOMY WITH BOTH CONSUMPTION AND GOVERNMENT CAPITAL ENTERING THE WELFARE FUNCTION

Government intervention in the economy in the pursuit of "social" targets has long been, and still is, a hotly debated issue both in theory and practice.

Many contributions have refused to attach any particular benefit to public policy, seeing it as causing a distortive reallocation of resources within a market system. Under a static framework, competitive equilibrium has been proved to represent a Paretian optimum solution, defined according to the original proposal of Pareto and Barone.[1]

Government policy may then be called for either to guarantee the competitive framework, to deal with the presence of "externalities" or to meet an income distribution target. In the first two cases the necessary conditions on the convexity of the functions both within the consumption and production sectors are not verified, and public policy can be assigned the goal of filling the gap. In the last one, the target is completely external to Paretian lines since for "any" given income distribution a Pareto-optimum solution can be proved to exist.

As is well known, the validity of this approach depends on the existence of a stable competitive equilibrium. Such conditions can not always be met. Some authors would rather support the idea that instability is the most general rule.[2]

Further, if the Keynesian case of under-employment equilibrium is referred to, government policy is urgently needed for the system to make

fuller use of its resources. Within a dynamic framework, further arguments can be made for the evaluation of public intervention in the market. First, the ramseyan criterion, used in the previous chapter, beyond the interpersonal measuring of utility, may also refer to subjective or social parameters. Second, an exact equivalent between dynamic competitive equilibrium and social optimum can not be proven to exist, nor necessarily can a competitive economy enter optimal paths spontaneously.

Placed on such a basis, fiscal and monetary policies have, by and large, represented "the" tool for achieving long run growth targets, and for the fine tuning of short run stabilization. Government corporations operating in a competitive market have very seldom been used.[3]

We have, however, shown that such a policy tool presents additional possibilities. Previous chapters examined this case within a very general economic framework. Welfare conditions under pure consumption maximization were also explored. However, government intervention in the economy may not be limited to the simple long run target of consumption maximization. Several other parameters may, in fact, be considered, and government agencies may well be called upon to manage them.

This appendix, therefore, analyzes the alternative paths that an economy might run to maximize welfare conditions, given by a multiparameter target function. Several combinations of private and social targets could be of interest. We will limit ourselves to considering only those targets that are relevant to the role that government

investment might play.

First, consider government expenditure for consumption goods entering the welfare function in a way different from per capita private consumption. In this case, the traditional trade off between private and public consumption is met, within the particular framework we introduced. Indeed, we saw how the government investment expenditure can influence per capita steady state private consumption. Therefore, in our analysis, the direct impact depends on the allocation of government expenditure to consumption and investment goods. As long as a social utility is granted to public consumption, the first flow directly affects welfare conditions. On the other hand, the second flow, investments, has its impact through making available a greater amount of private consumption goods. A further hypothesis refers to the case in which utility is also granted to government investments, per se. Indeed, they might be assigned particular targets resulting in the attainment of welfare gains. The function to be maximized would then include three different parameters: private consumption; public consumption; and government investments. Both government budget and national income identity would then be operative. In this study, production efficiency is not considered to be affected at all by the existence of government corporations. As previously stated, they are assumed to operate in the market like any other private corporation, and their presence does not affect the efficiency schedule of the economy.[4] Their peculiar feature is thus related simply to the social utility that such investments have, while the private ones do not directly enter the welfare function.

Therefore, for the sake of simplicity, we assume that government and private consumption enter the welfare function in the same way, i.e. only total per capita consumption will be referred to.

The welfare function is then given by:

(A.IV.1) $\int_o^\infty e^{-\rho t}\, U(q_c, k^G)dt$

which has to be maximized with respect to the following constraints:

(A.IV.2) $\dot{k} = q_I(k^T,\ p_k) - (he/p_k) - nk$

(A.IV.3) $he = \beta p_k q_i\ (k^T,\ p_k)$

(A.IV.4) $k^G = k^T\beta$

(A.IV.5) $k^T = k + k^T$

(A.IV.6) $q_c(k^T,\ p_k) - (1-h)e = (1-s)[q(k^T, p_k) + (d+\pi_m g)p_m - e]$

(A.IV.7) $\dot{g} = d - ng$

Now, we can solve (A.IV.6) for "d" and substitute it into (A.IV.1) to obtain:

(A.IV.7') $$\dot{g} = \frac{sq_c + \beta p_k q_I - se - (1-s)q_I}{(1 - s)p_m} - (n + \pi_m)g$$

where the constraint (A.IV.3) is also considered. Further, the relations (A.IV.3), (A.IV.4) and (A.IV.5) can be used to transform (A.IV.2) into:

(A.IV.2') $\dot{k} = (1-\beta)q_I - n(1-\beta)k^T$

The problem is now the maximization of (A.IV.1) subject to (A.IV.2') and (A.IV.7').

The Lagrangian can then be expressed as:

(A.IV.8) $L = U(q_c, \beta k^T) + \lambda_1[(1-\beta)q_I - n(1-\beta)k^T$

$$+ \lambda_2[\frac{sq_c + \beta p_k q_I - se - (1-s)q_I}{(1-s)p_m} - (n + \pi_m)g]$$

Now, we can assign to fiscal policy the target of stabilizing the rate of inflation $\pi_m$ at some value $\pi_m^*$. As mentioned before, monetary policy has to meet certain target levels of the price of capital, $p_k^*$.

Therefore, given the private propensity to save and the steady state variables, $k^T$ and g, the optimal growth path will be determined by using the instrument $\beta$, i.e. the intensity of government capital obtained through the government propensity to invest, h, as in (A.IV.3).

The first first-order condition is:

$$\frac{\partial L}{\partial \beta} = 0 = U_\beta k^T - \lambda_1[q_I - nk^T] + \lambda_2 \frac{p_k q_I}{(1-s)p_m}$$

which gives:

(A.IV.9) $$\lambda_1 = \frac{U_\beta k^T + \lambda_2[p_k q_I / (1-s)p_m]}{(q_I - nk^T)}$$

$$\frac{\partial L}{\partial g} = 0 = -\lambda_2(n + \pi_m) \quad \rightarrow \quad \text{(A.IV.10)} \quad \lambda_2 = 0$$

which shows a zero shadow price of the government debt, since no constraints are so far considered in the growth of g. The second first-order condition is:

$$\frac{\partial L}{\partial k^T} = U_{k^T}\beta + U_{q_c}\frac{\partial q_c}{\partial k^T} + \lambda_1 \left[ (1-\beta)\left(\frac{\partial q_I}{\partial k^T} - n\right)\right]$$

by which we obtain, through (A.IV.10),

$$\text{(A.IV.11)} \quad \lambda_1 = - \frac{U_{k^T}\beta + U_{q_c}\frac{\partial q_c}{\partial k^T}}{(1-\beta)\left(\frac{\partial q_I}{\partial k^T} - n\right)}$$

Now, by equalizing (A.IV.9) and (A.IV.11), we obtain:

$$\text{(A.IV.12)} \qquad \beta = \frac{[(r/p_k - n)\, U_\beta k^T - (q_I - nk^T)\, Uq_c r]}{[r/p_k - n)\, U_\beta k^T - (q_I - nk^T)\, U_{k^T}]}$$

At any point in time along any optimal path, and for any level of consumption goods and share of government capital, $\beta$, the marginal utility of consumption has to be equal to the marginal utility of government capital. Therefore, at each instant we can verify that:

$$Uq_c \frac{\partial q_c}{\partial k^T} = U_{k^T} = U_\beta k^T$$

Hence, the optimal solution for $\beta$ in steady state will be at a unity level, i.e. the whole stock of physical assets has to be owned by the

government.

This result also means that an economy where any price is controlled by the government is equivalent to a fully centralized economy.

Such a conclusion may well be surprising, but it can easily be explained. We argued that fiscal and monetary policies can control the price of money, $p_m$, and the price of capital, $p_k$, both expressed in terms of the price of consumption goods, $p_m$, taken as numeraire. Further, we did not constrain the expansion of government debt, g. Therefore, its shadow price turned out to be zero. In fact, two upper limits can be considered as constraints on g. The first is met within the consumption goods market. Indeed, provided the rate of inflation is not zero, the effects due to the so-called inflation-tax on disposable income have to be considered. We may correctly refer to a minimum level of private income related to some level of minimum consumption. We would then meet a constraint, such as:

$$\pi_m g \leq \pi^*_m g^*$$

Clearly, such a constraint is not met if the government maintains the price of money constant, i.e. the rate of inflation at zero. The second constraint is met within the assets market. Remember that in our model the debt/money ratio "x", is supposed to be moved to maintain a stock equilibrium in that market. However, a "liquidity trap" can limit the issue of money, or an aversion to government bonds can limit the issue of debt. These two cases can be expressed by a traditional "LM" curve, either perfectly elastic or totally inelastic to the rate of interest.

If either of these situations is met, an additional constraint is added to the previous (A.IV.2') and (A.IV.7'). Such a constraint is given by:

(A.IV.13) $$g \leq g^*$$

Our problem can then be expressed as:

$$\text{Max.} \quad \int_o^{\infty} e^{-\rho t}\, U(q_c,\ \beta k^T)\,dt$$

subject to: (A.IV.2'), (A.IV.8') and (A.IV.13).

The new expression for the Lagrangian is then:

(A.IV.8') $$L = U(q_c,\ \beta k^T) + \lambda_1[(1-\beta) - n(1-\beta)k^T]$$

$$+ \lambda_2\left[\frac{sq_c + \beta p_k q_I - se(1-s)q_I}{(1-s)\,p_m} - (n + \pi_m)g\right]$$

$$+ \lambda_3(g - g^*)$$

where, again we have two state variables, $k^T$ and g, and one instrument.

Now, the three first-order conditions for maximization are given by:

$$\frac{\partial L}{\partial \beta} = 0 = U_\beta k^T - \lambda_1(q_I - nk^T) + \lambda_2(p_k q_I) \,/\, (1-s)p_m$$

from which:

(A.IV.14) $$\lambda_1 = \frac{U_\beta k^T}{(q_I - nk^T)} + \lambda_2 \frac{p_k q_I}{(q_I - nk^T)(1-s)p_m}$$

and:

$$\frac{\partial L}{\partial g} = 0 \quad \rightarrow \quad \text{(A.IV.15)} \quad \lambda_2(n + \pi_m) = \lambda_3$$

and:

$$\frac{\partial L}{\partial k^T} = 0 = U_{q_c} r + U_{k^T}\beta + \lambda_1(1-\beta)(r/p_k - n) + \lambda_2[(sr + \beta r - (1 - s)\frac{r}{p_k})] / (1 - s)p_m$$

Now, we can substitute (A.IV.15) into (A.IV.14) and (A.IV.16):

$$\text{(A.IV.14')} \quad \lambda_1 = \frac{U_\beta k^T}{(q_I - nk^T)} + \lambda_3 \frac{p_k q_I}{n(q_I - nk^T)(1 - s)p_m}$$

$$\text{(A.IV.16')} \quad \lambda_1 = \frac{U_{q_c} r}{(1-\beta)[n - (r/p_k)]} + \frac{\beta U_{k^T}}{(1-\beta)[n - (r/p_k)]} + \frac{\lambda_3}{(1-\beta)[n - (r/p_k)]n(1 - s)p_m}[sr + \beta r - (1-s)(r/p_k)]$$

Further, $\lambda_1$ can be eliminated by equalizing (A.IV.14') to (A.IV.16'):

$$\text{(A.IV.17)} \quad \frac{U_\beta k^T}{(q_I - nk^T)} + \lambda_3 \frac{p_k q_I}{(q_I - nk^T)n(1 - s)p_m} = \frac{U_{q_c} r}{(1-\beta)[n-(r/p_k)]} + \frac{\beta U_{k^T}}{(1-\beta)[n - (r/p_k)]} + \lambda_3 \left[\frac{sr + \beta r - (1-s)(r/p_k)}{(1-\beta)[n - (r/p_k)]\, n(1-s)p_m}\right]$$

Therefore, given $p_k$ and $p_m$, achieved by fiscal and monetary policies, s and n as exogenously determined, the government intensity of capital, $\beta$, is left as a function of the total intensity of capital, $k^T$, and of the shadow price of the government debt, g.

Now, a system given by the three first-order conditions can be proven to be recursive. Indeed, given $\lambda_1$ and $\lambda_2$, $\lambda_3$ is determined. The relation (A.IV.16) can also be expressed as:

$$\lambda_1 = \frac{1}{(1-\beta)[(r/p_k) - n]} \left[ \lambda_2 \frac{[sr + \beta r - (1-s)(r/p_k)]}{(1 - s)p_m} \right.$$

$$\left. - U_{q_c} r - U_{k^T} \beta \right]$$

which can be substituted into (A.IV.14) to obtain:

$$\lambda_2 = f_1(k^T, \beta) \qquad \text{or} \qquad \beta = f_2(k^T, \lambda_1, \lambda_2)$$

Hence:

$$\lambda_2 \frac{[sr + \beta r - (1-s)(r/p_k)]}{(1-\beta)[(r/p_k) - n)(1-s)p_m} = U_{q_c} r + U_{k^T} \beta + \frac{U_\beta k^T}{q_I - nk^T}$$

$$+ \lambda_2 \frac{p_k q_I}{(q_I - nk^T)(1 - s)p_m}$$

which can be solved for $\lambda_2$ as:

$$\lambda_2 = [U_{q_c} r + U_{k^T} \beta + U_\beta k^T / (q_I - nk^T)] \ \ldots$$

$$\cdots \quad \frac{(1-\beta)[(r/p_k)- n](q_I - nk^T)(1 - s)p_m}{[sr + \beta r - (1-s)(r/p_k)][q_I - nk^T] - p_k q_I(1-\beta)[(r/p_k) - n]}$$

Now we can substitute it into (A.IV.14):

$$\lambda_1 = \frac{U_\beta k^T}{(q_I - nk^T)} + [U_{q_c} r + U_{k^T}\beta + U_\beta k^T / (q_I - nk^T)]$$

$$\frac{(1-\beta)[(r/p_k) - n]\ p_k q_I}{\{[sr + \beta r - (1-s)(r/p_k)](q_I - nk^T) - p_k q_I(1-\beta)[(r/p_k)-n]\}}$$

After substituting the values of $\lambda_1$, $\lambda_2$, $\lambda_3$ given by the first order conditions into the Lagrangian, we have:

$$\text{(A.IV.8")} \qquad L = U(q_c, \beta k^T) + \{ \frac{U_\beta k^T}{(q_I - nk^T)} + [U_{q_c} r + U_{k^T}\beta$$

$$+ U_\beta k^T/(q_I - nk^T)] \frac{(1-\beta)[(r/p_k) - n]\ p_k q_I}{[sr+\beta r-(1-s)(r/p_k)](q_I - nk^T) - p_k q_I(1-\beta)[(r/p_k)-n]} \}$$

$$(1-\beta)(q_I - nk^T) + \{[U_{q_c} r + U_{k^T}\beta + U_\beta k^T/(q_I - nk^T)]$$

$$\frac{(1-\beta)[(r/p_k)-n](q_I - nk^T)(1-s)p_m}{[sr+\beta r-(1-s)(r/p_k)](q_I - nk^T) - p_k q_I(1-\beta)[(r/p_k - n)]} \} \quad \cdots\cdot$$

$$.... \quad \{[\frac{sq_c+\beta p_k q_I - se-(1-s)q_I}{(1-s)p_m} - (n+\pi_m)g] + (n+\pi_m)(g-g^*)\}$$

which can be simplified in:

$$L = U(q_c, \beta k^T) + U_\beta k^T(1-\beta) + X[p_k q_I + sq_c - se-(1-s)q_I - ng^*(1-s)p_m]$$

where:

$$X = \frac{[U_{q_c} r + U_T \beta + U_\beta k^T/(q_I - nk^T)](1-\beta)[(r/p_k)-n](q_I-nk^T)}{[sr+\beta r-(1-s)(r/p_k)](q_I-nk^T)-p_k q_I(1-\beta)[(r/p_k)-n]}$$

Now, by making use of Pontryagin Maximum Principle we have:

$$\dot{\lambda}_1 = \alpha\lambda_1 + (-\partial L/\partial k^T)$$

$$\lambda_2 = \alpha\lambda_2 + (-\partial L/\partial g)$$

or:

(A.IV.18) $$\dot{\lambda}_1 = \alpha\lambda_1 - \{U_{k^T} + U_\beta k^T(1-\beta) + (\partial X/\partial k^T)\ [p_k q_I + sq_c - se-(1-s)q_c - (ng^* + \pi_m g)(1-s)p_m] + \dot{X}[(rs(1+p_k))/p_k]$$

(A.IV.19) $$\lambda_2 = \alpha\lambda_2$$

which together with (A.IV.2') and (A.IV.8') form a complete dynamic system where the instrument $\beta$ follows from (A.IV.17).

# Chapter V - OPTIMAL DISCOUNT RATES FOR INVESTMENT DECISIONS: MYOPIC PRIVATE RULES VERSUS HYPEROPIC GOVERNMENT RULES

The debate on government investments and their optimal rate of return has been concerned mainly with the case of projects involving social benefits and costs. Beyond this case, M.S. Feldstein[1] showed that the form of financing should also enter the evaluation. He clarified the two separate issues attached to measuring opportunity costs and discounting for time. Two peculiar aspects of our analysis need to be pointed out here. First, the kind of government investment we are considering does not exactly fill the standard definition of "social" investments. Indeed, we consider the government to be operating competitive corporations within a market economy. Production and technology are the same for both private and public enterprises. Second, when we do not include government expenditure in the social welfare function, we may also not include social benefits and costs from the evaluation of the projects. Only in the last section do we include them and work out the different rules that have to be followed.

Therefore, the government projects we consider are of the <u>self-financing kind</u>. Indeed, if their cash flows are always negative, whatever the rate we use to discount them, they will always be wealth decreasing. This obviously does not exclude the case of occasional cash deficits. The point is that during their life time, their sum must be positive. When this happens, discounting them at the social rate of time preference will leave the project with a non-negative present value.

Hence, their financing becomes an important issue to be investigated.

Feldstein's analysis, however, seems to present one main short coming: the role that the share of government capital can play in the determination of the shadow price of private investment is overlooked.

In the first section of this chapter, we examine the Feldstein proposal for the kind of investment we are analyzing. In the following section, we will point out the myopic or hyperopic results attached to the shortcoming we indicated.

## 1. Shadow Prices and Time Discounting Rules for the Financing of Government Projects

As is well known, in a second best world, there is no definite rate of discount which can simultaneously represent time preference and opportunity cost. In some analyses, the rate suggested is the rate of return on private capital, in others it is the time preference rate. Further approaches suggest that a weighted average between the two can be used.[2] A clear picture of the situation is given by M.S. Feldstein. He proposes to separate the evaluation of any opportunity cost involved with the project financing from the discounting rule to be used.

Once full consideration of shadow prices is taken into account, then the social time preference rates can and have to be used. Government investment expenditure can be financed through taxes or by the issue of debt and money. One dollar raised by taxes and used to finance a government project reduces both private consumption and investment.

As far as the reduction of consumption is concerned, the social time preference rate can appropriately be used. On the other hand, the reduction of investments at any time, "t", implies a reduction in the future stream of consumption which could have been obtained from them. Hence, the net present value of such consumption streams, discounted by the social time preference rate, represents the opportunity cost of foregone investments. If we consider a one dollar reduction in future investments, then the net present value of the consumption stream must be greater than one dollar. Following Feldstein's symbols, let us call the present value, S, so that one dollar of tax revenue used to finance government investment is worth[3] $[SA + (1-A)]$ dollars of private consumption, where A is the proportion taken off from private investment, and (1-A) is the amount of reduced consumption. A similar procedure can be used to evaluate the opportunity cost of a dollar raised through debt and money issue.

However, a distinction between money and debt has to be made, since "no interest" is paid on money. Thus, if the government finances investment by issuing debt, it needs to provide for interest payments, too. These again can be covered by taxes and/or by additional debt and money. Individuals receiving interest payments can then use them for consumption and investment. A complete evaluation should, however, include all these steps. Let us define $B_1$ as the share of interest payments financed by taxes; $B_2$ as the share due to debt; and $(1-B_1-B_2)$ as the share covered by issuing money. The bond holders are supposed to consume interest income in a proportion, C, and invest it in a

proportion (1-c). Let us define, "D", as the "excess" cost of one dollar issue of debt, and "M" as the cost of one dollar issue of money.

Now, if government pays an interest rate, r, then:

(V.2) $$rB_1(AS + 1 - A)$$

is the cost of enforcing additional taxes, and:

(V.3) $$rB_2(D + 1)$$

is the cost of imposing additional debt, and:

(V.4) $$r(1 - B_1 - B_2)(M + 1)$$

is the cost of additional issues of money. Against these costs, we have to put the effects of interest earned by private investments. These are equal to:

(V.5) $$r[C + (1 - C)S]$$

due to increased consumption and investment. Therefore, the total benefits and costs linked with interest payments are given by:

(V.6) $$rB_1(AS + 1 - A) + rB_2(D + 1) + r(1 - B_1 - B_2)(M + 1) - r[C + (1-C)S]$$

which may be discounted at the social time preference rate. If we consider the private propensity to consume as not depending on the interest rate, then any debt, when issued, reduces private investment by an equal amount. The total cost of debt financing is, therefore:

(V.7) $D + 1 = S + (6)/STP$ where STP = social time preference discount factor

from which the social cost can be measured as:

$$(V.8) \qquad D + 1 = \left[ dS + r[(B_1A+C)(S-1) + B_1 - S + (M+1)(1-B_1-B_2)] \right] / (d - rB_2)$$

It is then easy to verify that D = S-1, if no interests are paid on debt. This case can be applied to the measurement of the opportunity cost of issuing money, for which we may say that:

$$(V.9) \qquad (M + 1) = S$$

By substituting (V.9) into (V.8) we have:

$$(V.10) \qquad D + 1 = \left[ dS + r[(B_1A+C)(S-1) + B_1 - S(B_1+B_2)] \right] / (d - rB_2)$$

so that (D+1) = S, either if r = 0, or alternatively, when:

$$(V.11) \qquad C = B_1(1 - A)$$

i.e., when the propensity to consume out of interest payments is equal to their proportion covered by additional taxes which reduces private consumption. Relation (V.11) is similar to the result showed by Feldstein. Indeed, as long as money does not earn any interest, the inclusion of money in the financing of government expenditure, does not change the equalization condition between the shadow prices of investment and debt. Including money in this case is like having a higher share of taxes on investments. The effect of increasing money on the shadow price

of investment will be considered later.

The complete formula to evaluate government corporate investments can be stated as:

$$(V.12) \qquad NPV = \sum_{t=0}^{T} \left( (TR_t - TC_t)[(SA+1-A)Q_1 + (D+1)Q_2 + (M+1)(1-Q_2-Q_3)] \right) / (1+d)^t$$

where:[3]

TR = total revenue

TC = total costs

$Q_1$ = share of tax financing

$Q_2$ = share of debt financing

$1 - Q_1 - Q_2$ = share of money financing

Such relations correspond to Feldstein's contribution, where no social benefits or costs are implied, but where money issuing is considered.

2. Private investments shadow price, the propensity to invest, and the role of the government's share of capital

The case of a constant shadow price of private investment and of a constant propensity to invest is hardly met within the framework of a mixed economy where the share of government capital and the size of government investments are relevant enough not to be considered "marginal" to the whole economy. Therefore, the effects on the price of capital, $p_k$, and hence on private investments, have to be evaluated. Within a fully employed closed economy, the price of capital depends on the interest rate and on the debt/money ratio. Whatever the proportions

in which money and debt are moved, the price of capital will in all cases increase (as shown in Chapter 1), while the interest rate is likely to be lowered if more money than debt is issued. Alternatively, it is likely to be increased if the other case is met. Therefore, any debt and/or money issue decreases private investment and an increasing value of S should be considered.

Private propensity to save may still be considered a constant. The result will then be that private portfolios will include more financial assets and less physical capital.

Within a small open economy, both the price of capital and the interest rates are given. Therefore, any government deficits cause a capital outflow which needs to be counterbalanced by a tighter fiscal policy. Private disposable income will be lowered and both consumption and investment will decrease. Hence, any dollar taken off by taxes and used to finance government investments can be considered to affect the private allocation between consumption and investment.

In both cases, we need to substitute S and A in (V.12') with:

$$(V.15) \qquad S^*_t = S(TR_t - TC_t) \qquad \partial S_t/\partial(TR_t - TC_t) > 0$$

$$(V.16) \qquad A^*_t = A(TR_t - TC_t) \qquad \partial A_t/\partial(TR_t - TC_t) < 0$$

We now have:

$$'(V.12'') \qquad NPV =$$

$$\Sigma \left[ \alpha^1_t \left( [TR_t - TC_t][(S^*_t A^*_t - 1 - A^*)Q_1 + (D+1)Q_2 + (M+1)(1-Q_1Q_2)] \right) / (1+d)^t \right]$$

Then, cases of hyperopic decisions can be met whenever (V.12) is applied. Government investments processed under (V.12) should have been refused. While the government tries to increase the accumulation of capital, the economy comes out with less capital than in the case of no intervention.

Finally, this rule can also be applied to optimal subsidy policy. Again, (V.12") implies an over-subsidization which will lead to a lower investment process.

### 3. The Case of Social Benefits and Costs Entering Government Investment Decisions

Even if we refer in our analysis to government investments as not implying social benefits and costs, it is not difficult to apply the results we reached in the previous section to such a case.

In the evaluation of the cash flows, we would have to add together the "excess" of social benefits over total revenue and the "excess" of social cost over total cost. Hence, (V.12") will be defined as:

$$\text{(V.17)} \qquad NVP = \Sigma \left[ \alpha_t^1 \left( [TR_t - TC_t][(S_t^* A_t^* - 1 - A^*)Q_1 + (D+1)Q_2 + (M+1)(1-Q_1-Q_2)] \right) / (1+d)^t \right]$$

$$+ \Sigma \left[ [(b-TR) + (TC - c)] \; / \; (1+d)^t \right]$$

From (V.17), it is easy to verify that the shortcomings we pointed out earlier have to be corrected, even if social benefits and costs are included.

Part Two - TRENDS AND CYCLES OF THE ITALIAN ECONOMY AND THE ROLE OF GOVERNMENT CORPORATION INVESTMENTS IN THE LAST DECADE

INTRODUCTION

Chapter I - THE ECONOMETRIC MODEL OF THE UNIVERSITY OF BOLOGNA LINK PROJECT: STRUCTURE AND LINKAGES

Chapter II - THE IMPACT OF GOVERNMENT CORPORATION INVESTMENTS: 1967.I - 1976.IV

1. - The Investment Process in Italy
2. - The Effects of Government Corporation Investments on Production, Accumulation and Growth
3. - The Effects on Employment
4. - Prices, Wages and Distribution
   - 4.1 - The effects of Government Corporation investments on Italian inflation
   - 4.2 - Wages, productivity and unit labor cost
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5. - The Foreign Accounts Sector
6. - The Government Budget

INTRODUCTION

The post-war growth of the Italian economy has been remarkable for its intensity and continuity. The major economic transformations and developments of the 50's and the early 60's led Italy into the ranks of the most industrialized countries. A peculiarity of this growth has historically been the frequent Government intervention through direct investments in competitive enterprises. Indeed, Italian Government corporations have had, and still do today to an increasing extent, a consistent share of several markets.

In fact, the initial proposal for a Government Agency to take over and manage privately organized enterprises dates back to the days following the Great Depression in the early 1930's. At that time the banking system faced serious difficulties as a result of the collapse of several major industries.

The I.R.I. (Istituto per la Ricostruzione Industriale) was then assigned the task of assuming control of the major banks and steel corporations. State ownership was subsequently reinforced by the foundation of the E.N.I. (Ente Nazionale Idrocarburi) in the early 50's. The purpose of this Agency was to realize a cheap and easy supply of energy to support industrial growth.

Until the mid 60's, direct intervention in the market was limited to the fulfillment of long-run structural objectives.

The I.R.I., from one side, and the ENI, from the other, within a competitive framework, were supposed to regulate the markets, filling the two basic needs of industrial growth, oil and steel. In retrospect, these aims were successfully met.

However, the recessions experienced after the overheated period of 1962-1963 seem to have profoundly changed the role of the Italian Government corporations. To the original long-run growth targets, short-run stabilization targets have been increasingly added. In an, as yet, unfinished process, during the past decade, intervention through Government corporations has been used in an attempt to meet several different targets -- full employment on some occasions, stabilization on others, industrialization in the southern part of the country, take-overs of failing private corporations, etc...

Beyond some obvious benefits of pursuing these targets, the actual results are quite poor, and have puzzled many observers. Jumping from one target to another, and from one policy to another had led Italian Government corporations to a situation in which they no longer appear to have a clearly defined role. Today, their industrial and financial troubles are far worse than those of private enterprises.

Most likely, the overcoming of current economic difficulties in Italy depends on the future strategic role of the Government production sector.

However, our purpose in this study is not to investigate analytically the structure of the public sector, nor to analyze the full impact of its production -- financial and industrial decisions on the Italian economy. Rather, our analysis is limited to a first attempt to measure the effects of their investment decisions. The only quarterly model available for Italy, the one formulated by the University of Bologna, is here used to represent the structure of the economy.

Unfortunately, historical data for Government corporation invest-

ments are available only on an annual basis. Therefore, we have been constrained to compute quarterly series. Three hypotheses have been considered. The case of a moving average was tested together with a pro-cycle and an anti-cycle profile. The simulations performed were limited to treating Government Corporation investments as a demand shock which would be absent if such investment expenditures were not made. Comparisons with the "control" solution let one measure the effects on the production sector, and on Government accounts' relations. Clearly, because of the many constraints met in the analysis, no definite interpretation can be given to the results we obtained. First, the econometric model has some major failings: the financial sector and the interest rate structure are still inadequate, and the foreign account sector does not yet include capital movements. Second, the specific financial policy used by Government Corporations in their investments is not considered. Third, the impact of Government Corporation investments on the competitiveness of the economy and on the behavior of costing, pricing and accumulation is also not considered. Fourth, the results we obtain cannot be definitely attributable to government corporation investments. In fact, given the structure included in the model, any other investment expenditure performed with the same time profile of government investment would produce the same kind of effects.

These simulations, therefore, must be regarded as only a first approximation. They need deeper and more comprehensive analysis. Nevertheless, some quite interesting interpretations of the impact of government investments on the Italian economy can be outlined. Indeed, the increasing weight of government investments on growth, capital accumula-

tion and employment emerges in a clear cut way. In the early seventies they gave considerable support to the whole economy.

Like any demand shock, their short run effects are to increase inflation and government and foreign account deficits. However, the contribution to the growth of capital stock, and consequently to both production and productivity, soon becomes relevant. The switching point between the two effects, i.e. the demand push and the production capacity effects, was between 1971 and 1972. Had this not occurred, the performance of the Italian economy would have been worse than the actual path experienced after 1972, either in terms of production and employment, or in terms of inflation and BOP deficits.

However, two critical points on the efficiency of the system have to be considered. Government corporation investments are shown to have led Italian manufacturing industries toward, first, higher capital/labor ratios and, second, lower output/capital ratios. Therefore, such investments seem to have been made at a quite high capital intensity, associated with some traditional diminishing return path.

While the long run impact is quite clear, the contribution of government corporation investments to short run stabilization is barely significant. The results of both the pro-cycle and anti-cycle hypotheses are close to the ones of the moving average profile.

Obviously, a historical quarterly series would be the only correct way of testing their stabilization power. However, even with such a series, once investment projects are decided, it might be difficult to have their realization follow cyclical paths, because of the constraints of technical and managerial rules.

# Chapter I -- THE ECONOMETRIC MODEL OF THE UNIVERSITY OF BOLOGNA - LINK PROJECT: STRUCTURE AND LINKAGES

Several econometric models for the Italian economy have been estimated and tested over the last few years.[1] Unfortunately, the limited availability of data and the recent introduction of a new accounting system (S.E.C.)[2] have often limited these efforts to the investigation of major aggregate phenomena. The gap with the more sophisticated models elaborated in the rest of Europe and in the United States is still wide. The only quarterly model, completed and passed through a sufficiently long period of tests and simulations, is that of a group of economists at the University of Bologna.

This model has a basic neo-Keynesian structure where aggregate demand, managed by several fiscal and monetary tools, determines the level of production and employment, while its direct role in price determination is relatively weak. Indeed, a mark-up mechanism on direct cost, mainly the labor-cost, is the basic law of price formation. Clearly, demand conditions have an indirect law on prices through their effects on the unit labor cost.

In formulating the model, two major constraints have been considered. Indeed, the first effort of this analysis was devoted to an investigation of the impact of short run policy decisions. Therefore, to test the effect of several government instruments, a fairly wide fiscal and monetary sector was needed.

The second constraint was due to the relations of the model to a wider econometric effort, involving an international project developed

at the University of Pennsylvania. In fact, the University of Bologna model is part of the Project LINK which, as is well known, tries to relate several national models to a world-trade structure. Therefore, the foreign sector had to be elaborated in a major way to meet the needs of the international linkages. The other sectors of the economy are, on the other hand, still simple and unsophisticated. Further analyses are currently trying to improve their performance.

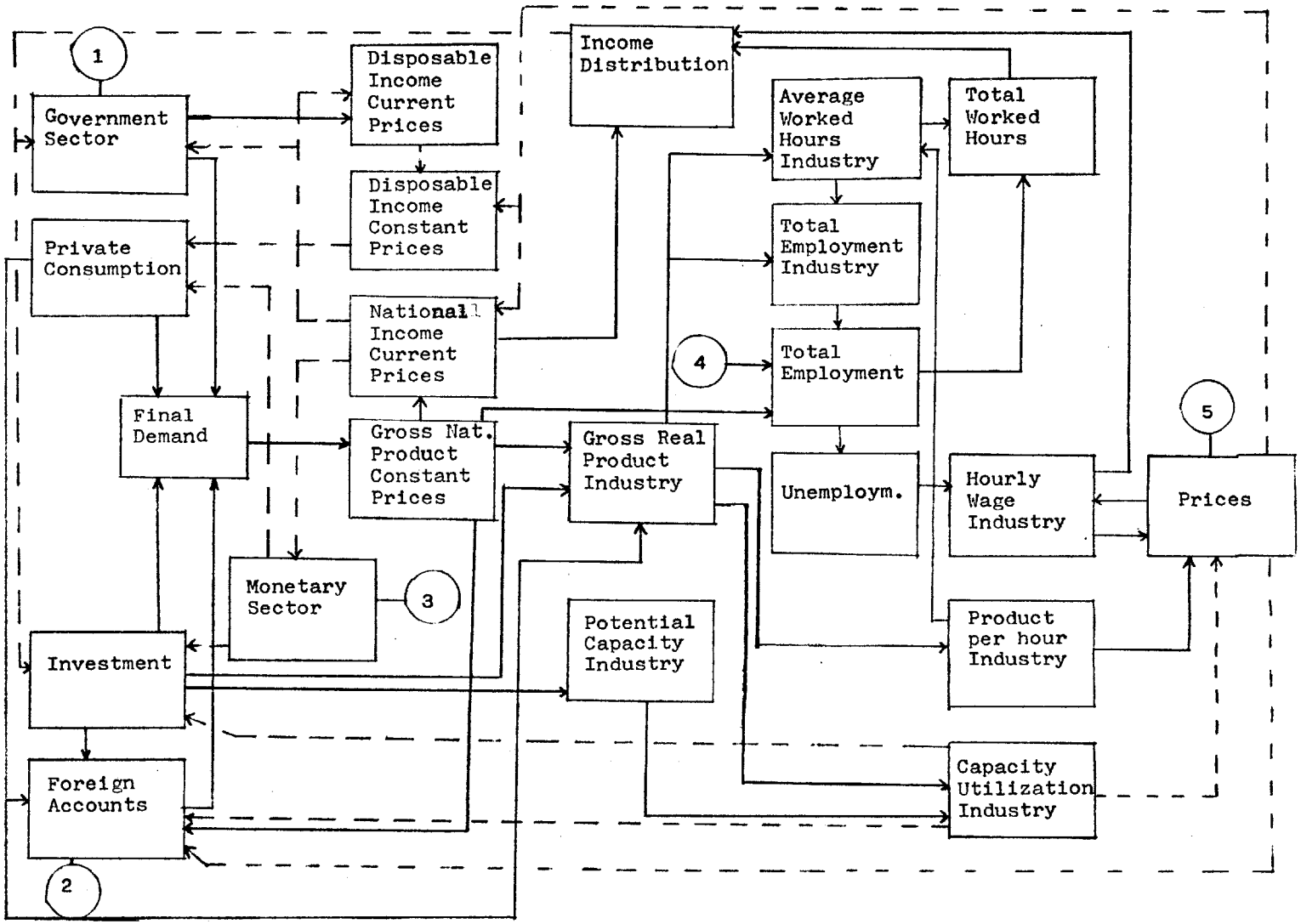
The actual version of the model is estimated over the period 1960. I-1974.IV according to a standard TSLS method. The structural relations are organized in four major blocks: a) final demand, b) production and employment, c) government sector, d) monetary relations (see Chart I.1).

1. Final Demand

Aggregate demand in the model is explained by three major behavioral rules: domestic, foreign and Government demand. The main item of domestic demand is private consumption, divided into durable and non-durable goods. It is related through a distributed lag structure to disposable income, to income distribution, and to the conditions in the money market. Therefore, both wage-price relations and fiscal-monetary policy affect private consumption.

Total investments are explained by a stock adjustment mechanism applied to the two different functions of fixed capital expenditure and inventories. Gross domestic product and domestic demand enter these functions together with interest rates and credit rationing, explaining the cost and availability of funds.

Fixed investments are then supposed to follow independent rules according to the expenditure for "structure," and "machinery and equipment."




1 Government Expenditure
2 World Trade and Prices
3 Monetary base and discount rate
4 Employment in Agriculture
5 Prices of imported raw materials

Demand flows

Supply flows

Main exogenous variables

In the latter item, to include both expectations on profitability and the effects of income distribution, profits and cash-flows are also considered.

Net exports are the second major component of final demand. They are computed as the difference between total exports for goods and services and total imports. Disposable income and the level of world trade relate such items to domestic and foreign purchasing capacity, while domestic, export and import-prices explain different conditions of international competition.

The third item, Government demand for goods and services, is mainly considered as a policy tool. Indeed, Government consumption is given exogenously in monetary terms, being endogenized in real terms through an endogenous deflator. Government investments, on the other hand, are not distinguished from private investments. While they can still be used as an independent tool, their behavior is not distinguished, and is included in the estimated behavior of the three investment functions.

Furthermore, the investments of Government Corporations in the Italian national accounts are not considered part of the public sector. Thus, we are constrained to use a model which includes private, Government Corporations' and strictly public investments in the same item.

2. Production and employment

Once final demand is explained, the level of production is also determined.

The composition of demand also tells us the level of activity in manufacturing, building, and services which then determines the level of

employment through a stock-adjustment mechanism.

Manufacturing is obviously a key sector of the Italian economy. Therefore a very important role is assigned to it in the model. Indeed, actual and potential production in manufacturing are the main cyclical indicators affecting the short-run dynamics of productivity. Therefore, with a given labor-force, the rate of unemployment is measured by considering the level of activity and productivity.

A standard Phillips curve is then introduced to measure the dynamics of wages with respect to the rate of unemployment. Wages are also determined by the consumption price index because of the very well known wage-indexation system operating within the Italian economy. The ratio between monetary wage and productivity is a measure of the unit labor cost which enters the deflator for the value added through the mark-up law of price formation. In the short run, however, the mark-up on labor cost and raw material is not considered as a constant but is supposed to depend on the level of demand and on the price of imported raw materials.

3. Government Sector

The current account deficit of the Government sector is the main indicator of Government Budget policies.

The major item of expenditure is given by purchases of consumption goods due primarily to wages and salaries and secondarily to rents, depreciation, and direct consumption of goods and services.

Government revenue is mainly due to direct taxes, indirect taxation and pay-roll taxes.

The quite complicated fiscal system of the Italian economy is

simplified in the model in order to explain the long lag between the time or formal ascertainment of tax revenue and its actual payment.

4. Monetary Relations

The banking system is the key of the monetary sector. The variables directly controlled by policy operators are exogenously determined. The main market considered is the one for demand and savings deposits, and a rate on long term bonds is supposed to clear it. The channels of monetary policy connect monetary decisions to the real sector of the economy, which is therefore affected by interest rates and a credit rationing index.

# Chapter II -- THE IMPACT OF GOVERNMENT CORPORATION INVESTMENTS: 1967.I-1976.IV

## 1. The Investment Process in Italy

Within several western countries, the expenditure for investment goods is usually the most subject to cyclical fluctuation. In Italy, however, the instability of the demand for investments is far greater than in many other cases. Indeed, after the first post-war crisis of 1963-64, the behavior of Italian investments has followed a very irregular path.

A further characteristic can be outlined by considering the three different medium-run trends experienced during the last ten years. As shown in Figure II.1, where the variable TCINV refers to total fixed investments, including the expenditure for machinery and equipment and the expenditure for both industrial and business construction, an increasing phase from 1967.I until 1973.IV is followed by a decline lasting almost two years and a recovery period in 1976 which brings the level back up only to that reached in 1971.III.

The declining trend of the last few years is also registered in percentage terms with respect to GNP. As referred to in Table II.1, from a level almost exactly 20 percent, the ratio falls to 17.7 percent.

Further interesting information emerges from considering government corporations and private investment behavior separately.

As already noted, government corporation investments are available only at an annual level. We therefore considered three different hypotheses for representing their quarterly outline.[1] Figure II.3 shows the

three cases. No relevant differences seem to be attached to the different hypotheses until 1971-72. Major variations might have been experienced after that point if short run stabilization policies had been pursued. However, as we will see later, the effects related to each of them do not seem very different, and the moving average case will be considered in most of the following comments.

By comparing the rate of growth of private and Government Corporation investments, Table II.4, their different behavior comes out very clearly. Indeed, the role of Government Corporation expenditure for investments goods is very remarkable in the first part of the decade, from 1968 until 1972, while a deeply negative contribution is shown for the last four years.

Private investments, on the other hand, after the substained growth of the first three years, show a very long period of decline lasting over two years.

It is interesting to note that while Government Corporations made a great investment effort during the stagnant years of 1970-72, they did not react to the 1973-74 growth. Instead, they entered a dangerous period of decline, not ended even during the recent 1976 recovery. This phenomenon is even clearer in Table II.5 and Figure II.4, where the ratio between Government Corporations and national investments are presented.

From a level ranging around 9 to 10 percent in the 60's, the ratio grows to over 16 percent in 1972 and then declines to 11 - 12 percent. The absolute size and timing of Government Corporation investments easily show how important they have been and could be in the future for the Italian economy. Therefore, their impact on the economic system is by

Table II.1 - Total Fixed Investments at 1963 prices billion of liras

| Year | Fixed Investments | Fixed Investments as percentage of GNP |
|---|---|---|
| 1967 | 6896 | 18.95 |
| 1968 | 7567 | 19.52 |
| 1969 | 8134 | 19.65 |
| 1970 | 8828 | 19.73 |
| 1971 | 8941 | 19.95 |
| 1972 | 9069 | 19.28 |
| 1973 | 9749 | 19.93 |
| 1974 | 9926 | 19.38 |
| 1975 | 8946 | 17.91 |
| 1976 | 9754 | 17.71 |

Table II.2 - TCINV=Total fixed Investment, control solution
TMINV=Total fixed investments, moving average solution

| | TCINV | TMINV |
|---|---|---|
| 6701 | 1645.00 | 1489.00 |
| 6702 | 1723.00 | 1536.00 |
| 6703 | 1756.00 | 1545.00 |
| 6704 | 1772.00 | 1551.00 |
| 6801 | 1769.00 | 1547.00 |
| 6802 | 1837.00 | 1618.00 |
| 6803 | 1938.00 | 1721.00 |
| 6804 | 2023.00 | 1804.00 |
| 6901 | 1956.00 | 1736.00 |
| 6902 | 2099.00 | 1887.00 |
| 6903 | 2223.00 | 2002.00 |
| 6904 | 1856.00 | 1620.00 |
| 7001 | 2100.00 | 1858.00 |
| 7002 | 2151.00 | 1899.00 |
| 7003 | 2268.00 | 2015.00 |
| 7004 | 2309.00 | 2064.00 |
| 7101 | 2120.00 | 1862.00 |
| 7102 | 2170.00 | 1907.00 |
| 7103 | 2413.00 | 2146.00 |
| 7104 | 2238.00 | 1953.00 |
| 7201 | 2139.00 | 1845.00 |
| 7202 | 2243.00 | 1946.00 |
| 7203 | 2354.00 | 2045.00 |
| 7204 | 2333.00 | 2014.00 |
| 7301 | 2353.00 | 2043.00 |
| 7302 | 2355.00 | 2041.00 |
| 7303 | 2375.00 | 2055.00 |
| 7304 | 2666.00 | 2341.00 |
| 7401 | 2470.00 | 2135.00 |
| 7402 | 2496.00 | 2171.00 |
| 7403 | 2475.00 | 2171.00 |
| 7404 | 2485.00 | 2169.00 |
| 7501 | 2301.00 | 2022.00 |
| 7502 | 2207.00 | 1929.00 |
| 7503 | 2149.00 | 1851.00 |
| 7504 | 2289.00 | 1960.00 |
| 7601 | 2334.00 | 1979.00 |
| 7602 | 2435.00 | 2090.00 |
| 7603 | 2485.00 | 2152.00 |
| 7604 | 2500.00 | 2166.00 |
| | 1 | 2 |

billions of 1963 lire

Fig.II-1 TCINV= Total Expenditure for Fixed Investments, control solution
TMINV= Total Expenditure for Fixed Investments, moving-average solution

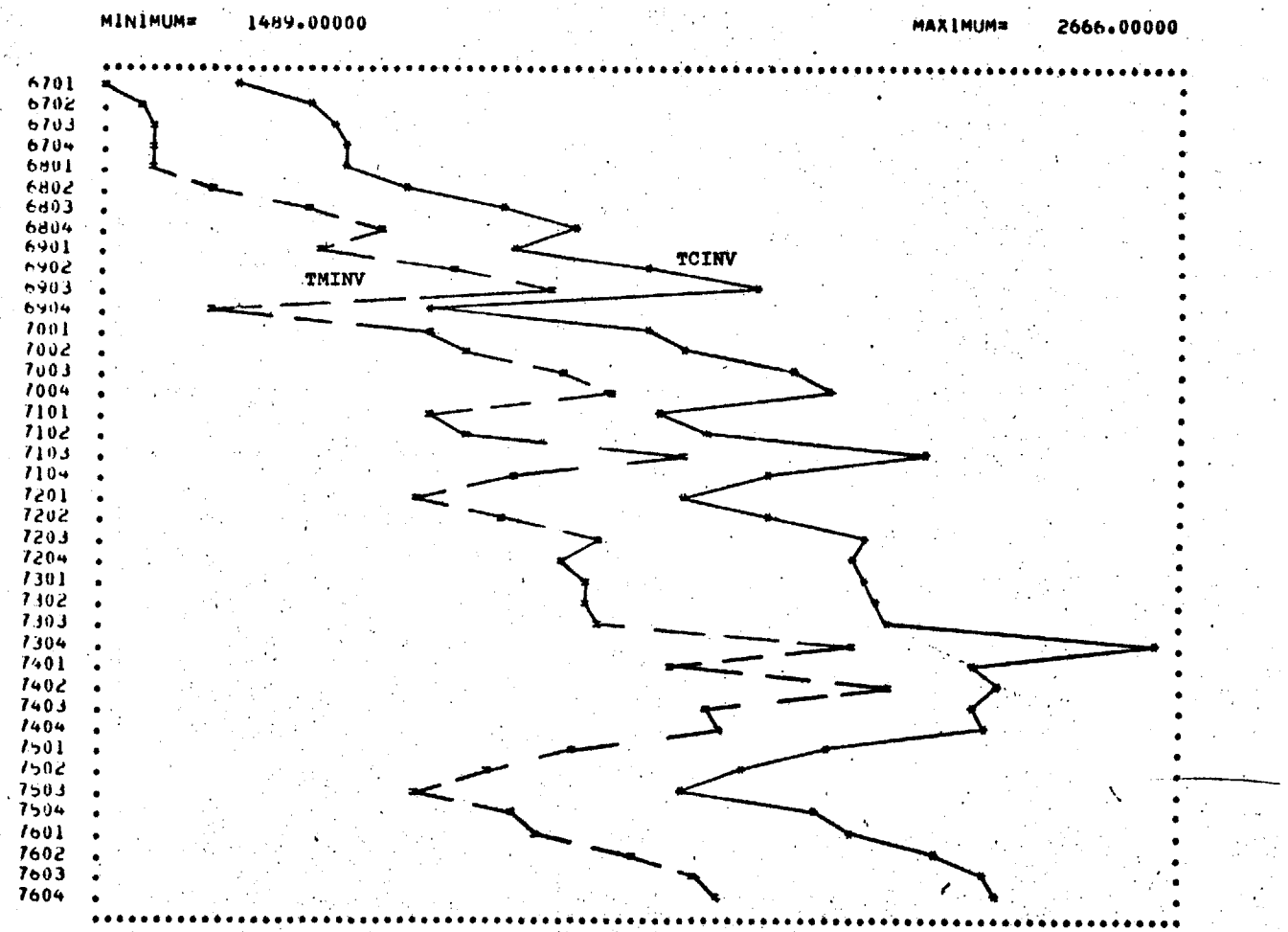


Fig. II.2 - Differentials between total fixed investments under the control solution and the moving average solution, billions of 1963 lire.

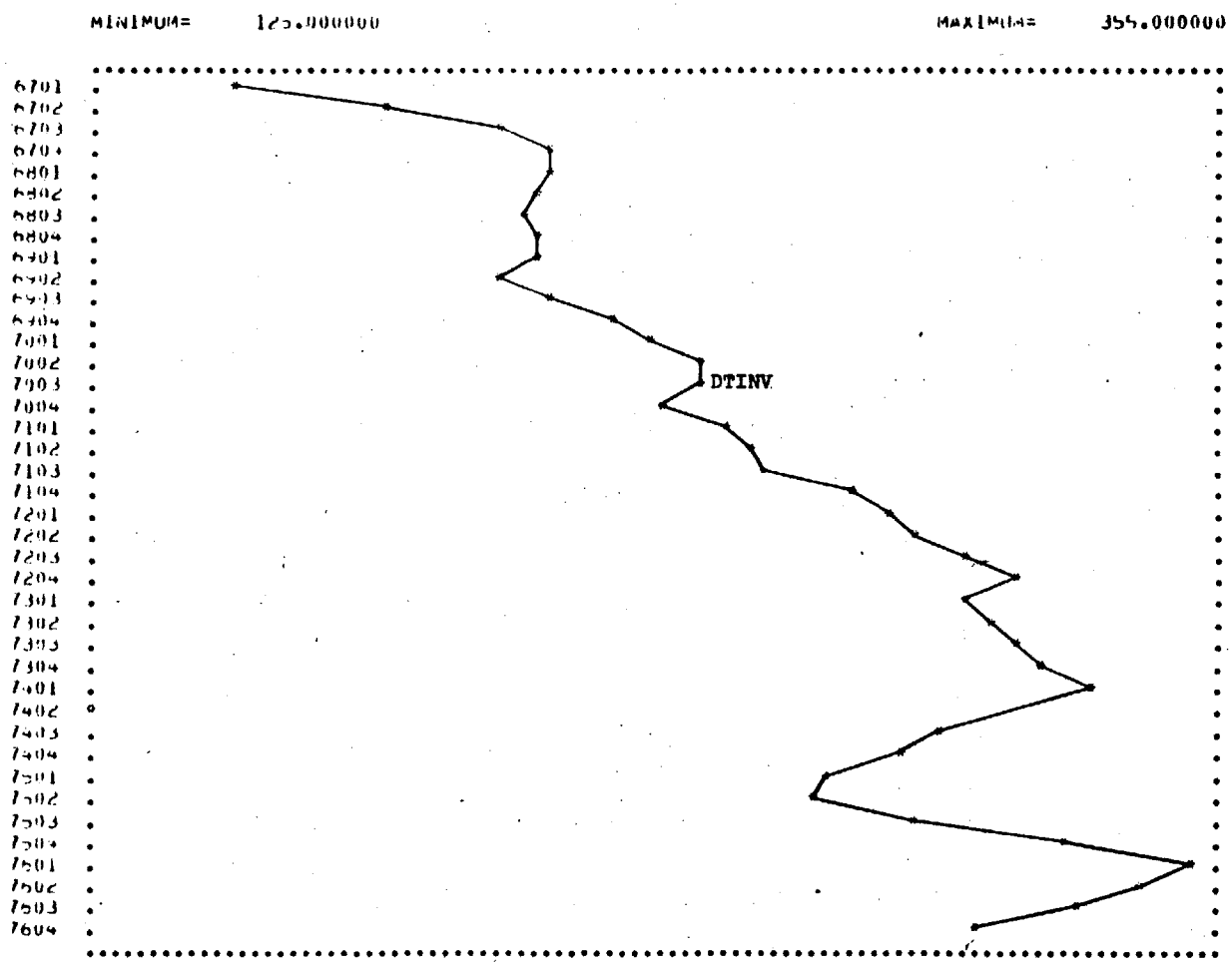


Table II.3 - Government Corporation Investments:
MIPI= quarterly series obtained by a moving average criterium
YIPI= pro-cycle case
AIPI= anti-cycle case

| | MIPI | YIPI | AIPI |
|---|---|---|---|
| 6701 | 154.000 | 157.000 | 165.000 |
| 6702 | 158.000 | 163.000 | 163.000 |
| 6703 | 166.000 | 163.000 | 163.000 |
| 6704 | 171.000 | 165.000 | 157.000 |
| 6801 | 176.000 | 179.000 | 195.000 |
| 6802 | 181.000 | 182.000 | 190.000 |
| 6803 | 192.000 | 190.000 | 182.000 |
| 6804 | 199.000 | 195.000 | 179.000 |
| 6901 | 196.000 | 207.000 | 215.000 |
| 6902 | 200.000 | 225.000 | 191.000 |
| 6903 | 221.000 | 215.000 | 207.000 |
| 6904 | 235.000 | 191.000 | 225.000 |
| 7001 | 250.000 | 260.000 | 285.000 |
| 7002 | 265.000 | 268.000 | 278.000 |
| 7003 | 297.000 | 278.000 | 268.000 |
| 7004 | 308.000 | 285.000 | 260.000 |
| 7101 | 321.000 | 341.000 | 322.000 |
| 7102 | 332.000 | 322.000 | 341.000 |
| 7103 | 351.000 | 325.000 | 337.000 |
| 7104 | 359.000 | 337.000 | 325.000 |
| 7201 | 362.000 | 355.000 | 397.000 |
| 7202 | 371.000 | 357.000 | 383.000 |
| 7203 | 390.000 | 383.000 | 357.000 |
| 7204 | 395.000 | 397.000 | 355.000 |
| 7301 | 386.000 | 296.000 | 402.000 |
| 7302 | 372.000 | 357.000 | 384.000 |
| 7303 | 380.000 | 385.000 | 357.000 |
| 7304 | 388.000 | 402.000 | 296.000 |
| 7401 | 387.000 | 333.000 | 334.000 |
| 7402 | 376.000 | 347.000 | 308.000 |
| 7403 | 360.000 | 334.000 | 333.000 |
| 7404 | 344.000 | 308.000 | 347.000 |
| 7501 | 320.000 | 323.000 | 305.000 |
| 7502 | 315.000 | 309.000 | 315.000 |
| 7503 | 324.000 | 305.000 | 323.000 |
| 7504 | 331.000 | 315.000 | 309.000 |
| 7601 | 340.000 | 277.000 | 293.000 |
| 7602 | 325.000 | 282.000 | 282.000 |
| 7603 | 309.000 | 282.000 | 282.000 |
| 7604 | 285.000 | 293.000 | 277.000 |
| | 1 | 2 | 3 |

billions of lire, constant prices

Fig. II.3
Government corporation investments

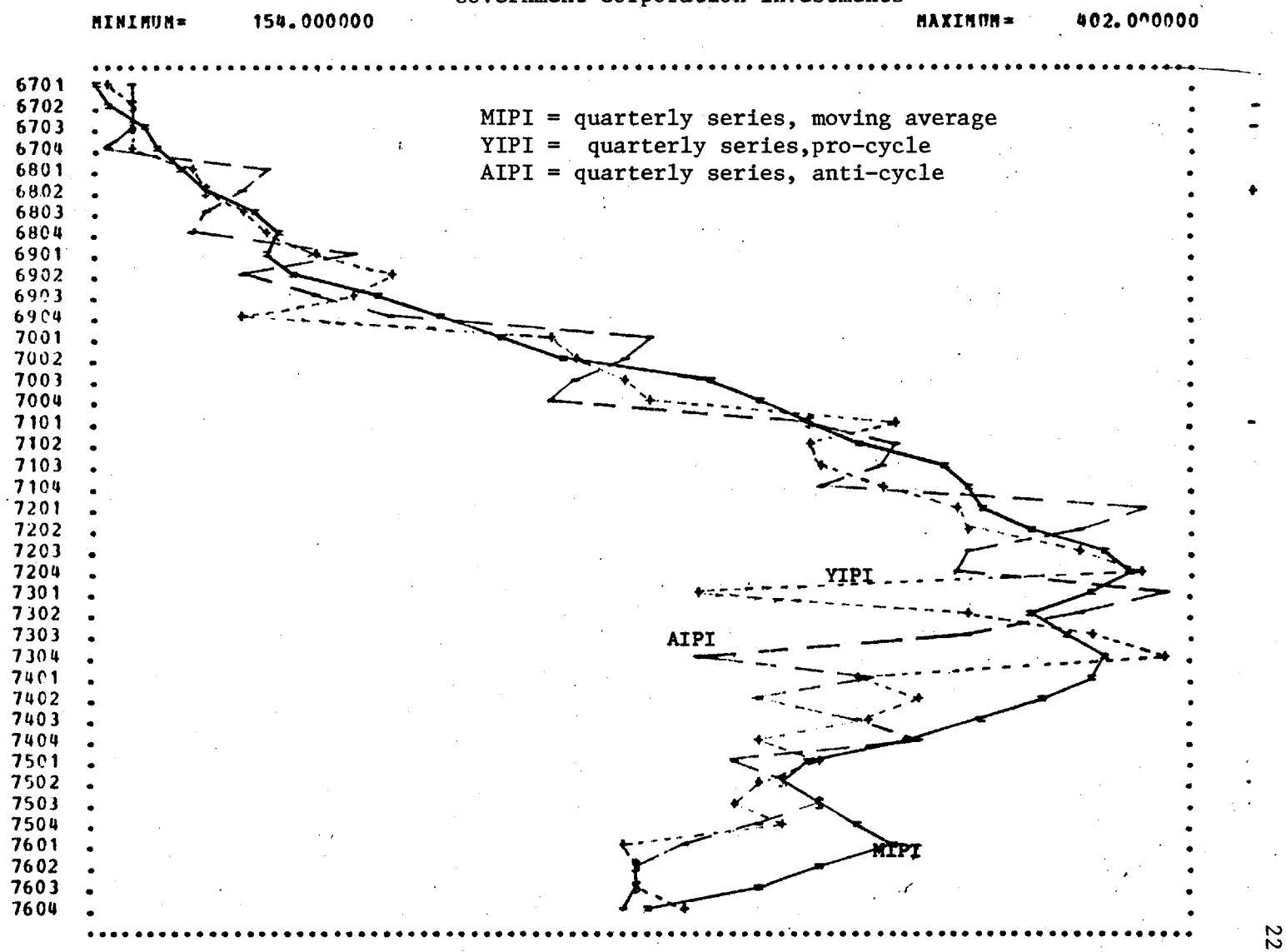


Table II.4 - Annual rate of change of fixed investments at 1963 prices

| year | total | government corporations investments | private investments |
|---|---|---|---|
| 1968 | 9.73 | 15.25 | 9.16 |
| 1969 | 7.49 | 13.40 | 6.79 |
| 1970 | 8.53 | 31.45 | 5.82 |
| 1971 | 1.28 | 21.70 | - 1.68 |
| 1972 | 1.43 | 11.37 | - 0.36 |
| 1973 | 7.49 | 0.53 | 8.90 |
| 1974 | 1.81 | - 3.86 | 2.87 |
| 1975 | - 9.87 | - 12.06 | - 9.49 |
| 1976 | 9.03 | - 2.40 | 10.95 |

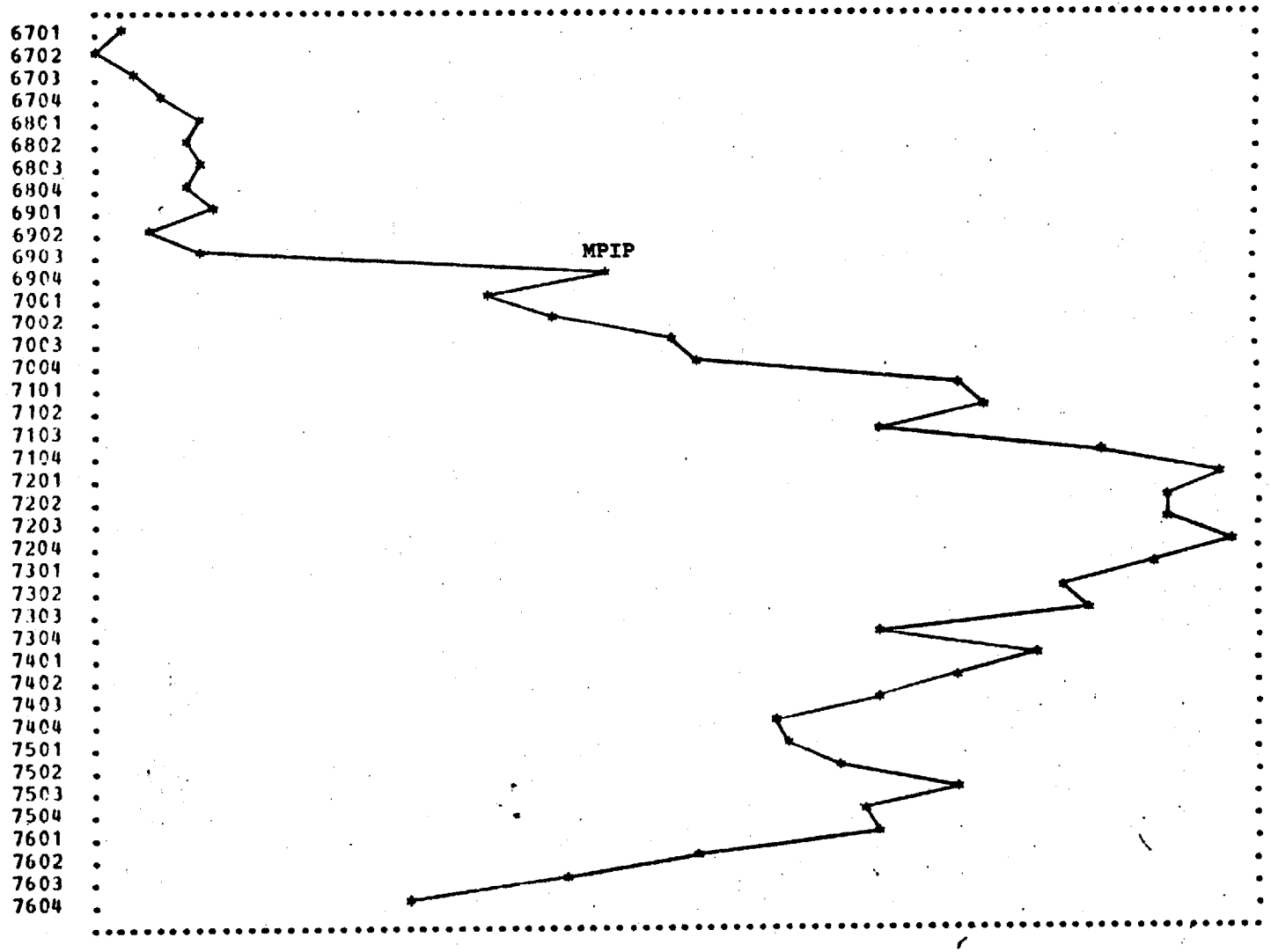
Table II.5 - Government corporation investments as percentage of total fixed investments, 1963 orices, quarterly series.

| | MIPIP |
|---|---|
| 6701 | .936170E-01 |
| 6702 | .917005E-01 |
| 6703 | .945330E-01 |
| 6704 | .965011E-01 |
| 6801 | .994912E-01 |
| 6802 | .985302E-01 |
| 6803 | .990712E-01 |
| 6804 | .983687E-01 |
| 6901 | .100204 |
| 6902 | .952834E-01 |
| 6903 | .994152E-01 |
| 6904 | .126616 |
| 7001 | .119048 |
| 7002 | .123199 |
| 7003 | .130952 |
| 7004 | .133391 |
| 7101 | .151415 |
| 7102 | .152995 |
| 7103 | .145462 |
| 7104 | .160411 |
| 7201 | .169238 |
| 7202 | .165403 |
| 7203 | .165675 |
| 7204 | .169310 |
| 7301 | .164046 |
| 7302 | .157962 |
| 7303 | .160000 |
| 7304 | .145536 |
| 7401 | .156680 |
| 7402 | .150641 |
| 7403 | .145455 |
| 7404 | .138431 |
| 7501 | .139070 |
| 7502 | .142728 |
| 7503 | .150768 |
| 7504 | .144605 |
| 7601 | .145673 |
| 7602 | .133470 |
| 7603 | .124346 |
| 7604 | .114000 |

1

Fig. II.4

Government corporation investments as percentage of total investments



far wider than in any other country.

The following sections will try to give an analytic measure of their recent role within the Italian economy.

2. The Effects of Government Corporation Investments on Production, Accumulation and Growth

As mentioned before, we have simulated the University of Bologna econometric model for the case of complete absence of Government Corporation investments from total fixed investments. Therefore, a rough measure of their effects can be obtained by the difference between such results and the control solution of the system.

This section is mainly concerned with the impact on domestic demand for consumption and investments. The effects on Italian foreign trade will be investigated in a following section.

As it might be evident from the previous considerations on the historical profile of Government Corporation investment expenditure, their contribution to GNP growth seems to be quite poor in the sixties, becoming increasingly important during the seventies.

Indeed, as Table II.6 and Figure II.5 show, in the case of no Government Corporation investments, Italian GNP would have been lower by a minimum amount of 60 billion (at 1963 prices), in the second quarter of 1969, and by a maximum of 736 billion in 1976.IV. In percentage terms, such a differential would range from 1 percent up to more than 5 percent (see PCGNP in Table II.7).

However, the decreasing path of Government Corporation investments of the last three years, does not show its impact on the level of production. Indeed, the long lag structure included in the model between

investments, considered as a final expenditure, and their contribution to production capacity produces these effects well beyond 1976.

A further point to be stressed is the multiplier effect on one lira of government corporation investments in terms of gross national product. These effects are computed in each quarter as the ratio between the differential of GNP, between the control and the moving average solution, and the differentials of government corporation investments in the same quarter. As shown in Table II.7, MUGNP, the multiplier is well below 1 until the second quarter of 1972. After that point, it increases in value, reaching 2.5 at the end of 1976. It is interesting to note that its value decreases only in three cases, 1972.III, 1975.I, and 1975. IV, corresponding to the general acceleration of domestic demand registered one or two quarters previously.

A sophisticated tax structure relates GNP to disposable income in the model. The differential behavior of the last variable can then be computed as shown in Table II.7. Because of the fiscal-drag, the effects produced on disposable income are obviously lower than the ones on total GNP. Only one peculiar effect can be noted. The percentage between differential disposable income and GNP shows three different trends. The first one is a decreasing path from .72 in 1967 to almost zero during 1968 and mid-1969. After that point, it increases to .53 and stays around .50 during 1972-73. A final declining trend brings the ratio back to .46 in 1976. This behavior can obviously be taken as the actual marginal tax effect working within the Italian fiscal system. Therefore, it indicates that in very recent years, the Italian fiscal system has

become more severe, and its marginal fiscal drag is actually around 52 to 53 percent. The behavior of disposable income is an important element in the determination of private expenditure for consumption goods.

The historical profile and the ones obtained from our simulations are reported in Table II.7 and pictured in Figure II.8. Again the effects due to Government Corporation investments are insignificant until the end of 1969, after which point they increase to the level of 231 billion lire at the end of 1976. (See Table II.9). However, both the percentage effect on private consumption, and the multiplier effects, shown in columns 2 and 3 of Table II.9 are well below the impact on GNP.

In fact, while the multiplier on GNP jumps to over 2, the one on consumption expenditure is always below unity and only at the end of 1976 reaches its maximum at .81.

Much more interesting turns out to be the profile of fixed investments under the alternative hypothesis that we considered. The impact of Government Corporation investments on the accumulation process is shown to be very consistent over the entire period. Indeed, the differentials range from a minimum of 156 billion lire to over 300 billion in the final year. As is well known, one of the major worries about Government investments, in general, and about Government Corporations in particular, is concerned with the possibility of their crowding-out private investment.

In the model we considered, there are two major linkages through which this phenomenon can be noted. In fact, Government investments do indeed compete with private ones within the financial markets, pushing interest rates up and reinforcing the impact of credit-rationing policy. Unfortunately the structure of the interest rates in the model is not very

sophisticated, the long-run bond rate being the major variable. In the actual version, however, this rate is taken as an exogenous variable and, therefore, the only endogenous constraint we met is the level of credit rationing. Thus, it may be assumed that an expansion of the money supply maintained the historical level of that interest rate constant under the alternative simulations we performed. This forced hypothesis may limit the validity of our results which can then be taken only as a minimum measure of the impact of Government Corporation investments on total fixed investments. Therefore, the crowding out effect that we will outline, would be higher if interest rates were to be pushed upward by the financial needs of Government Corporation investments.

However, the behavior of investment expenditure in Italy has been proven to be only slightly dependent on interest rates, while the acceleration effect on GNP seems to be far more important. Furthermore, Italian monetary policy has often been managed through quantitative control of credit and rationing rather than through interest rate policies. Since these effects are included in our results, the error we incur should not be very relevant.

The crowding out effect can be analyzed by considering the variable MUINV in Table II.10, which reports the ratio of the differential between actual total investments and the level registered in case of absence of government corporation expenditure to the increase of government corporation investments. Therefore, so long as this ratio is below one, we can refer to a crowding out effect.

As can be seen in the table, three different periods may be outlined. In the first one, lasting from 1967 until 1969, and in the third

one confined to 1976, no crowding out effects are registered. In fact, the investments that the Italian economy would have lost, are proven to be higher than the Government Corporation expenditure itself.

Therefore, in this period, Government Corporations seem to have indirectly pushed the private expenditure for investments up, by pushing up levels of activity. The middle years show instead a clear crowding out effect, which, however, does not exceed 20 percent of the expenditure. Clearly, the effect is proven to be heavier during the period of higher recovery of private investments. This case is illustrated in 1974.II, a period during which private investments' expenditure reached a peak-level, and a tight credit-rationing policy was followed by the Italian monetary authorities.

Therefore, in that quarter, the additional contribution of Government Corporation investments to the accumulation process was very small. A quite full crowding out effect seems to have been experienced according to the model because of competition for credit.

The profile of expenditure for machinery and equipment is shown to be very different from the one for residential buildings, plants and structures. Three main considerations have to be outlined. First, the model does not distinguish yet between residential and non-residential construction. This explains the astonishing fluctuation of this expenditure and its declining trend starting in 1969. As often recalled, the deep depression of residential construction has largely been a limiting constraint on Italian growth. The level of housing starts has decreased by 50 percent over recent years.

A second consideration is related to the different reaction shown by the two kinds of expenditure. Indeed investments in machinery and equipment seem to recover earlier than ones for construction. This can be explained by the poor medium-run performance of the economy during the 1970's and the increasingly unstable cycle. Under such conditions the renewal of machinery is always decided well before the building of new plants.

A further point to be stressed is again the peculiar impact registered in the second quarter of 1974. The crowding-out effects are shown to be much heavier than is the case for machinery and equipment. (See Table II.12 and Figure II.12). In fact, if no government corporation investments were produced, some relaxation of credit rationing could have pushed higher investments in construction.

Indeed, the effect of the credit rationing is proven by the model to be much stronger for construction than for machinery. Therefore, the quantitative control of credit introduced in that period show a heavier negative effect from government corporation expenditure.

The law of capital accumulation is used in the model to estimate the stock of physical assets within manufacturing industries. As registered in Table II.13 and pictured in Figure II.13, the contribution of Government Corporations has been increasingly important during the last decade. Without the contribution of those corporations, at the end of the period the capital stock of manufacturing would have been lower by over 4500 billion lire. This variable is quite important in the working of the model. Indeed, as a ratio to the value added, it gives the level of capacity utilization which directly affects investment functions. It

Table II.6

CGNP= Gross National Product, Control solution
MGNP= Gross National Product, Moving-average solution
YGNP= Gross National Product, Pro-cycle solution
AGNP= Gross National Product, Anti-cycle solution

| | CGNP | MGNP | YGNP | AGNP |
|---|---|---|---|---|
| 6701 | 8795.00 | 8647.00 | 8645.00 | 8637.00 |
| 6702 | 9038.00 | 8901.00 | 8896.00 | 8897.00 |
| 6703 | 9158.00 | 9032.00 | 9036.00 | 9036.00 |
| 6704 | 9403.00 | 9304.00 | 9311.00 | 9320.00 |
| 6801 | 9359.00 | 9279.00 | 9277.00 | 9261.00 |
| 6802 | 9499.00 | 9431.00 | 9429.00 | 9424.00 |
| 6803 | 9815.00 | 9752.00 | 9754.00 | 9763.00 |
| 6804 | 10100.0 | 10035.0 | 10038.0 | 10056.0 |
| 6901 | 10152.0 | 10090.0 | 10079.0 | 10072.0 |
| 6902 | 10386.0 | 10327.0 | 10304.0 | 10335.0 |
| 6903 | 10632.0 | 10553.0 | 10562.0 | 10563.0 |
| 6904 | 10226.0 | 10124.0 | 10170.0 | 10133.0 |
| 7001 | 11229.0 | 11120.0 | 11111.0 | 11083.0 |
| 7002 | 11144.0 | 11005.0 | 10999.0 | 10992.0 |
| 7003 | 11172.0 | 11005.0 | 11017.0 | 11032.0 |
| 7004 | 11196.0 | 11000.0 | 11019.0 | 11047.0 |
| 7101 | 11293.0 | 11049.0 | 11028.0 | 11044.0 |
| 7102 | 11181.0 | 10916.0 | 10923.0 | 10899.0 |
| 7103 | 11163.0 | 10870.0 | 10890.0 | 10874.0 |
| 7104 | 11183.0 | 10858.0 | 10876.0 | 10884.0 |
| 7201 | 11759.0 | 11407.0 | 11409.0 | 11371.0 |
| 7202 | 11622.0 | 11260.0 | 11266.0 | 11247.0 |
| 7203 | 11540.0 | 11148.0 | 11150.0 | 11177.0 |
| 7204 | 12120.0 | 11695.0 | 11691.0 | 11732.0 |
| 7301 | 11664.0 | 11258.0 | 11341.0 | 11239.0 |
| 7302 | 12190.0 | 11741.0 | 11746.0 | 11725.0 |
| 7303 | 12220.0 | 11735.0 | 11725.0 | 11754.0 |
| 7304 | 12828.0 | 12304.0 | 12281.0 | 12389.0 |
| 7401 | 12754.0 | 12222.0 | 12275.0 | 12268.0 |
| 7402 | 13084.0 | 12548.0 | 12574.0 | 12603.0 |
| 7403 | 12700.0 | 12171.0 | 12194.0 | 12180.0 |
| 7404 | 12672.0 | 12133.0 | 12157.0 | 12117.0 |
| 7501 | 12827.0 | 12302.0 | 12291.0 | 12310.0 |
| 7502 | 12385.0 | 11850.0 | 11851.0 | 11843.0 |
| 7503 | 12131.0 | 11547.0 | 11563.0 | 11540.0 |
| 7504 | 12606.0 | 11974.0 | 11988.0 | 11979.0 |
| 7601 | 13803.0 | 13133.0 | 13189.0 | 13156.0 |
| 7602 | 13627.0 | 12941.0 | 12973.0 | 12951.0 |
| 7603 | 13738.0 | 13026.0 | 13044.0 | 13014.0 |
| 7604 | 13911.0 | 13175.0 | 13160.0 | 13141.0 |
| | 1 | 2 | 3 | 4 |

Fig. II.5

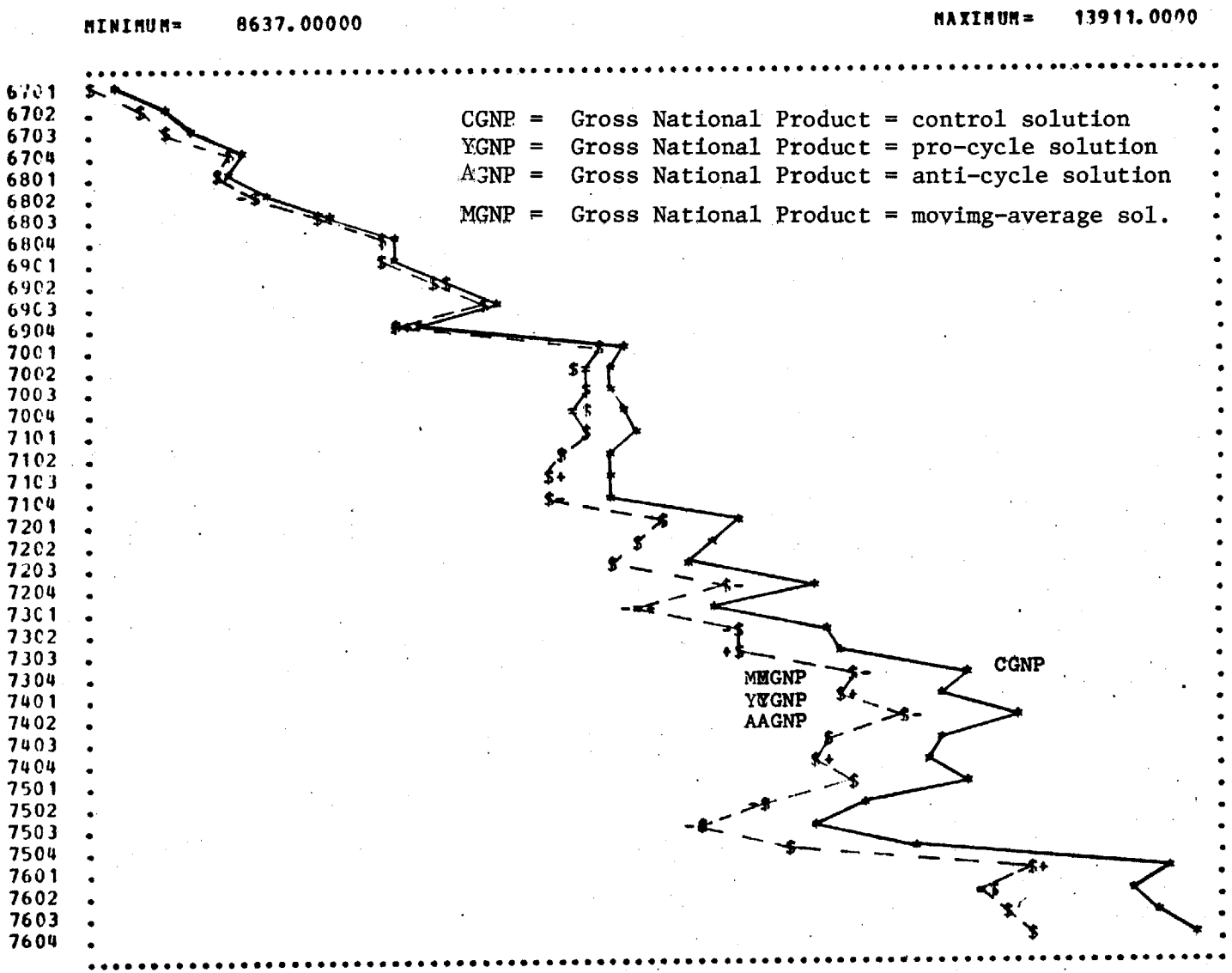

MINIMUM= 8637.00000
MAXIMUM= 13911.0000
CGNP = Gross National Product = control solution
YGNP = Gross National Product = pro-cycle solution
AGNP = Gross National Product = anti-cycle solution
MGNP = Gross National Product = movimg-average sol.
6701
6702
6703
6704
6801
6802
6803
6804
6901
6902
6903
6904
7001
7002
7003
7004
7101
7102
7103
7104
7201
7202
7203
7204
7301
7302
7303
7304
7401
7402
7403
7404
7501
7502
7503
7504
7601
7602
7603
7604
CGNP
MMGNP
YYGNP
AAGNP

Table II.7

DCGNP=Differentials in GNP between control and moving average solutions

PDCGNP= DCGNP/CGNP

MUCGNP= DCGNP/MIPI

| | DCGNP | PDCGNP | MUGNP |
|---|---|---|---|
| 6701 | 148.000 | .168277E-01 | .961039 |
| 6702 | 137.000 | .151582E-01 | .867089 |
| 6703 | 126.000 | .137585E-01 | .759036 |
| 6704 | 99.0000 | .105286E-01 | .578947 |
| 6801 | 80.0000 | .854792E-02 | .454545 |
| 6802 | 68.0000 | .715865E-02 | .375691 |
| 6803 | 63.0000 | .641375E-02 | .328125 |
| 6804 | 65.0000 | .643564E-02 | .329533 |
| 6901 | 62.0000 | .610717E-02 | .316326 |
| 6902 | 59.0000 | .568072E-02 | .293000 |
| 6903 | 79.0000 | .743040E-02 | .357466 |
| 6904 | 102.000 | .997457E-02 | .434043 |
| 7001 | 109.000 | .970701E-02 | .436000 |
| 7002 | 139.000 | .124731E-01 | .524528 |
| 7003 | 167.000 | .149481E-01 | .562290 |
| 7004 | 196.000 | .175062E-01 | .636364 |
| 7101 | 244.000 | .216063E-01 | .760125 |
| 7102 | 265.000 | .237009E-01 | .798193 |
| 7103 | 293.000 | .262474E-01 | .834758 |
| 7104 | 325.000 | .290620E-01 | .903292 |
| 7201 | 352.000 | .299345E-01 | .972376 |
| 7202 | 362.000 | .311478E-01 | .975741 |
| 7203 | 392.000 | .339688E-01 | 1.00513 |
| 7204 | 425.000 | .350660E-01 | 1.07595 |
| 7301 | 406.000 | .348080E-01 | 1.05181 |
| 7302 | 449.000 | .368335E-01 | 1.20699 |
| 7303 | 485.000 | .396890E-01 | 1.27632 |
| 7304 | 524.000 | .408481E-01 | 1.35052 |
| 7401 | 532.000 | .417124E-01 | 1.37468 |
| 7402 | 536.000 | .409661E-01 | 1.42553 |
| 7403 | 529.000 | .416535E-01 | 1.46944 |
| 7404 | 539.000 | .425347E-01 | 1.56686 |
| 7501 | 525.000 | .409293E-01 | 1.64063 |
| 7502 | 535.000 | .431974E-01 | 1.69841 |
| 7503 | 584.000 | .481411E-01 | 1.80247 |
| 7504 | 632.000 | .501349E-01 | 1.90936 |
| 7601 | 670.000 | .485402E-01 | 1.97059 |
| 7602 | 686.000 | .503412E-01 | 2.11077 |
| 7603 | 712.000 | .518270E-01 | 2.30421 |
| 7604 | 736.000 | .529078E-01 | 2.58246 |
| | 1 | 2 | 3 |

Fig. II.6

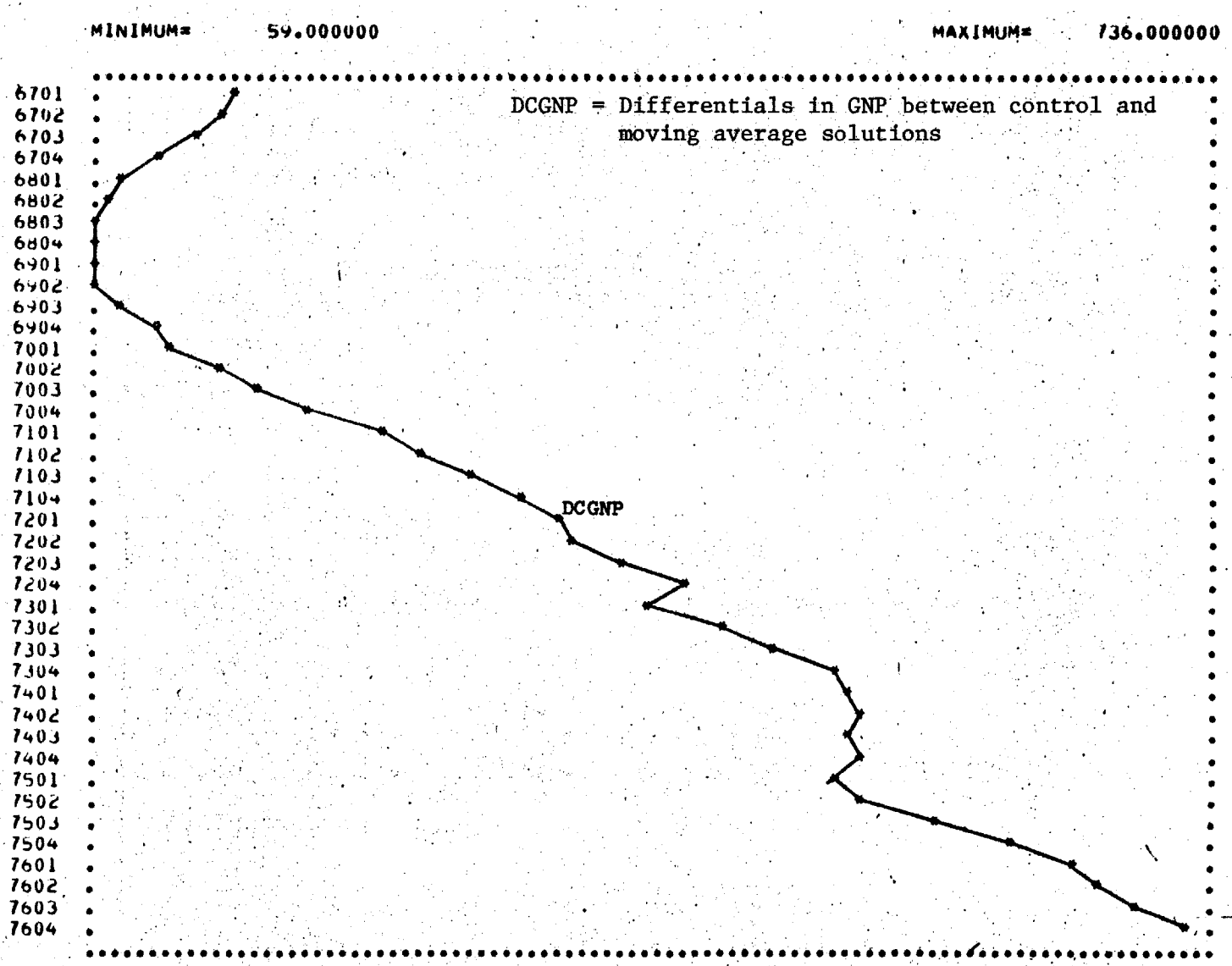

MINIMUM= 59.000000
MAXIMUM= 736.000000
DCGNP = Differentials in GNP between control and moving average solutions
6701
6702
6703
6704
6801
6802
6803
6804
6901
6902
6903
6904
7001
7002
7003
7004
7101
7102
7103
7104
7201
7202
7203
7204
7301
7302
7303
7304
7401
7402
7403
7404
7501
7502
7503
7504
7601
7602
7603
7604
DCGNP

Table II.7 - Disposable Income
CYD= Control solution MYD=Moving-average sol.
AYD= Anti-cycle sol. YYD=Pro-cycle solution
A

| | CYD | MYD | YYD | AYD |
|---|---|---|---|---|
| 6701 | 6146.10 | 6039.00 | 6037.00 | 6031.50 |
| 6702 | 6458.70 | 6382.60 | 6379.60 | 6381.60 |
| 6703 | 6489.30 | 6430.80 | 6434.60 | 6435.40 |
| 6704 | 6677.80 | 6660.60 | 6665.40 | 6672.70 |
| 6801 | 6781.70 | 6774.70 | 6772.50 | 6760.50 |
| 6802 | 6979.50 | 6983.80 | 6932.50 | 6979.20 |
| 6803 | 7146.00 | 7143.40 | 7144.30 | 7152.20 |
| 6804 | 7434.00 | 7431.90 | 7433.70 | 7447.70 |
| 6901 | 7311.10 | 7313.00 | 7305.10 | 7295.10 |
| 6902 | 7431.10 | 7432.40 | 7417.20 | 7438.60 |
| 6903 | 7980.10 | 7957.40 | 7966.30 | 7963.30 |
| 6904 | 7494.50 | 7470.60 | 7511.00 | 7480.70 |
| 7001 | 8287.50 | 8259.00 | 8248.30 | 8231.30 |
| 7002 | 8081.30 | 8026.90 | 8021.50 | 8020.10 |
| 7003 | 8151.70 | 8070.40 | 8073.20 | 8092.20 |
| 7004 | 8093.80 | 7995.40 | 8007.60 | 8028.40 |
| 7101 | 8390.20 | 8272.90 | 8255.70 | 8263.60 |
| 7102 | 8291.10 | 8182.50 | 8167.90 | 8147.20 |
| 7103 | 8336.50 | 8179.10 | 8192.30 | 8180.90 |
| 7104 | 8294.80 | 8141.60 | 8151.60 | 8158.20 |
| 7201 | 8987.20 | 8821.40 | 8819.00 | 8794.40 |
| 7202 | 8732.30 | 8553.00 | 8565.80 | 8556.10 |
| 7203 | 8913.40 | 8707.10 | 8705.80 | 8727.30 |
| 7204 | 9337.30 | 9119.10 | 9110.20 | 9142.60 |
| 7301 | 8855.20 | 8638.10 | 8695.30 | 8621.50 |
| 7302 | 9094.40 | 8867.50 | 8854.10 | 8853.60 |
| 7303 | 9394.50 | 9141.30 | 9130.80 | 9154.10 |
| 7304 | 9444.50 | 9097.10 | 9679.70 | 9756.00 |
| 7401 | 8905.70 | 8653.20 | 8693.60 | 8674.00 |
| 7402 | 9528.90 | 9272.00 | 9245.10 | 9301.90 |
| 7403 | 8969.50 | 8730.00 | 8741.60 | 8726.40 |
| 7404 | 9389.80 | 9122.50 | 9134.20 | 9107.30 |
| 7501 | 10012.3 | 9767.60 | 9752.80 | 9779.10 |
| 7502 | 9037.40 | 8809.40 | 8801.30 | 8801.20 |
| 7503 | 9004.30 | 8759.70 | 8777.50 | 8780.30 |
| 7504 | 9572.90 | 9269.60 | 9274.40 | 9268.90 |
| 7601 | 9935.80 | 9673.50 | 9711.50 | 9688.70 |
| 7602 | 9537.40 | 9237.10 | 9249.20 | 9239.30 |
| 7603 | 9780.60 | 9446.20 | 9448.50 | 9432.70 |
| 7604 | 9533.50 | 9247.60 | 9274.80 | 9267.30 |
| | 1 | 2 | 3 | 4 |

billions of 1963 lire

Table II.7 - Differentials between disposable income of the control solution and moving-average solution, DCYD

| Year and quarter | DCYD | DCYD/DCGNP |
|---|---|---|
| 6701 | 107 | .72 |
| 6702 | 76 | .55 |
| 6703 | 59 | .47 |
| 6704 | 18 | .18 |
| 6801 | 7 | .09 |
| 6802 | -4 | -.06 |
| 6803 | 3 | .05 |
| 6804 | 2 | .03 |
| 6901 | -2 | -.03 |
| 6902 | -1 | -.04 |
| 6903 | 23 | .29 |
| 6904 | 18 | .18 |
| 7001 | 28 | .26 |
| 7002 | 54 | .39 |
| 7003 | 81 | .49 |
| 7004 | 98 | .50 |
| 7101 | 123 | .50 |
| 7102 | 128 | .48 |
| 7103 | 157 | .53 |
| 7104 | 153 | .47 |
| 7201 | 166 | .47 |
| 7202 | 169 | .47 |
| 7203 | 206 | .53 |
| 7204 | 218 | .51 |
| 7301 | 217 | .53 |
| 7302 | 226 | .50 |
| 7303 | 257 | .53 |
| 7304 | 287 | .55 |
| 7401 | 252 | .47 |
| 7402 | 257 | .48 |
| 7403 | 237 | .45 |
| 7404 | 247 | .46 |

| Year and quarter | DCYD | DCYD/DCGNP |
|---|---|---|
| 7501 | 245 | .47 |
| 7502 | 233 | .44 |
| 7503 | 279 | .48 |
| 7504 | 303 | .48 |
| 7601 | 313 | .47 |
| 7602 | 300 | .44 |
| 7603 | 334 | .47 |
| 7604 | 336 | .46 |

Fig. II.7

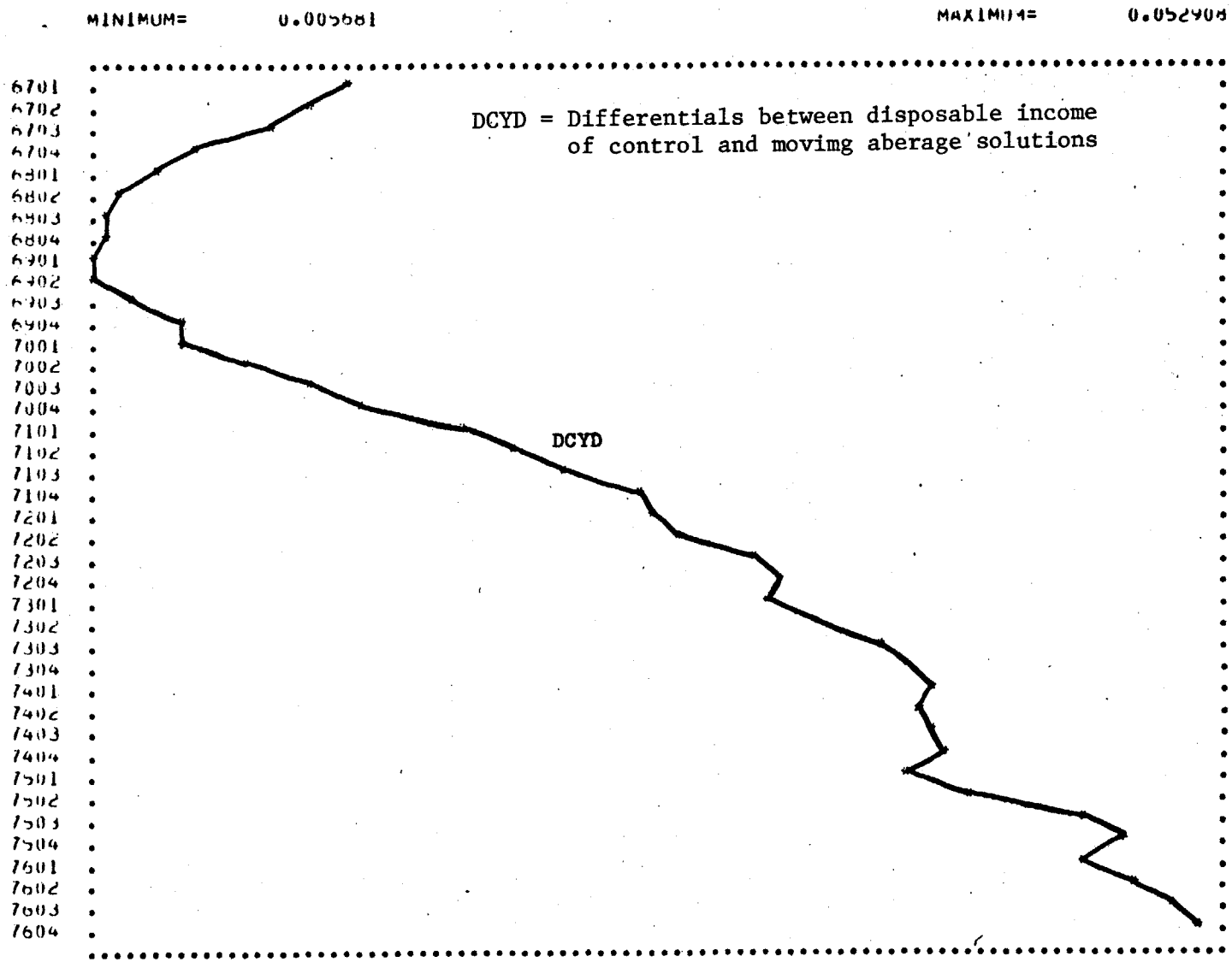

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6703
6704
6801
6802
6803
6804
6901
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6904
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7002
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7004
7101
7102
7103
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7301
7302
7303
7304
7401
7402
7403
7404
7501
7502
7503
7504
7601
7602
7603
7604
DCYD = Differentials between disposable income
of control and movimg aberage solutions
DCYD

**Fig. II.8**

Disposable income

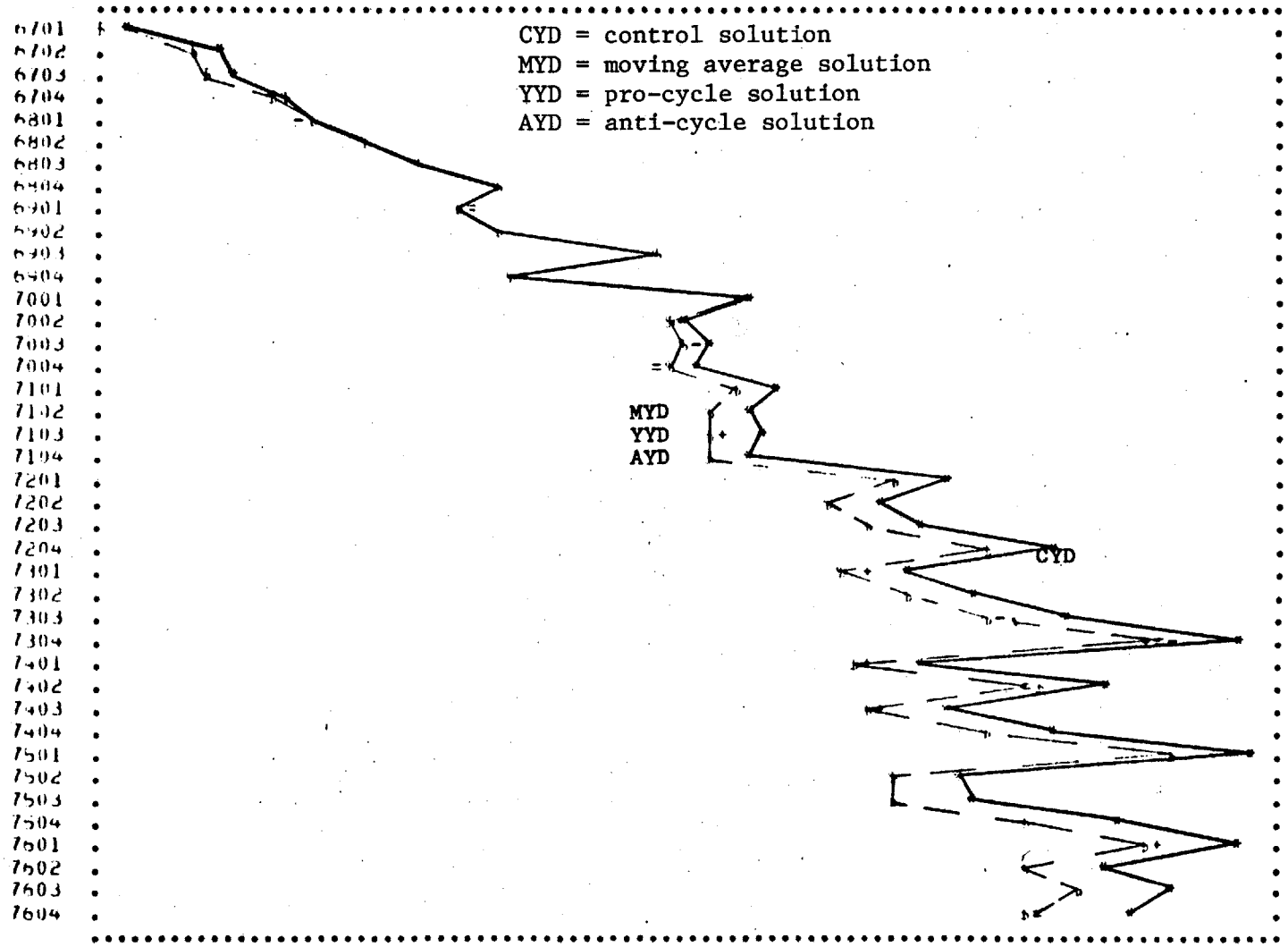


Table II.8 - Private Consumptions

CCP= Control Solution
YCP= Pro-cycle Solution
MCP= Moving-average sol.
ACP= Anti-cycle solution

billions of 1963 lire

| | CCP | MCP | YCP | ACP |
|---|---|---|---|---|
| 6701 | 5797.00 | 5774.00 | 5774.00 | 5772.00 |
| 6702 | 5847.00 | 5812.00 | 5812.00 | 5811.00 |
| 6703 | 5887.00 | 5846.00 | 5846.00 | 5846.00 |
| 6704 | 5957.00 | 5919.00 | 5920.00 | 5922.00 |
| 6801 | 6033.00 | 6001.00 | 6001.00 | 6000.00 |
| 6802 | 6134.00 | 6109.00 | 6109.00 | 6107.00 |
| 6803 | 6252.00 | 6232.00 | 6233.00 | 6233.00 |
| 6804 | 6409.00 | 6395.00 | 6396.00 | 6399.00 |
| 6901 | 6509.00 | 6502.00 | 6501.00 | 6503.00 |
| 6902 | 6610.00 | 6607.00 | 6603.00 | 6609.00 |
| 6903 | 6798.00 | 6792.00 | 6790.00 | 6794.00 |
| 6904 | 6837.00 | 6829.00 | 6835.00 | 6831.00 |
| 7001 | 7026.00 | 7013.00 | 7016.00 | 7010.00 |
| 7002 | 7121.00 | 7102.00 | 7103.00 | 7098.00 |
| 7003 | 7207.00 | 7178.00 | 7181.00 | 7179.00 |
| 7004 | 7260.00 | 7218.00 | 7223.00 | 7226.00 |
| 7101 | 7494.00 | 7437.00 | 7437.00 | 7441.00 |
| 7102 | 7382.00 | 7310.00 | 7312.00 | 7311.00 |
| 7103 | 7152.00 | 7063.00 | 7066.00 | 7064.00 |
| 7104 | 7289.00 | 7189.00 | 7193.00 | 7193.00 |
| 7201 | 7680.00 | 7569.00 | 7572.00 | 7567.00 |
| 7202 | 7647.00 | 7527.00 | 7530.00 | 7524.00 |
| 7203 | 7511.00 | 7379.00 | 7381.00 | 7380.00 |
| 7204 | 7805.00 | 7661.00 | 7662.00 | 7666.00 |
| 7301 | 8088.00 | 7935.00 | 7948.00 | 7936.00 |
| 7302 | 8062.00 | 7901.00 | 7910.00 | 7900.00 |
| 7303 | 7940.00 | 7768.00 | 7773.00 | 7769.00 |
| 7304 | 8270.00 | 8082.00 | 8083.00 | 8095.00 |
| 7401 | 8434.00 | 8242.00 | 8251.00 | 8257.00 |
| 7402 | 8368.00 | 8173.00 | 8183.00 | 8191.00 |
| 7403 | 8011.00 | 7821.00 | 7831.00 | 7835.00 |
| 7404 | 8360.00 | 8173.00 | 8183.00 | 8183.00 |
| 7501 | 8617.00 | 8435.00 | 8440.00 | 8447.00 |
| 7502 | 8350.00 | 8175.00 | 8178.00 | 8184.00 |
| 7503 | 8028.00 | 7848.00 | 7853.00 | 7853.00 |
| 7504 | 8208.00 | 8019.00 | 8023.00 | 8021.00 |
| 7601 | 8563.00 | 8363.00 | 8372.00 | 8366.00 |
| 7602 | 8350.00 | 8142.00 | 8151.00 | 8145.00 |
| 7603 | 8373.00 | 8152.00 | 8160.00 | 8152.00 |
| 7604 | 8332.00 | 8101.00 | 8103.00 | 8096.00 |
| | 1 | 2 | 3 | 4 |

Fig. II.9

MINIMUM= 5772.00000 Private consumptions MAXIMUM= 8617.00000

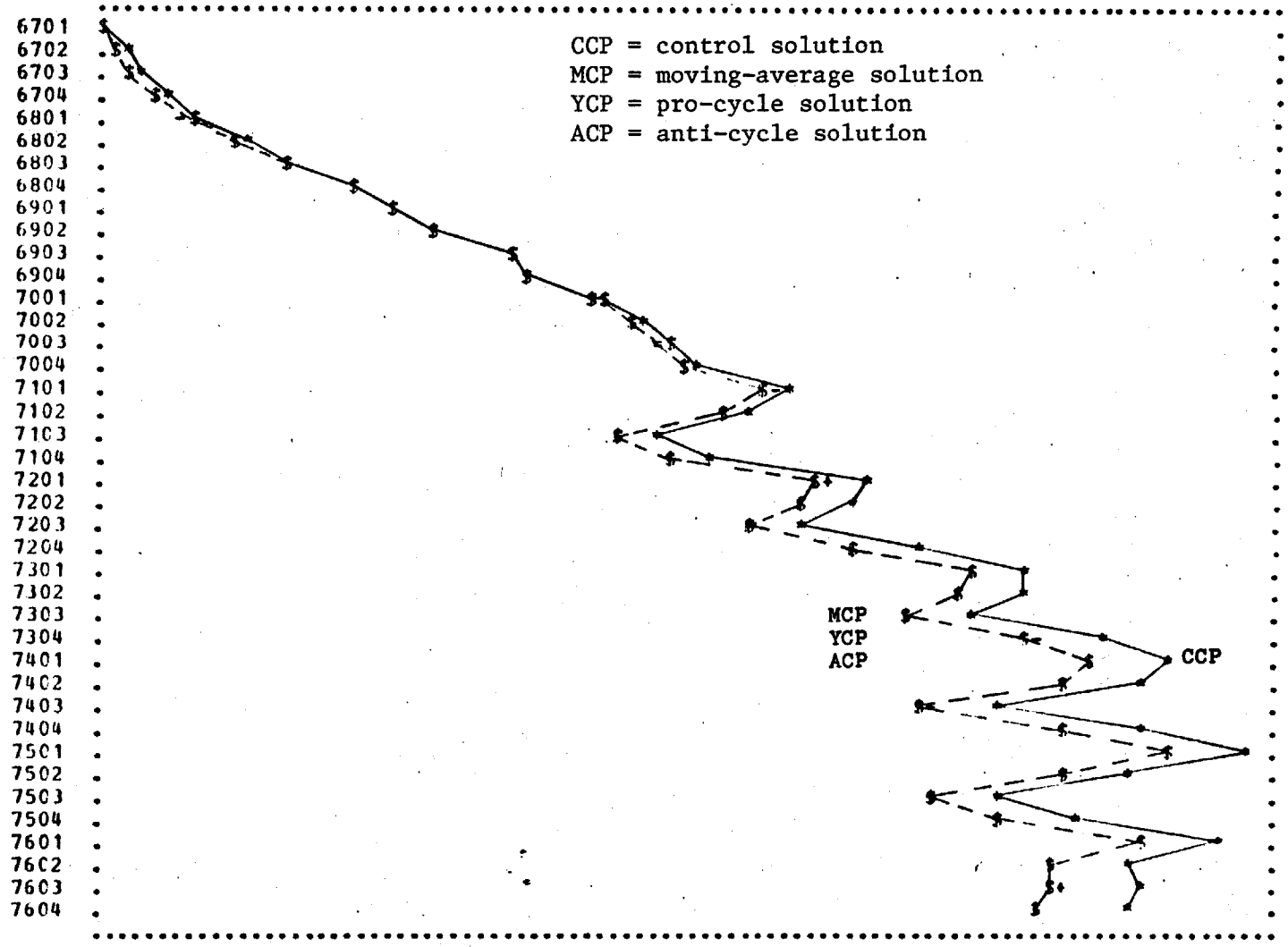


Table II.9 - Differentials between Private Consumptions of the control solution and of the moving-average solution, DCCP.

PCCP=DCCP/CCP
MUCP=DCCP/MIPI

| | DCCP | PCCP | MUCP |
|---|---|---|---|
| 6701 | 23.0000 | .39[illegible]E-02 | .14[illegible] |
| 6702 | 35.0000 | .59[illegible]E-02 | .22[illegible] |
| 6703 | 41.0000 | .69[illegible]E-02 | .24[illegible] |
| 6704 | 38.0000 | .63[illegible]E-02 | .22[illegible] |
| 6801 | 32.0000 | .53[illegible]E-02 | .18[illegible] |
| 6802 | 25.0000 | .40[illegible]E-02 | .18[illegible] |
| 6803 | 20.0000 | .31[illegible]E-02 | .10[illegible] |
| 6804 | 14.0000 | .21[illegible]E-02 | .70[illegible]E-01 |
| 6901 | 7.00000 | .10[illegible]E-02 | .36[illegible]E-01 |
| 6902 | 3.00000 | .45[illegible]E-03 | .15[illegible]E-01 |
| 6903 | 6.00000 | .88[illegible]E-03 | .27[illegible]E-01 |
| 6904 | 8.00000 | .11[illegible]E-02 | .34[illegible]E-01 |
| 7001 | 18.0000 | .18[illegible]E-02 | .62[illegible]E-01 |
| 7002 | 19.0000 | .26[illegible]E-02 | .71[illegible]E-01 |
| 7003 | 29.0000 | .40[illegible]E-02 | .97[illegible]E-01 |
| 7004 | 42.0000 | .57[illegible]E-02 | .13[illegible] |
| 7101 | 57.0000 | .76[illegible]E-02 | .17[illegible] |
| 7102 | 72.0000 | .97[illegible]E-02 | .21[illegible] |
| 7103 | 89.0000 | .12[illegible]E-01 | .25[illegible] |
| 7104 | 100.000 | .13[illegible]E-01 | .27[illegible] |
| 7201 | 111.000 | .14[illegible]E-01 | .30[illegible] |
| 7202 | 120.000 | .16[illegible]E-01 | .32[illegible] |
| 7203 | 132.000 | .17[illegible]E-01 | .33[illegible] |
| 7204 | 144.000 | .18[illegible]E-01 | .36[illegible] |
| 7301 | 153.000 | .18[illegible]E-01 | .39[illegible] |
| 7302 | 161.000 | .19[illegible]E-01 | .43[illegible] |
| 7303 | 172.000 | .21[illegible]E-01 | .46[illegible] |
| 7304 | 188.000 | .22[illegible]E-01 | .48[illegible] |
| 7401 | 192.000 | .22[illegible]E-01 | .49[illegible] |
| 7402 | 195.000 | .23[illegible]E-01 | .51[illegible] |
| 7403 | 190.000 | .23[illegible]E-01 | .52[illegible] |
| 7404 | 187.000 | .22[illegible]E-01 | .54[illegible] |
| 7501 | 182.000 | .21[illegible]E-01 | .56[illegible] |
| 7502 | 175.000 | .20[illegible]E-01 | .56[illegible] |
| 7503 | 180.000 | .22[illegible]E-01 | .55[illegible] |
| 7504 | 189.000 | .23[illegible]E-01 | .57[illegible] |
| 7601 | 200.000 | .23[illegible]E-01 | .58[illegible] |
| 7602 | 208.000 | .24[illegible]E-01 | .64[illegible] |
| 7603 | 221.000 | .26[illegible]E-01 | .71[illegible] |
| 7604 | 231.000 | .27[illegible]E-01 | .81[illegible] |
| | 1 | 2 | 3 |

billions of 1963 lire

Fig. II.10

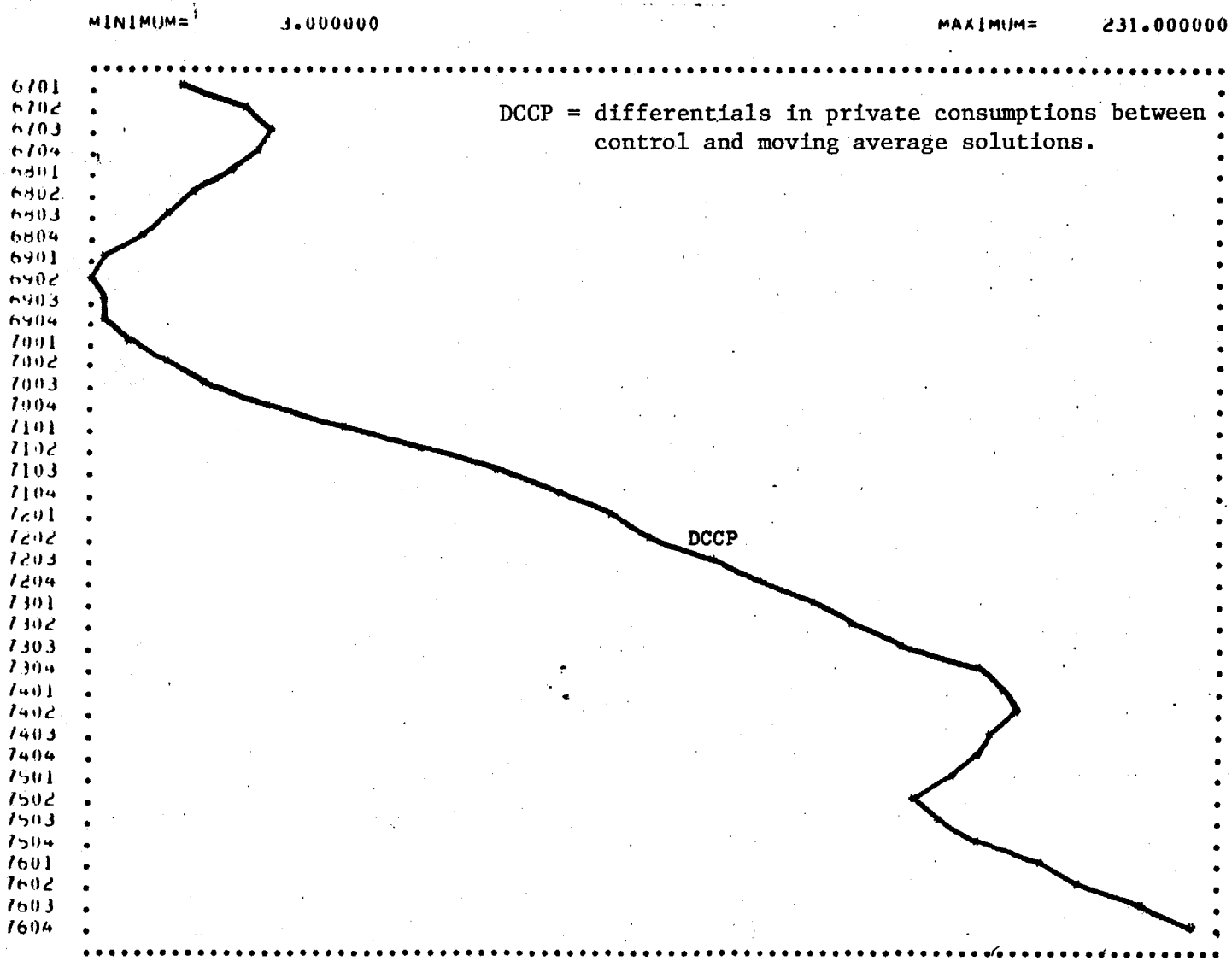

MINIMUM= 3.000000
MAXIMUM= 231.000000
6701
6702
6703
6704
6801
6802
6803
6804
6901
6902
6903
6904
7001
7002
7003
7004
7101
7102
7103
7104
7201
7202
7203
7204
7301
7302
7303
7304
7401
7402
7403
7404
7501
7502
7503
7504
7601
7602
7603
7604
DCCP = differentials in private consumptions between control and moving average solutions.
DCCP

Table II.10

TCINV=Total fixed investments, control solution
TMINV=Total fixed investment, moving-average solution
DTINV= TCINV - TMINV
PTINV= DTINV/TCINV
MUINV= DTINV/MIPI

billions of 1963 lire

| | TCINV | TMINV | DTINV | PTINV | MUINV |
|---|---|---|---|---|---|
| 6701 | 1645.00 | 1489.00 | 156.000 | .948328E-01 | 1.01299 |
| 6702 | 1723.00 | 1536.00 | 187.000 | .108532 | 1.18354 |
| 6703 | 1756.00 | 1545.00 | 211.000 | .120159 | 1.27108 |
| 6704 | 1772.00 | 1551.00 | 221.000 | .124718 | 1.29240 |
| 6801 | 1769.00 | 1547.00 | 222.000 | .125495 | 1.26136 |
| 6802 | 1837.00 | 1618.00 | 219.000 | .119216 | 1.20994 |
| 6803 | 1938.00 | 1721.00 | 217.000 | .111971 | 1.13021 |
| 6804 | 2023.00 | 1804.00 | 219.000 | .108255 | 1.10050 |
| 6901 | 1956.00 | 1736.00 | 220.000 | .112474 | 1.12245 |
| 6902 | 2099.00 | 1887.00 | 212.000 | .101000 | 1.06000 |
| 6903 | 2223.00 | 2002.00 | 221.000 | .994152E-01 | 1.00000 |
| 6904 | 1856.00 | 1620.00 | 236.000 | .127155 | 1.00426 |
| 7001 | 2100.00 | 1858.00 | 242.000 | .115238 | .968000 |
| 7002 | 2151.00 | 1899.00 | 252.000 | .117155 | .950943 |
| 7003 | 2268.00 | 2015.00 | 253.000 | .111552 | .851852 |
| 7004 | 2309.00 | 2064.00 | 245.000 | .106107 | .795455 |
| 7101 | 2120.00 | 1882.00 | 238.000 | .121698 | .803738 |
| 7102 | 2170.00 | 1907.00 | 263.000 | .121198 | .792169 |
| 7103 | 2413.00 | 2146.00 | 267.000 | .110651 | .760684 |
| 7104 | 2238.00 | 1953.00 | 285.000 | .127346 | .793872 |
| 7201 | 2139.00 | 1845.00 | 294.000 | .137447 | .812155 |
| 7202 | 2243.00 | 1946.00 | 297.000 | .132412 | .800539 |
| 7203 | 2354.00 | 2045.00 | 309.000 | .131266 | .792308 |
| 7204 | 2333.00 | 2014.00 | 319.000 | .136734 | .807595 |
| 7301 | 2353.00 | 2043.00 | 310.000 | .131747 | .803109 |
| 7302 | 2355.00 | 2041.00 | 314.000 | .133333 | .844086 |
| 7303 | 2375.00 | 2035.00 | 320.000 | .134737 | .842105 |
| 7304 | 2666.00 | 2341.00 | 325.000 | .121905 | .837629 |
| 7401 | 2470.00 | 2135.00 | 335.000 | .135628 | .865633 |
| 7402 | 2496.00 | 2371.00 | 125.000 | .500801E-01 | .332447 |
| 7403 | 2475.00 | 2171.00 | 304.000 | .122828 | .844444 |
| 7404 | 2485.00 | 2189.00 | 296.000 | .119115 | .860465 |
| 7501 | 2301.00 | 2022.00 | 279.000 | .121252 | .871875 |
| 7502 | 2207.00 | 1929.00 | 278.000 | .125963 | .882540 |
| 7503 | 2149.00 | 1851.00 | 298.000 | .138669 | .919753 |
| 7504 | 2289.00 | 1960.00 | 329.000 | .143731 | .993958 |
| 7601 | 2334.00 | 1979.00 | 355.000 | .152099 | 1.04412 |
| 7602 | 2435.00 | 2090.00 | 345.000 | .141684 | 1.06154 |
| 7603 | 2485.00 | 2152.00 | 333.000 | .134004 | 1.07767 |
| 7604 | 2500.00 | 2188.00 | 312.000 | .124800 | 1.09474 |
| | 1 | 2 | 3 | 4 | 5 |

Table II.11 - Total expenditure for machineries and equipment: billions of lire 1963

CIMI=control solution
MIMI=moving-average solution
YIMI=pro-cycle solution
AIMI=anti-cycle solution

| | CIMI | MIMI | YIMI | AIMI |
|---|---|---|---|---|
| 6701 | 683.000 | 529.000 | 526.000 | 518.000 |
| 6702 | 668.000 | 484.000 | 478.000 | 477.000 |
| 6703 | 669.000 | 458.000 | 460.000 | 459.000 |
| 6704 | 678.000 | 455.000 | 460.000 | 468.000 |
| 6801 | 702.000 | 478.000 | 476.000 | 461.000 |
| 6802 | 710.000 | 485.000 | 484.000 | 475.000 |
| 6803 | 715.000 | 485.000 | 487.000 | 492.000 |
| 6804 | 734.000 | 502.000 | 505.000 | 521.000 |
| 6901 | 767.000 | 540.000 | 529.000 | 525.000 |
| 6902 | 790.000 | 564.000 | 538.000 | 574.000 |
| 6903 | 811.000 | 572.000 | 573.000 | 586.000 |
| 6904 | 672.000 | 424.000 | 467.000 | 436.000 |
| 7001 | 819.000 | 562.000 | 558.000 | 530.000 |
| 7002 | 886.000 | 622.000 | 622.000 | 605.000 |
| 7003 | 936.000 | 668.000 | 687.000 | 691.000 |
| 7004 | 972.000 | 714.000 | 738.000 | 764.000 |
| 7101 | 975.000 | 717.000 | 701.000 | 726.000 |
| 7102 | 996.000 | 732.000 | 741.000 | 729.000 |
| 7103 | 1004.00 | 724.000 | 749.000 | 738.000 |
| 7104 | 996.000 | 709.000 | 733.000 | 740.000 |
| 7201 | 1000.00 | 711.000 | 723.000 | 679.000 |
| 7202 | 1055.00 | 762.000 | 777.000 | 746.000 |
| 7203 | 1080.00 | 772.000 | 780.000 | 799.000 |
| 7204 | 1082.00 | 769.000 | 766.000 | 809.000 |
| 7301 | 1099.00 | 798.000 | 885.000 | 788.000 |
| 7302 | 1224.00 | 929.000 | 953.000 | 916.000 |
| 7303 | 1259.00 | 962.000 | 963.000 | 979.000 |
| 7304 | 1284.00 | 979.000 | 962.000 | 1068.00 |
| 7401 | 1331.00 | 1027.00 | 1070.00 | 1089.00 |
| 7402 | 1357.00 | 1062.00 | 1089.00 | 1140.00 |
| 7403 | 1238.00 | 969.000 | 995.000 | 1006.00 |
| 7404 | 1204.00 | 948.000 | 983.000 | 946.000 |
| 7501 | 1149.00 | 912.000 | 906.000 | 920.000 |
| 7502 | 1111.00 | 877.000 | 875.000 | 867.000 |
| 7503 | 1062.00 | 812.000 | 821.000 | 803.000 |
| 7504 | 1011.00 | 742.000 | 749.000 | 754.000 |
| 7601 | 1069.00 | 775.000 | 829.000 | 813.000 |
| 7602 | 1154.00 | 872.000 | 912.000 | 910.000 |
| 7603 | 1209.00 | 941.000 | 966.000 | 963.000 |
| 7604 | 1228.00 | 982.000 | 968.000 | 979.000 |
| | 1 | 2 | 3 | 4 |

Fig.II.11

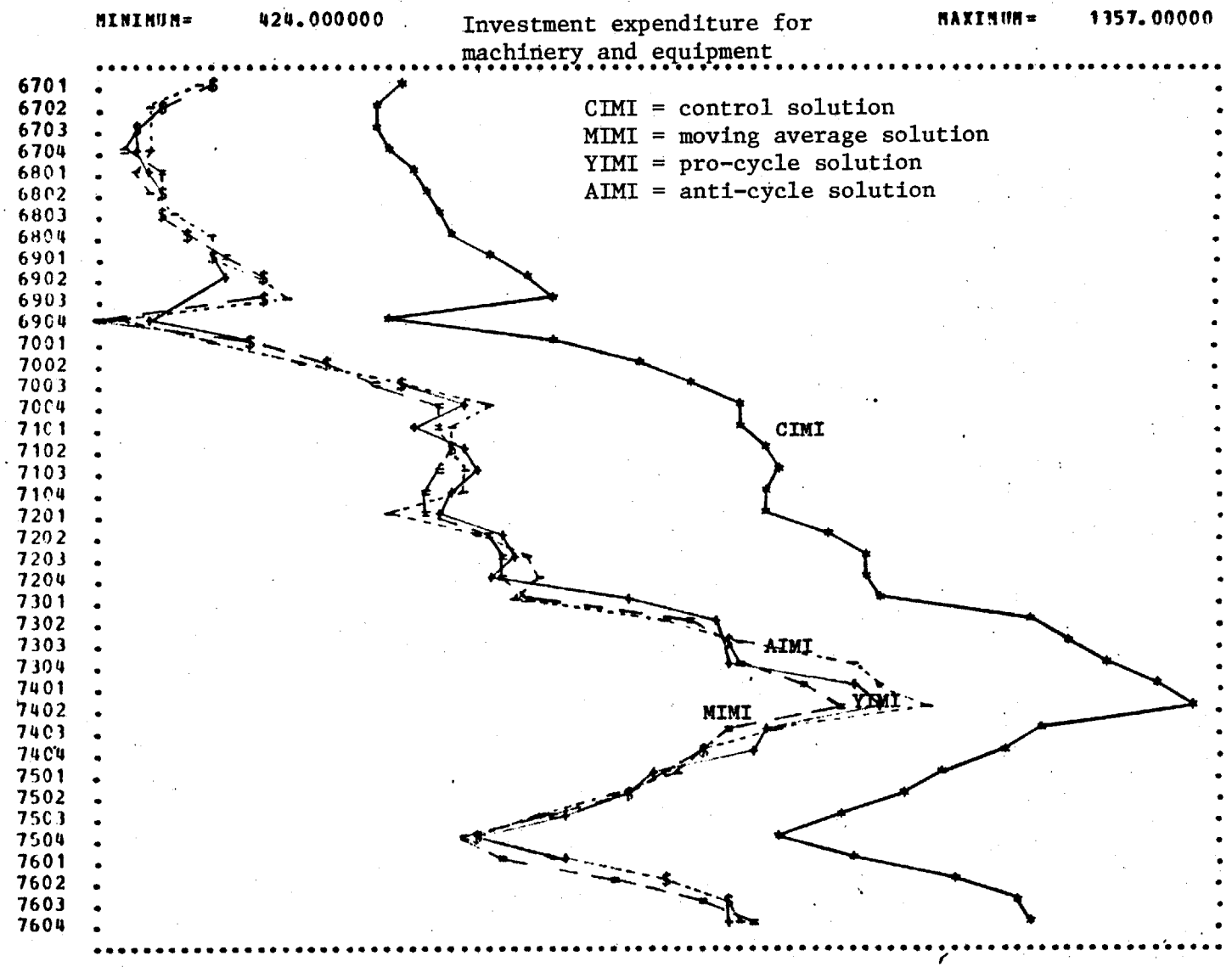

MINIMUM= 424.000000
Investment expenditure for machinery and equipment
MAXIMUM= 1357.00000
CIMI = control solution
MIMI = moving average solution
YIMI = pro-cycle solution
AIMI = anti-cycle solution
6701
6702
6703
6704
6801
6802
6803
6804
6901
6902
6903
6904
7001
7002
7003
7004
7101
7102
7103
7104
7201
7202
7203
7204
7301
7302
7303
7304
7401
7402
7403
7404
7501
7502
7503
7504
7601
7602
7603
7604
CIMI
AIMI
YIMI
MIMI

Table II.12 - Total expenditure for Constructions:

CIC=control solution
MIC=moving-average solution
YIC=pro-cycle solution
AIC=anti-cycle solution

| | CIC | MIC | YIC | AIC |
|---|---|---|---|---|
| 6701 | 962.000 | 960.000 | 959.000 | 959.000 |
| 6702 | 1055.00 | 1052.00 | 1052.00 | 1052.00 |
| 6703 | 1087.00 | 1087.00 | 1087.00 | 1087.00 |
| 6704 | 1094.00 | 1096.00 | 1096.00 | 1096.00 |
| 6801 | 1067.00 | 1069.00 | 1069.00 | 1069.00 |
| 6802 | 1127.00 | 1133.00 | 1133.00 | 1133.00 |
| 6803 | 1223.00 | 1236.00 | 1236.00 | 1236.00 |
| 6804 | 1289.00 | 1302.00 | 1302.00 | 1303.00 |
| 6901 | 1189.00 | 1196.00 | 1196.00 | 1196.00 |
| 6902 | 1309.00 | 1323.00 | 1323.00 | 1323.00 |
| 6903 | 1412.00 | 1430.00 | 1431.00 | 1431.00 |
| 6904 | 1184.00 | 1196.00 | 1197.00 | 1196.00 |
| 7001 | 1281.00 | 1296.00 | 1296.00 | 1295.00 |
| 7002 | 1265.00 | 1277.00 | 1277.00 | 1277.00 |
| 7003 | 1332.00 | 1347.00 | 1347.00 | 1347.00 |
| 7004 | 1337.00 | 1350.00 | 1350.00 | 1351.00 |
| 7101 | 1145.00 | 1145.00 | 1145.00 | 1146.00 |
| 7102 | 1174.00 | 1175.00 | 1175.00 | 1175.00 |
| 7103 | 1409.00 | 1422.00 | 1422.00 | 1421.00 |
| 7104 | 1242.00 | 1244.00 | 1244.00 | 1244.00 |
| 7201 | 1139.00 | 1134.00 | 1133.00 | 1133.00 |
| 7202 | 1188.00 | 1184.00 | 1183.00 | 1183.00 |
| 7203 | 1274.00 | 1273.00 | 1272.00 | 1272.00 |
| 7204 | 1251.00 | 1245.00 | 1244.00 | 1245.00 |
| 7301 | 1254.00 | 1245.00 | 1245.00 | 1245.00 |
| 7302 | 1131.00 | 1112.00 | 1112.00 | 1111.00 |
| 7303 | 1116.00 | 1093.00 | 1093.00 | 1093.00 |
| 7304 | 1382.00 | 1362.00 | 1359.00 | 1362.00 |
| 7401 | 1139.00 | 1108.00 | 1108.00 | 1110.00 |
| 7402 | 1139.00 | 1309.00 | 1309.00 | 1308.00 |
| 7403 | 1237.00 | 1202.00 | 1201.00 | 1201.00 |
| 7404 | 1281.00 | 1241.00 | 1239.00 | 1238.00 |
| 7501 | 1152.00 | 1110.00 | 1109.00 | 1106.00 |
| 7502 | 1096.00 | 1052.00 | 1051.00 | 1049.00 |
| 7503 | 1087.00 | 1039.00 | 1038.00 | 1035.00 |
| 7504 | 1278.00 | 1218.00 | 1217.00 | 1212.00 |
| 7601 | 1265.00 | 1204.00 | 1204.00 | 1199.00 |
| 7602 | 1281.00 | 1218.00 | 1218.00 | 1213.00 |
| 7603 | 1276.00 | 1211.00 | 1211.00 | 1205.00 |
| 7604 | 1272.00 | 1206.00 | 1205.00 | 1199.00 |
| | 1 | 2 | 3 | 4 |

billions of lire 1963

Fig.II.12

Investment expenditure for constructions

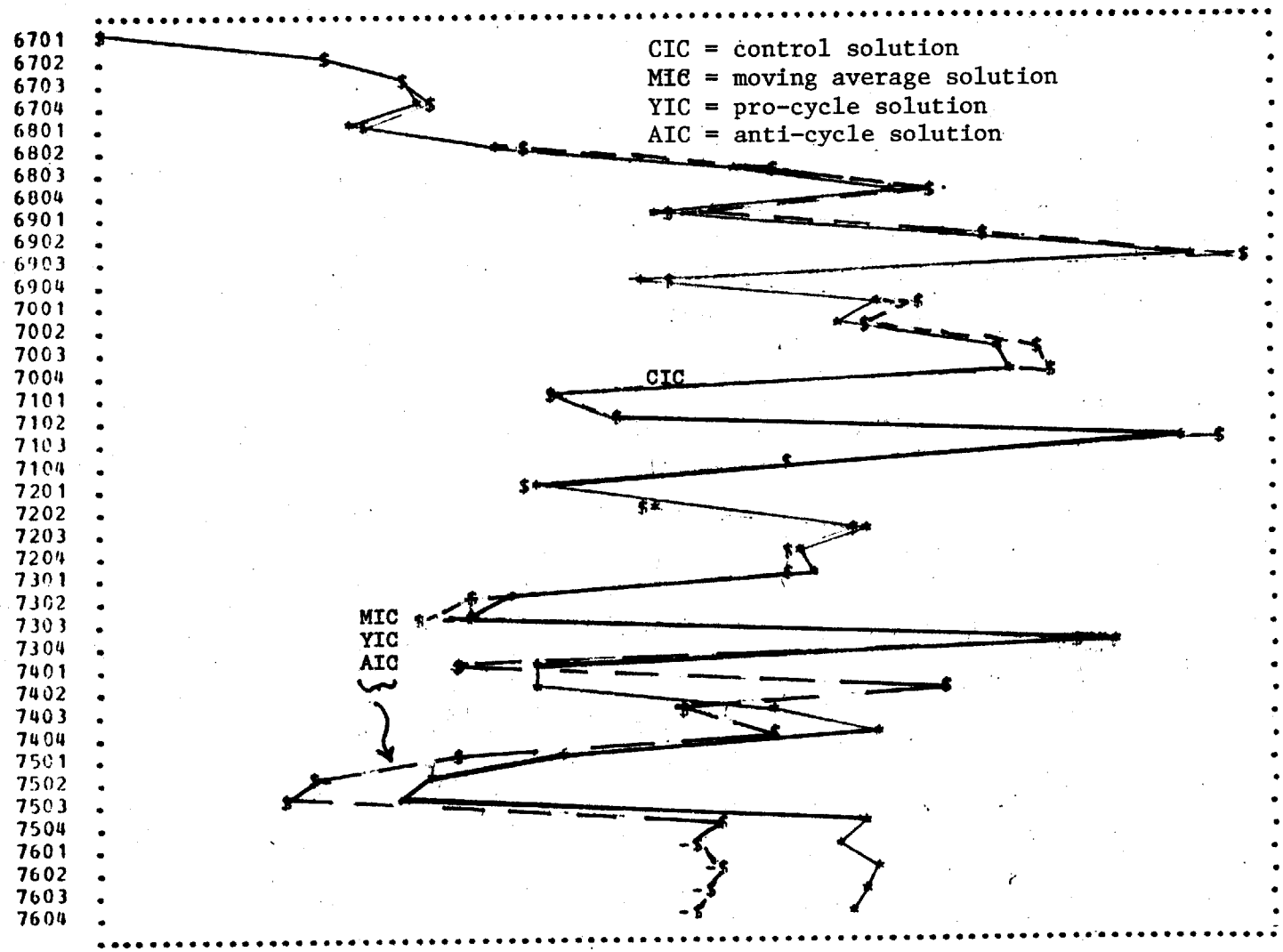


Table II.13 - Capital Stock in Manufacturing Industries:

CKINV=Control solution
MKINV=Moving average solution
YKINV=Pro-cycle solution
AKINV=Anti-cycle solution

| | CKINV | MKINV | YKINV | AKINV |
|---|---|---|---|---|
| 6701 | 16039.0 | 16039.0 | 16039.0 | 16039.0 |
| 6702 | 16090.5 | 15936.3 | 15933.4 | 15925.3 |
| 6703 | 16104.0 | 15765.5 | 15756.8 | 15747.4 |
| 6704 | 16096.6 | 15547.2 | 15540.5 | 15530.0 |
| 6401 | 16090.3 | 15316.1 | 15316.9 | 15314.3 |
| 6802 | 16090.9 | 15195.1 | 15092.3 | 15074.4 |
| 6803 | 16101.5 | 14880.8 | 14877.4 | 14850.2 |
| 6804 | 16096.7 | 14645.5 | 14544.2 | 14622.3 |
| 6901 | 16079.2 | 14395.2 | 14397.0 | 14391.7 |
| 6902 | 16086.0 | 14175.0 | 14106.5 | 14150.9 |
| 6903 | 16068.5 | 13932.1 | 13897.3 | 13923.8 |
| 6904 | 16071.6 | 13695.0 | 13662.2 | 13702.3 |
| 7001 | 15936.2 | 13313.0 | 13322.0 | 13331.7 |
| 7002 | 15985.3 | 13104.8 | 13110.4 | 13092.0 |
| 7003 | 16203.4 | 13058.5 | 13064.6 | 13023.8 |
| 7004 | 16530.1 | 13117.2 | 13142.2 | 13111.2 |
| 7101 | 16905.0 | 13233.9 | 13283.0 | 13276.0 |
| 7102 | 17340.2 | 13411.3 | 13444.4 | 13464.4 |
| 7103 | 17792.2 | 13599.3 | 13591.3 | 13649.1 |
| 7104 | 18222.8 | 13750.6 | 13817.4 | 13813.8 |
| 7201 | 18643.4 | 13864.2 | 13975.6 | 13979.1 |
| 7202 | 19064.7 | 14016.0 | 14119.3 | 14079.3 |
| 7203 | 19545.7 | 14203.6 | 14322.7 | 14251.0 |
| 7204 | 19995.0 | 14345.1 | 14471.9 | 14418.7 |
| 7301 | 20399.1 | 14436.2 | 14560.0 | 14549.8 |
| 7302 | 20814.4 | 14704.8 | 14918.5 | 14819.6 |
| 7303 | 21369.7 | 15149.7 | 15392.7 | 15259.8 |
| 7304 | 21960.6 | 15554.4 | 15895.7 | 15779.2 |
| 7401 | 22567.2 | 16179.0 | 16397.7 | 16378.6 |
| 7402 | 23197.1 | 16727.7 | 16991.7 | 17006.1 |
| 7403 | 23845.0 | 17305.3 | 17596.3 | 17671.8 |
| 7404 | 24367.5 | 17789.8 | 18104.5 | 18185.6 |
| 7501 | 24836.6 | 18236.3 | 18582.4 | 18609.9 |
| 7502 | 25218.6 | 18508.2 | 18958.6 | 19005.3 |
| 7503 | 25539.9 | 18920.7 | 19246.3 | 19296.7 |
| 7504 | 25791.0 | 19161.4 | 19544.8 | 19514.8 |
| 7601 | 26130.4 | 19480.3 | 19827.4 | 19832.6 |
| 7602 | 26380.3 | 19593.5 | 20098.2 | 20115.2 |
| 7603 | 26648.5 | 19944.0 | 20388.4 | 20420.1 |
| 7604 | 26921.8 | 20217.9 | 20667.7 | 20691.5 |
| | 1 | 2 | 3 | 4 |

billions of lire

Fig.II.13

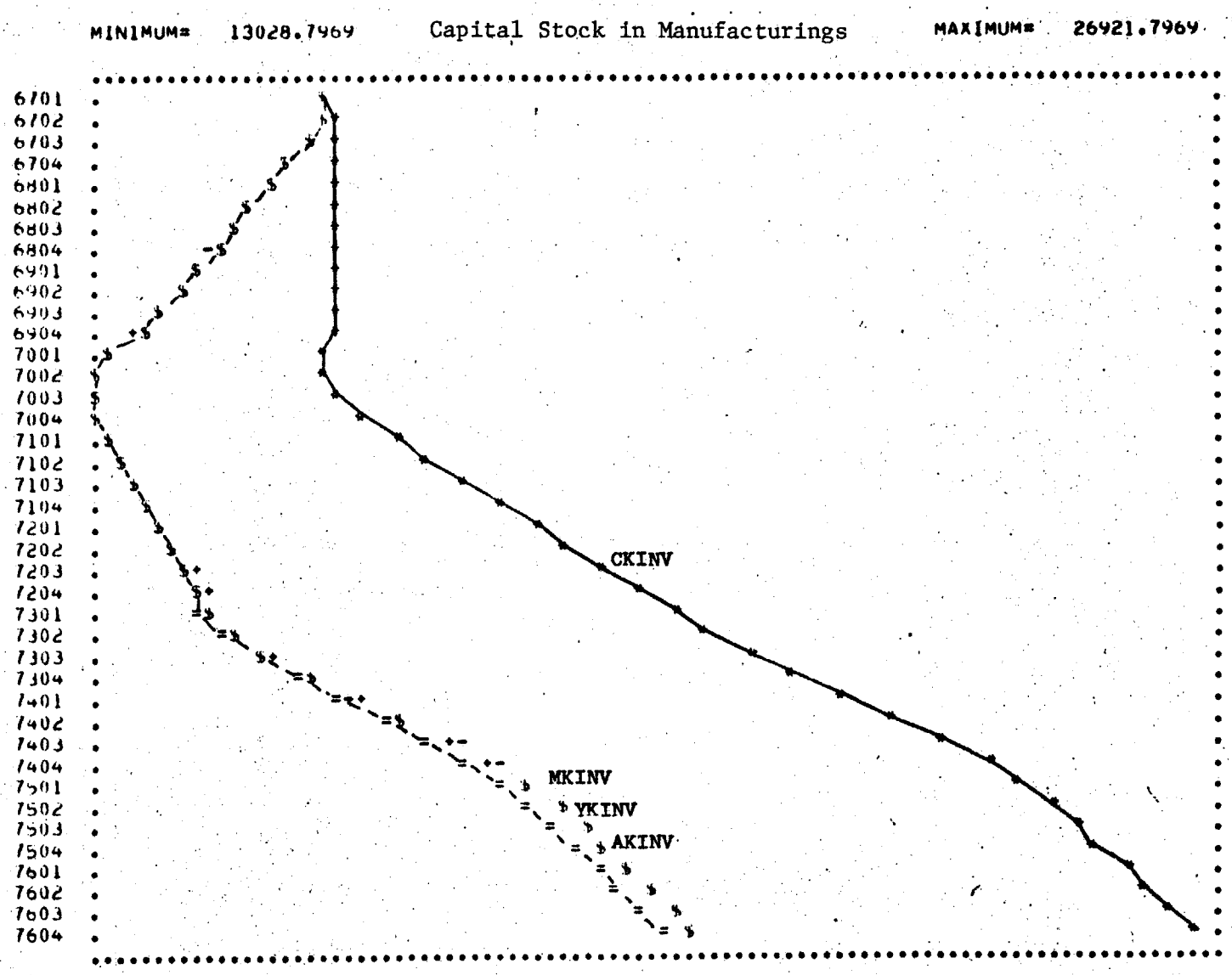
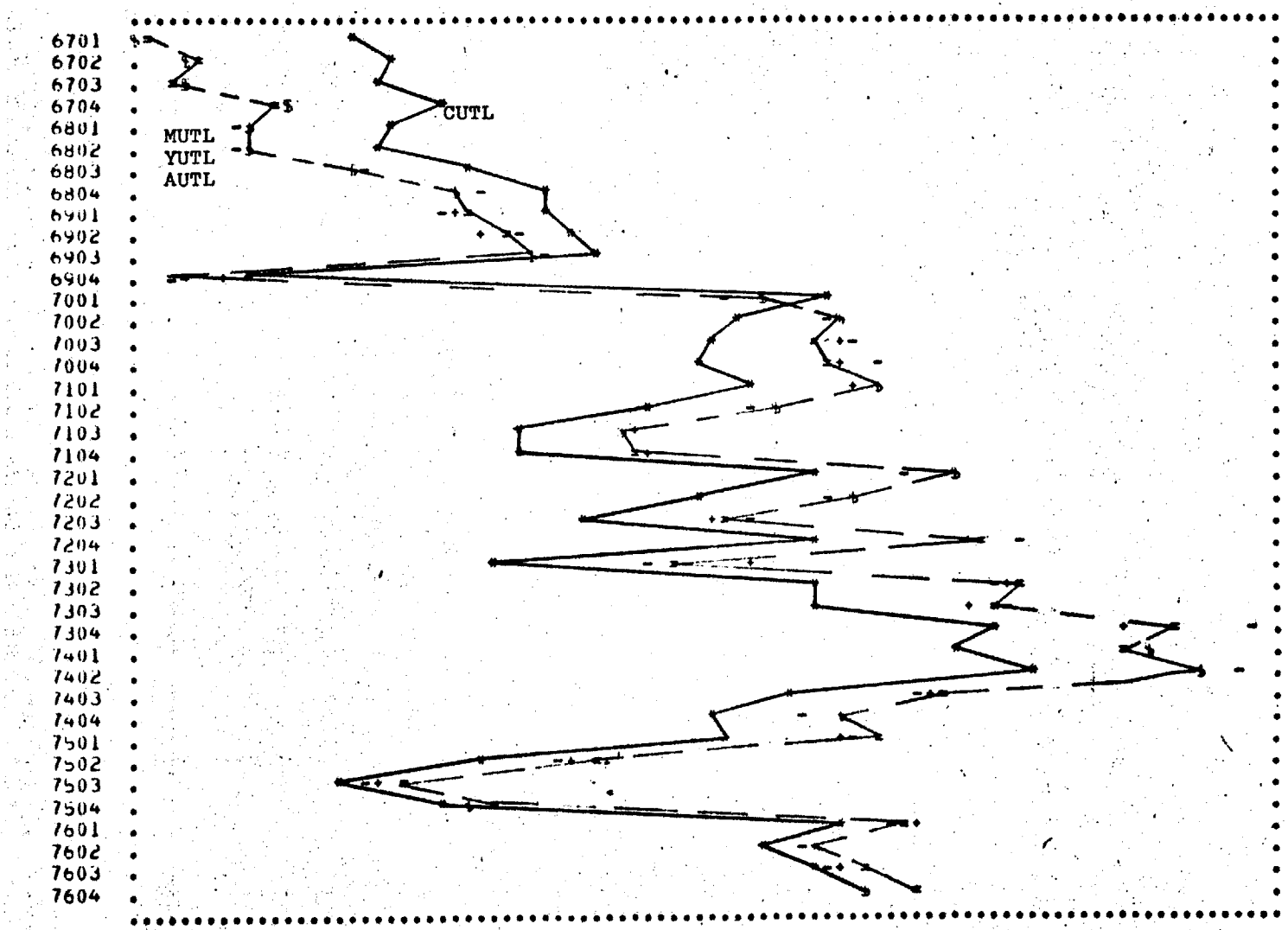

MINIMUM= 13028.7969
Capital Stock in Manufacturings
MAXIMUM= 26921.7969
6701
6702
6703
6704
6801
6802
6803
6804
6901
6902
6903
6904
7001
7002
7003
7004
7101
7102
7103
7104
7201
7202
7203
7204
7301
7302
7303
7304
7401
7402
7403
7404
7501
7502
7503
7504
7601
7602
7603
7604
CKINV
MKINV
YKINV
AKINV

Table II.14 - Index of Capacity Utilization:

CUTL=Control solution
MUTL=Moving-average solution
YUTL=Pro-cycle colution
AUTL=Anti-cycle solution

| | CUTL | MUTL | YUTL | AUTL |
|---|---|---|---|---|
| 6701 | 842.800 | 806.100 | 805.400 | 803.500 |
| 6702 | 851.600 | 813.500 | 814.300 | 814.400 |
| 6703 | 847.800 | 812.700 | 813.600 | 813.600 |
| 6704 | 860.000 | 829.900 | 831.300 | 833.400 |
| 6801 | 851.700 | 820.200 | 823.800 | 822.200 |
| 6802 | 847.600 | 825.500 | 825.300 | 823.800 |
| 6803 | 863.700 | 844.500 | 844.900 | 845.800 |
| 6804 | 879.400 | 861.300 | 861.900 | 866.000 |
| 6901 | 878.900 | 864.800 | 862.300 | 861.000 |
| 6902 | 882.800 | 871.000 | 865.900 | 873.100 |
| 6903 | 888.300 | 875.400 | 876.900 | 877.900 |
| 6904 | 826.500 | 811.800 | 821.400 | 813.800 |
| 7001 | 928.900 | 918.200 | 916.600 | 911.000 |
| 7002 | 913.500 | 932.000 | 931.200 | 929.300 |
| 7003 | 907.700 | 927.300 | 930.300 | 933.500 |
| 7004 | 906.000 | 928.200 | 932.000 | 938.300 |
| 7101 | 915.800 | 938.600 | 933.400 | 937.600 |
| 7102 | 895.800 | 919.300 | 920.300 | 915.900 |
| 7103 | 872.900 | 892.000 | 893.600 | 892.600 |
| 7104 | 873.600 | 893.700 | 896.500 | 898.200 |
| 7201 | 925.900 | 953.000 | 952.000 | 944.000 |
| 7202 | 905.000 | 933.000 | 932.900 | 929.000 |
| 7203 | 884.500 | 909.900 | 908.300 | 914.500 |
| 7204 | 927.000 | 957.800 | 954.600 | 963.800 |
| 7301 | 869.100 | 901.700 | 915.900 | 896.400 |
| 7302 | 926.700 | 963.500 | 961.500 | 958.300 |
| 7303 | 927.100 | 960.100 | 954.000 | 961.300 |
| 7304 | 959.400 | 990.200 | 981.600 | 1004.00 |
| 7401 | 952.300 | 981.500 | 985.400 | 987.200 |
| 7402 | 966.200 | 996.200 | 995.000 | 1002.60 |
| 7403 | 921.800 | 948.900 | 948.300 | 946.100 |
| 7404 | 907.600 | 932.300 | 932.200 | 923.900 |
| 7501 | 910.800 | 937.900 | 930.600 | 933.300 |
| 7502 | 867.300 | 888.000 | 882.800 | 880.800 |
| 7503 | 840.900 | 852.500 | 849.300 | 845.900 |
| 7504 | 860.300 | 868.100 | 864.600 | 864.700 |
| 7601 | 930.400 | 941.800 | 945.700 | 941.600 |
| 7602 | 917.000 | 927.000 | 925.800 | 924.700 |
| 7603 | 926.700 | 935.700 | 932.400 | 929.400 |
| 7604 | 936.900 | 945.700 | 936.700 | 935.800 |
| | 1 | 2 | 3 | 4 |

Fig. II.14
Index of capacity utilization



also affects through the mark-up law, the determination of prices, and it is also important in opening up export possibilities.

As we shall see leter, the contribution of government corporation investments to accumulation and growth, to inflation and BOP control seems to work through such a channel. However, for lack of data, the index of capacity utilization is limited to the manufacturing sectors. It is given by the ratio of value added to the stock of capital within such industries.

From the results presented in Table and Figure II.14, the two sides of an investment expenditure can very clearly be analyzed.

The first impact is given by their expenditure effect, which implies a higher level of utilization of the existing capacity. During the 1970's therefore, lack of Government Corporation investment would have led to a much lower level of activity. However, once an investment is incorporated, it becomes an addition to the production capacity. This effect may then prevail over the multiplier effects on demand and can lead the index of capacity utilization down.

This process is shown very clearly in Figure II.14, where for the period 1970-75 the level of capacity utilization would have been much higher than the historical one, which includes actual Government Corporation additions to capital stock.

### 3. The Effects on Employment

Employment, dependent on the level of demand and productivity, is considered an endogenous variable in the model. To consider employment behavior within the manufacturing, construction and service sectors, three

different functions have been introduced.

Interestingly, the results shown in the model differ from official statistics. In recent years it has become increasingly difficult to lay off workers in Italy. Indeed, lay-offs and firings are strictly regulated by recent legislation. In many cases, as an alternative to lay-offs, workers remain employed and are paid by a national fund (Cassa Integrazione Guadagni). Therefore, the wide demand cycles of recent years are not registered by the official data on unemployment.

In our model the level of employment is computed by the ratio between total worked hours and average worked hours per employee. Thus, we arrive at a more meaningful measure of unemployment.

The major effect produced by Government Corporation investment on the level of employment is within the manufacturing sector. As shown in Table II.15, this impact has consistently increased, reaching 200,000 to 250,000 units of employees activated by Government Corporation expenditure out of a total of 5.62 million employees registered in the last quarter considered.

Government Corporation investments have had a much smaller impact on employment in the construction industry. Table and Figure II.16 show how declining employment levels in the construction industry have closely followed declining levels of activity.

Indeed, over three hundred thousand units have been lost over the last six years, from a peak of 1.8 million in 1970 down to 1.5 million in 1976.

Government Corporation investments seem to have had the peculiar impact of further depressing the levels of employment in the construction

sector in 1969-70. After that date they show an increasingly positive contribution until the peak reached in 1975-76, with over 50,000 jobs activated.

The service sector, on the other hand, registers a very light reaction to the demand shock due to government corporation investments. Both the control and the moving-average solutions give very similar results. (See Figure II.17).

The above levels of employment can now be compared to the available labor force to obtain an estimate of the rate of unemployment.

A sharp decrease of this rate is shown in Table II.18. From a level of 9 percent in 1967, it falls to a minimum of 2.9 percent in the last quarter of 1974. The most rapid decrease is reported in the strong recovery of 1973-74 when the rate dropped by more than two points in a few quarters.

Since 1974, however, the rate of unemployment has increased, and only a light improvement was registered during the 1976 recovery.

As we already pointed out, such a profile seems to be barely related to the conditions on production and growth. Unfortunately, Italian data are quite poor and they have to be considered with some caution.

One further structural change, which cannot be fully understood by the series we present, has to be mentioned.

While the total rate of unemployment has consistently decreased, its distribution over different age classes has widened. The constraints in the labor market make it very difficult for a worker to lose his job, but also make it very difficult for newcomers to find them. Therefore,

while the aggregate rate of unemployment is not very high compared to the rest of Europe, the peculiar concentration of unemployment among workers under 30 years of age reveals an astonishing 17 percent rate within this group. Clearly this concentration entails deep social costs.

One further interesting effect results from government corporation investments. Until the end of 1972 the impact of government corporation investment expenditure was to reduce the rate of unemployment by 1/2 to 1 percentage point; see LUA and MUA in Table II.18. After 1972, the unemployment rate would have been lower had it not been for government corporation investments.

The first impact can easily be explained by the higher level of production to supply new plant and machinery, activated by government corporation demand. Once these investments were incorporated, a higher productivity has been produced. Therefore, unemployment rates were also increased.

Even if the model does not distinguish the behavioral decisions of private and government corporations, the results we obtain from the simulations underline the effect that government corporation investments have in pushing the whole system towards higher capital intensity. Historical experience can confirm this situation, since Italian government corporations are more heavily represented in capital-intensive sectors, such as oil and steel, and their investments are usually in large scale plants.

Table II.15 - Total Employment, Manufacturing Industries
thousands of units
CLIMA= Control solution
MLIMA= Moving average solution
YLIMA= Pro-cycle solution
ALIMA= Anti-cycle solution

| | CLIMA | MLIMA | YLIMA | ALIMA |
|---|---|---|---|---|
| 6701 | 4617.60 | 4588.90 | 4588.40 | 4586.80 |
| 6702 | 4618.90 | 4567.30 | 4565.80 | 4564.60 |
| 6703 | 4618.00 | 4547.80 | 4547.20 | 4546.30 |
| 6704 | 4627.50 | 4545.10 | 4545.70 | 4546.50 |
| 6801 | 4629.70 | 4539.70 | 4539.80 | 4537.70 |
| 6802 | 4629.20 | 4534.30 | 4534.20 | 4531.20 |
| 6803 | 4642.00 | 4543.20 | 4543.50 | 4542.30 |
| 6804 | 4664.90 | 4563.10 | 4563.70 | 4565.70 |
| 6901 | 4721.60 | 4619.60 | 4618.50 | 4619.20 |
| 6902 | 4776.90 | 4674.90 | 4670.50 | 4675.90 |
| 6903 | 4832.40 | 4727.90 | 4725.20 | 4730.40 |
| 6904 | 4839.40 | 4730.30 | 4734.90 | 4733.80 |
| 7001 | 4924.20 | 4811.50 | 4814.30 | 4809.60 |
| 7002 | 4988.70 | 4870.40 | 4872.20 | 4866.90 |
| 7003 | 5037.70 | 4912.40 | 4915.90 | 4913.30 |
| 7004 | 5078.50 | 4946.10 | 4951.90 | 4953.50 |
| 7101 | 5121.30 | 4980.40 | 4982.30 | 4986.40 |
| 7102 | 5145.50 | 4995.40 | 4998.50 | 4999.60 |
| 7103 | 5150.90 | 4990.00 | 4995.40 | 4993.80 |
| 7104 | 5159.10 | 4987.30 | 4994.60 | 4994.40 |
| 7201 | 5207.20 | 5026.60 | 5033.10 | 5027.50 |
| 7202 | 5233.80 | 5044.70 | 5051.40 | 5043.70 |
| 7203 | 5243.30 | 5044.20 | 5050.10 | 5047.30 |
| 7204 | 5285.70 | 5077.40 | 5081.70 | 5085.00 |
| 7301 | 5278.70 | 5064.40 | 5079.70 | 5068.30 |
| 7302 | 5319.10 | 5099.30 | 5113.20 | 5100.50 |
| 7303 | 5356.00 | 5129.50 | 5139.60 | 5132.60 |
| 7304 | 5413.40 | 5179.40 | 5185.10 | 5192.90 |
| 7401 | 5458.70 | 5218.90 | 5229.70 | 5236.20 |
| 7402 | 5509.70 | 5266.00 | 5278.00 | 5287.90 |
| 7403 | 5521.90 | 5276.70 | 5289.40 | 5296.70 |
| 7404 | 5523.80 | 5277.60 | 5291.40 | 5292.10 |
| 7501 | 5530.20 | 5285.90 | 5295.70 | 5298.60 |
| 7502 | 5502.60 | 5258.40 | 5266.20 | 5267.50 |
| 7503 | 5460.10 | 5211.10 | 5219.00 | 5217.30 |
| 7504 | 5442.60 | 5188.80 | 5194.50 | 5192.90 |
| 7601 | 5505.30 | 5243.00 | 5255.80 | 5251.70 |
| 7602 | 5545.80 | 5278.30 | 5292.80 | 5288.10 |
| 7603 | 5586.40 | 5314.00 | 5328.00 | 5322.40 |
| 7604 | 5627.30 | 5351.10 | 5360.60 | 5355.60 |
| | 1 | 2 | 3 | 4 |

Fig. II.15

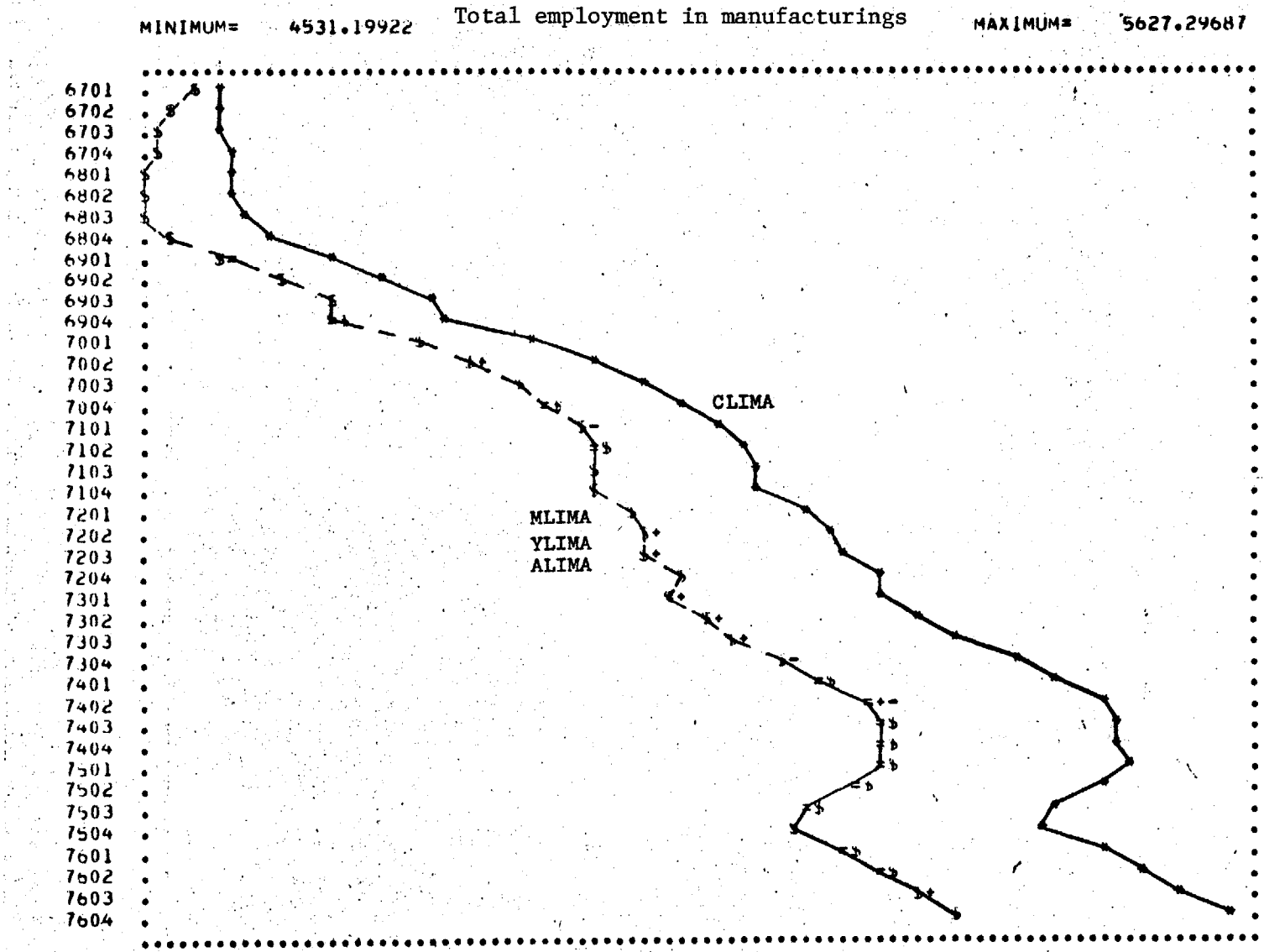

MINIMUM= 4531.19922
Total employment in manufacturings
MAXIMUM= 5627.29687
6701
6702
6703
6704
6801
6802
6803
6804
6901
6902
6903
6904
7001
7002
7003
7004
7101
7102
7103
7104
7201
7202
7203
7204
7301
7302
7303
7304
7401
7402
7403
7404
7501
7502
7503
7504
7601
7602
7603
7604
CLIMA
MLIMA
YLIMA
ALIMA

Table II.16 - Total Employment, Constructions
thousands of units
CLCA=control solution
MLCA=moving-average solution
YLCA=pro-cycle solution
ALCA=anti-cycle solution

| | CLCA | MLCA | YLCA | ALCA |
|---|---|---|---|---|
| 6701 | 1627.60 | 1625.10 | 1625.10 | 1624.90 |
| 6702 | 1629.80 | 1625.40 | 1625.30 | 1625.20 |
| 6703 | 1637.40 | 1631.80 | 1631.70 | 1631.60 |
| 6704 | 1642.50 | 1636.40 | 1636.50 | 1636.60 |
| 6801 | 1636.90 | 1630.50 | 1630.60 | 1630.40 |
| 6802 | 1645.60 | 1640.10 | 1640.20 | 1640.00 |
| 6803 | 1673.30 | 1670.10 | 1670.10 | 1670.10 |
| 6804 | 1708.00 | 1706.40 | 1706.40 | 1706.70 |
| 6901 | 1708.30 | 1706.90 | 1706.80 | 1707.10 |
| 6902 | 1734.90 | 1735.10 | 1734.70 | 1735.30 |
| 6903 | 1776.30 | 1778.50 | 1778.30 | 1778.80 |
| 6904 | 1750.40 | 1752.60 | 1753.10 | 1753.00 |
| 7001 | 1753.20 | 1756.20 | 1756.60 | 1756.00 |
| 7002 | 1749.50 | 1752.40 | 1752.70 | 1752.00 |
| 7003 | 1760.30 | 1763.70 | 1764.00 | 1763.60 |
| 7004 | 1767.40 | 1770.70 | 1771.20 | 1771.20 |
| 7101 | 1723.40 | 1723.50 | 1723.70 | 1724.10 |
| 7102 | 1695.50 | 1693.50 | 1693.60 | 1693.70 |
| 7103 | 1725.50 | 1724.60 | 1724.80 | 1724.60 |
| 7104 | 1708.50 | 1705.90 | 1706.20 | 1706.10 |
| 7201 | 1668.10 | 1662.10 | 1662.40 | 1661.70 |
| 7202 | 1647.90 | 1639.80 | 1639.90 | 1639.00 |
| 7203 | 1650.20 | 1641.10 | 1641.00 | 1640.60 |
| 7204 | 1644.30 | 1633.30 | 1633.00 | 1633.30 |
| 7301 | 1638.30 | 1625.40 | 1625.90 | 1625.10 |
| 7302 | 1603.60 | 1586.70 | 1587.30 | 1586.20 |
| 7303 | 1572.10 | 1551.20 | 1551.50 | 1550.90 |
| 7304 | 1604.00 | 1581.20 | 1580.90 | 1581.80 |
| 7401 | 1573.80 | 1546.80 | 1546.90 | 1548.20 |
| 7402 | 1592.50 | 1563.10 | 1563.20 | 1564.70 |
| 7403 | 1582.00 | 1547.80 | 1549.90 | 1551.20 |
| 7404 | 1580.90 | 1545.70 | 1545.70 | 1546.00 |
| 7501 | 1548.90 | 1510.60 | 1510.30 | 1510.10 |
| 7502 | 1509.20 | 1468.30 | 1467.80 | 1466.90 |
| 7503 | 1474.90 | 1431.00 | 1430.50 | 1429.00 |
| 7504 | 1487.50 | 1439.50 | 1438.90 | 1436.90 |
| 7601 | 1493.00 | 1441.40 | 1441.20 | 1438.50 |
| 7602 | 1498.80 | 1444.30 | 1444.40 | 1441.30 |
| 7603 | 1500.50 | 1443.50 | 1443.80 | 1440.20 |
| 7604 | 1498.90 | 1440.00 | 1439.90 | 1436.10 |
| | 1 | 2 | 3 | 4 |

Fig. II.16

Total employment in construction

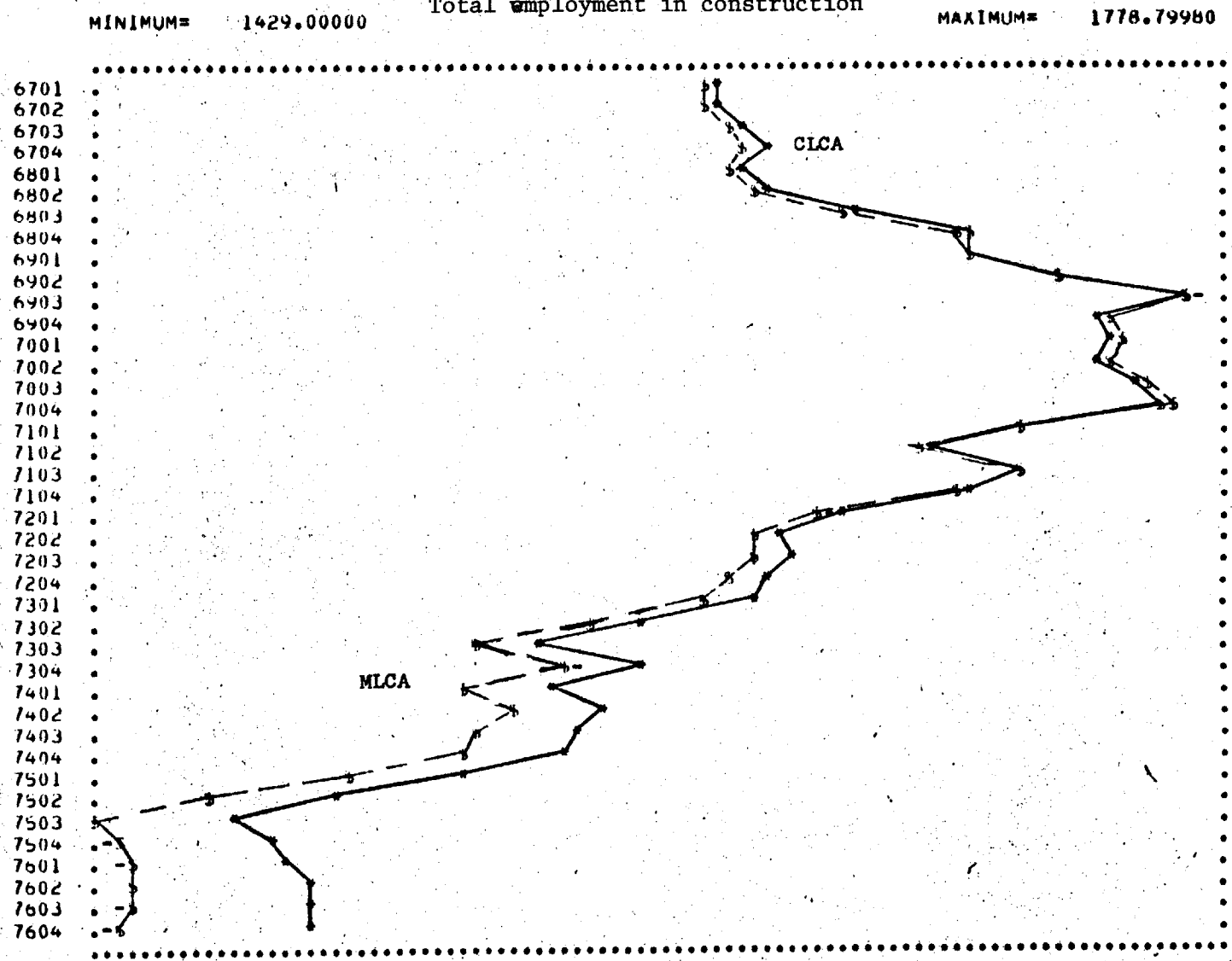


Table II.17 - Total Employment, Services

CLSEA=control solution
MLSEA=moving-average solution
YLSEA=pro-cycle solution
ALSEA=anti-cycle solution

thousands of units

| | CLSEA | MLSEA | YLSEA | ALSEA |
|---|---|---|---|---|
| 6701 | 4437.10 | 4436.40 | 4436.30 | 4436.30 |
| 6702 | 4464.10 | 4463.40 | 4463.40 | 4463.40 |
| 6703 | 4486.80 | 4486.60 | 4486.60 | 4486.70 |
| 6704 | 4507.40 | 4508.50 | 4508.60 | 4508.70 |
| 6801 | 4530.60 | 4533.10 | 4533.20 | 4533.20 |
| 6802 | 4564.10 | 4568.20 | 4568.20 | 4568.20 |
| 6803 | 4586.80 | 4592.40 | 4592.50 | 4592.60 |
| 6804 | 4614.70 | 4621.70 | 4621.70 | 4621.90 |
| 6901 | 4644.10 | 4652.30 | 4652.30 | 4652.40 |
| 6902 | 4674.50 | 4683.90 | 4683.80 | 4684.00 |
| 6903 | 4710.30 | 4720.60 | 4720.60 | 4720.70 |
| 6904 | 4728.10 | 4738.90 | 4739.20 | 4739.00 |
| 7001 | 4767.70 | 4779.00 | 4779.20 | 4778.80 |
| 7002 | 4799.50 | 4810.70 | 4810.80 | 4810.60 |
| 7003 | 4830.60 | 4841.30 | 4841.30 | 4841.30 |
| 7004 | 4858.70 | 4868.20 | 4868.30 | 4868.40 |
| 7101 | 4889.80 | 4897.60 | 4897.40 | 4897.50 |
| 7102 | 4909.70 | 4915.40 | 4915.30 | 4915.20 |
| 7103 | 4932.50 | 4935.90 | 4935.90 | 4935.80 |
| 7104 | 4952.40 | 4953.30 | 4953.20 | 4953.00 |
| 7201 | 4990.80 | 4989.20 | 4989.10 | 4988.70 |
| 7202 | 5015.90 | 5011.80 | 5011.60 | 5011.30 |
| 7203 | 5035.40 | 5028.50 | 5028.20 | 5028.20 |
| 7204 | 5065.10 | 5055.30 | 5055.10 | 5055.20 |
| 7301 | 5093.20 | 5080.90 | 5081.10 | 2080.50 |
| 7302 | 5124.00 | 5108.70 | 5108.70 | 5108.30 |
| 7303 | 5147.40 | 5128.80 | 5128.50 | 5128.50 |
| 7304 | 5177.40 | 5155.10 | 5154.80 | 5155.30 |
| 7401 | 5207.10 | 5181.60 | 5181.60 | 5181.70 |
| 7402 | 5237.20 | 5208.50 | 5208.50 | 5208.50 |
| 7403 | 5254.90 | 5223.00 | 5223.20 | 5222.80 |
| 7404 | 5283.00 | 5247.80 | 5247.90 | 5247.30 |
| 7501 | 5320.20 | 5282.00 | 5282.00 | 5281.70 |
| 7502 | 5334.90 | 5293.50 | 5293.60 | 5293.20 |
| 7503 | 5342.00 | 5297.00 | 5297.20 | 5296.70 |
| 7504 | 5363.20 | 5313.90 | 5314.20 | 5313.60 |
| 7601 | 5406.80 | 5353.80 | 5354.50 | 5353.40 |
| 7602 | 5443.30 | 5386.60 | 5387.20 | 5385.80 |
| 7603 | 5479.60 | 5418.70 | 5419.20 | 5417.50 |
| 7604 | 5513.90 | 5448.70 | 5449.10 | 5447.00 |
| | 1 | 2 | 3 | 4 |

Fig. II.17

Total employment, services

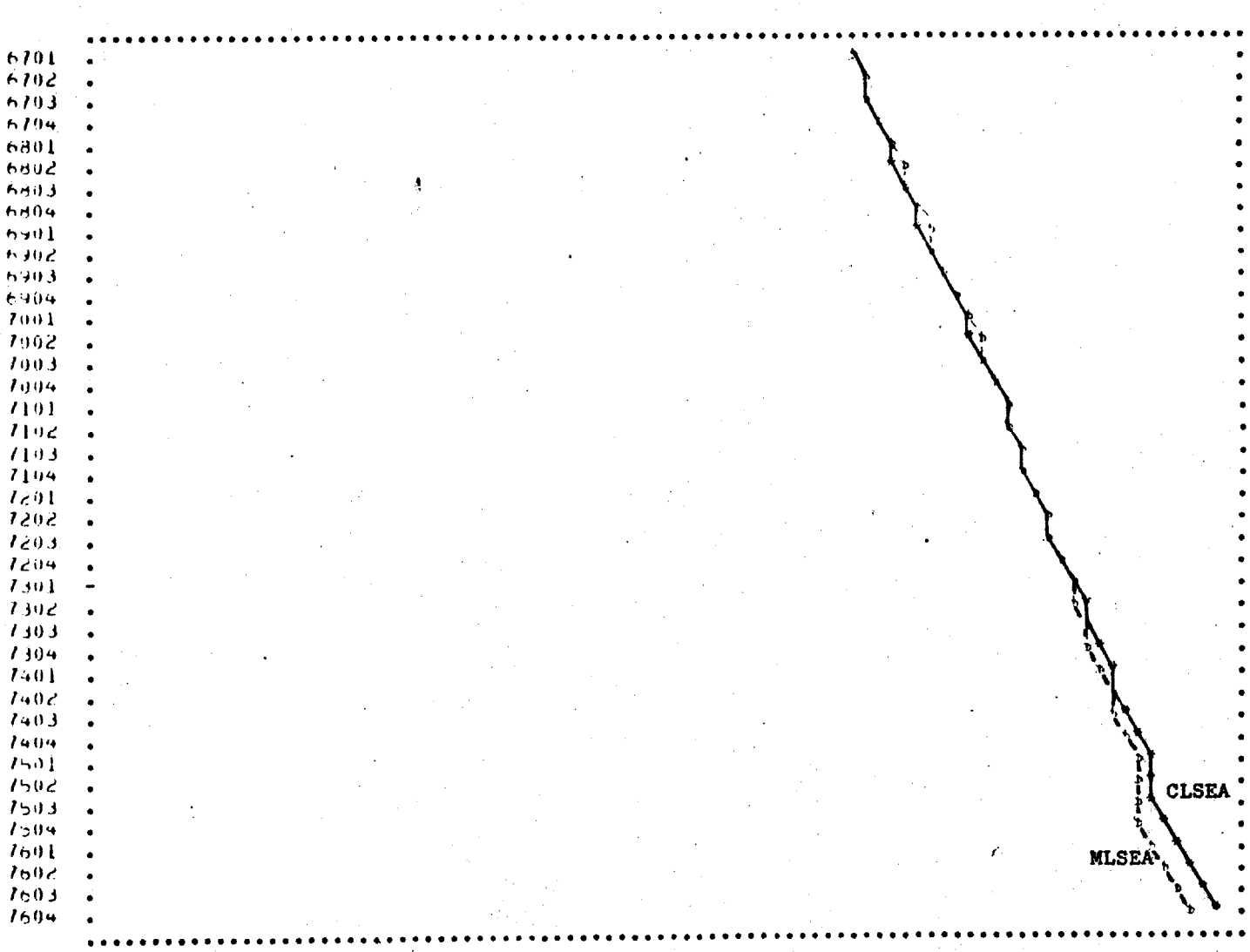


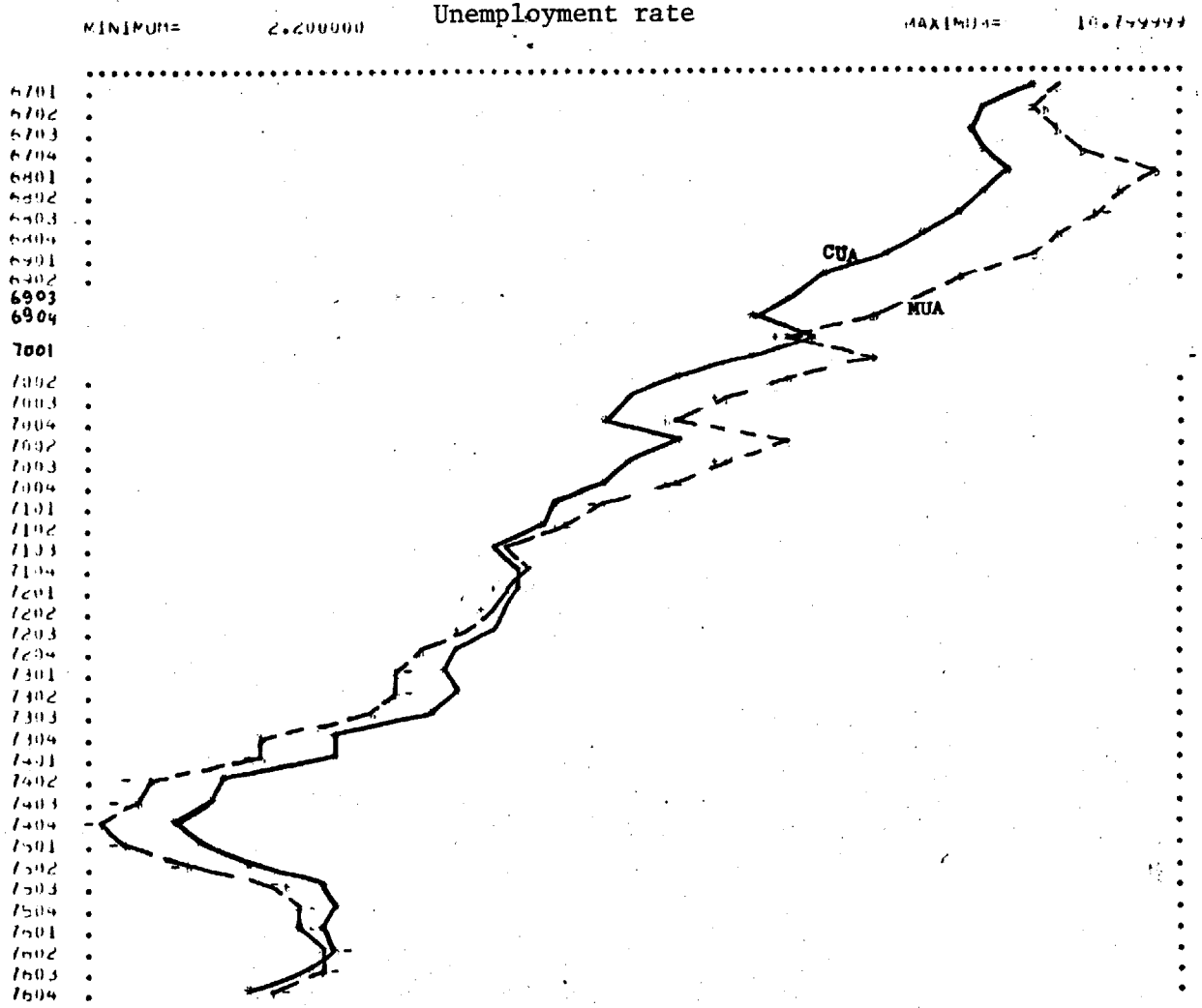
Table II.18 - Unemployment Rate:

CUA= control solution
MUA= moving average solution
YUA= pro-cycle solution
AUA= anti-cycle solution

| | CUA | MUA | YUA | AUA |
|---|---|---|---|---|
| 6701 | 9.90000 | 10.1000 | 10.1000 | 10.1000 |
| 6702 | 9.50000 | 9.90000 | 10.0000 | 10.0000 |
| 6703 | 9.40000 | 10.1000 | 10.1000 | 10.1000 |
| 6704 | 9.50000 | 10.3000 | 10.3000 | 10.3000 |
| 6801 | 9.70000 | 10.8000 | 10.8000 | 10.8000 |
| 6802 | 9.50000 | 10.6000 | 10.6000 | 10.6000 |
| 6803 | 9.30000 | 10.4000 | 10.4000 | 10.5000 |
| 6804 | 9.00000 | 10.1000 | 10.1000 | 10.1000 |
| 6901 | 8.70000 | 9.90000 | 9.90000 | 9.90000 |
| 6902 | 8.20000 | 9.30000 | 9.30000 | 9.30000 |
| 6903 | 7.60000 | 8.70000 | 8.70000 | 8.60000 |
| 6904 | 8.00000 | 9.00000 | 9.00000 | 9.00000 |
| 7001 | 7.30000 | 8.30000 | 8.30000 | 8.30000 |
| 7002 | 7.00000 | 7.90000 | 7.90000 | 7.90000 |
| 7003 | 6.60000 | 7.40000 | 7.30000 | 7.40000 |
| 7004 | 6.40000 | 7.00000 | 6.90000 | 6.90000 |
| 7101 | 6.00000 | 6.40000 | 6.40000 | 6.30000 |
| 7102 | 5.90000 | 6.10000 | 6.00000 | 6.00000 |
| 7103 | 5.60000 | 5.70000 | 5.50000 | 5.50000 |
| 7104 | 5.80000 | 5.80000 | 5.70000 | 5.70000 |
| 7201 | 5.70000 | 5.60000 | 5.50000 | 5.60000 |
| 7202 | 5.60000 | 5.50000 | 5.40000 | 5.50000 |
| 7203 | 5.50000 | 5.30000 | 5.20000 | 5.30000 |
| 7204 | 5.20000 | 4.90000 | 4.90000 | 4.90000 |
| 7301 | 5.10000 | 4.70000 | 4.70000 | 4.80000 |
| 7302 | 5.20000 | 4.70000 | 4.70000 | 4.80000 |
| 7303 | 5.00000 | 4.50000 | 4.50000 | 4.50000 |
| 7304 | 4.20000 | 3.60000 | 3.50000 | 3.60000 |
| 7401 | 4.20000 | 3.60000 | 3.60000 | 3.50000 |
| 7402 | 3.30000 | 2.70000 | 2.70000 | 2.50000 |
| 7403 | 3.20000 | 2.50000 | 2.50000 | 2.40000 |
| 7404 | 2.90000 | 2.30000 | 2.30000 | 2.20000 |
| 7501 | 3.10000 | 2.50000 | 2.50000 | 2.40000 |
| 7502 | 3.50000 | 3.00000 | 3.00000 | 2.90000 |
| 7503 | 4.10000 | 3.70000 | 3.80000 | 3.80000 |
| 7504 | 4.20000 | 3.90000 | 4.00000 | 4.00000 |
| 7601 | 4.10000 | 3.90000 | 4.00000 | 4.00000 |
| 7602 | 4.20000 | 4.10000 | 4.20000 | 4.30000 |
| 7603 | 4.00000 | 4.10000 | 4.10000 | 4.20000 |
| 7604 | 3.50000 | 3.70000 | 3.70000 | 3.80000 |
| | 1 | 2 | 3 | 4 |

Fig. II.18

Unemployment rate



## 4. Prices, Wages and Distribution

### 4.1. The effects of government corporation investments on Italian inflation

Since the oil crisis of 1973, the most puzzling problem facing all industrialized nations has been the control of inflation. The problem in Italy is particularly severe. The huge increase in oil prices found the Italian economy in a peculiar situation. As we have already seen, during the early 1970's, growth performance was very poor. Nevertheless, because of the relevant increases in wages started in 1969, the GNP deflator increased from 2.8 percent in 1968 to over 8 percent in 1972, the most relevant increase being due to the price index for construction. Only at the end of 1972 did the Italian economy begin to grow again at a significant rate. Thus, the oil crisis fell on an already cost-inflation economy, and pushed the rate of inflation up to over 20 percent.

Since that time, despite the tight control on demand and the fluctuations in production, inflation has never been kept below 15 percent. As can be seen from the consumer price index, Table II.19, Column B, even during the sharp decrease of final demand in 1975, when GNP decreased by 3.75 percent in constant prices, the inflation rate remained very high. Then, the recent recovery of 1976 proved again that any consistent demand shock easily pushes up the rate of inflation.

Three relations have to be stressed here. First, within the domestic price structure, the rate of increase of the investment goods deflator has usually been lower than the consumption price index. Second,

the increase in construction prices has been higher than the deflator for purchases of machinery and equipment. Third, import-export prices show wide differences from domestic prices. In the early 1970's they were lower. Export prices were lower because of the constraints of international competition. Import prices were lower because of the lower inflation rates among Italy's major trading partners.

This situation was completely reversed in 1973, when the prices of Italian exports rose by over 20 percent and 40 percent respectively. These increases were a consequence of the huge increase in unit costs. Loss of competitiveness led the Italian lira to devalue sharply. As an immediate and direct consequence, the prices of imports increased by a percentage higher than the one for exports.

For an open economy like Italy's, it is very difficult to control foreign accounts' deficits through exchange devaluation. Even in the recent experience of 1976, the decrease in the value of the Italian lira pushed up export flows, but gave in the meantime considerable support to domestic inflation. As shown in Table II.19, import prices went up by 28 percent and helped push consumption prices up by over 20 percent.

Within this general framework, the impact of Government Corporation investments does not appear very significant. In the first few years, they contributed to the increase in inflation. After 1971, however, as a result of their contribution to the increase in production capacity, they served to slow the rate of inflation by a slight amount. Clearly, they had a more significant impact on investment deflators. In fact, the prices of machinery, equipment and construction would all have been

higher than the actual prices by 2 to 3 percent had government corporation investments not been made. Even this impact, however, was insignificant in 1976.

Table II. 19 - Inflation rates, annual, end of year 1967-76

| | A Deflator GNP | | B Consumption Prices | | C Investment Deflators | | | | D Export Prices | | E Import Prices |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Machinery Exp. | | Constructions | | | | |
| | Y | M | Y | M | Y | M | Y | M | Y | M | |
| 1968 | 2.80 | 1.74 | 1.92 | 1.81 | 2.01 | 1.77 | 2.33 | 1.31 | -0.39 | - .49 | -1.87 |
| 1969 | 3.62 | 3.87 | 2.59 | 2.67 | 0.93 | 0.41 | 4.34 | 4.18 | 3.34 | 3.45 | 3.34 |
| 1970 | 5.35 | 5.93 | 5.55 | 6.27 | 8.71 | 8.89 | 9.35 | 9.35 | 4.17 | 5.05 | 4.16 |
| 1971 | 6.94 | 7.08 | 6.38 | 6.27 | 5.85 | 5.20 | 8.85 | 8.58 | 5.47 | 5.99 | 6.74 |
| 1972 | 8.35 | 8.99 | 7.83 | 8.33 | 6.45 | 6.54 | 10.40 | 11.05 | 4.40 | 4.88 | 2.32 |
| 1973 | 15.10 | 16.29 | 15.56 | 16.50 | 20.43 | 21.90 | 24.34 | 27.06 | 19.62 | 20.41 | 28.41 |
| 1974 | 19.42 | 21.30 | 23.32 | 24.87 | 36.71 | 39.80 | 31.44 | 36.60 | 41.38 | 42.44 | 54.80 |
| 1975 | 14.08 | 16.74 | 13.41 | 15.58 | 11.67 | 14.91 | 14.13 | 18.08 | 1.03 | 2.66 | 2.18 |
| 1976 | 15.72 | 16.65 | 20.84 | 21.62 | 14.05 | 14.90 | 12.96 | 12.89 | 17.78 | 18.40 | 28.35 |

Table II.20 - GNP Deflators

CPGNP = control solution
MPGNP = moving-average solutionn
YPGNP = pro-cycle solution
APGNP = anti-cycle solution

| | CPGNP | MPGNP | YPGNP | APGNP |
|---|---|---|---|---|
| 6701 | 1156.50 | 1167.10 | 1157.10 | 1157.10 |
| 6702 | 1159.40 | 1156.90 | 1156.90 | 1156.30 |
| 6703 | 1162.70 | 1157.10 | 1157.00 | 1155.90 |
| 6704 | 1162.60 | 1159.40 | 1159.30 | 1159.20 |
| 6801 | 1174.90 | 1164.90 | 1164.90 | 1165.10 |
| 6802 | 1185.10 | 1173.80 | 1173.90 | 1173.00 |
| 6803 | 1180.00 | 1174.20 | 1174.20 | 1173.90 |
| 6804 | 1189.30 | 1177.20 | 1177.20 | 1177.00 |
| 6901 | 1207.70 | 1195.90 | 1195.00 | 1196.20 |
| 6902 | 1230.60 | 1218.10 | 1218.10 | 1218.30 |
| 6903 | 1243.80 | 1232.40 | 1231.90 | 1232.70 |
| 6904 | 1234.30 | 1222.60 | 1221.80 | 1222.90 |
| 7001 | 1231.20 | 1222.40 | 1221.70 | 1223.10 |
| 7002 | 1271.20 | 1263.20 | 1263.00 | 1263.90 |
| 7003 | 1292.20 | 1285.40 | 1285.10 | 1285.50 |
| 7004 | 1298.20 | 1294.90 | 1295.10 | 1294.90 |
| 7101 | 1344.60 | 1341.00 | 1341.60 | 1342.10 |
| 7102 | 1369.70 | 1367.40 | 1367.60 | 1368.80 |
| 7103 | 1379.20 | 1375.60 | 1375.90 | 1376.70 |
| 7104 | 1385.30 | 1386.60 | 1387.10 | 1387.40 |
| 7201 | 1420.90 | 1421.60 | 1422.40 | 1423.00 |
| 7202 | 1442.30 | 1444.30 | 1445.20 | 1445.00 |
| 7203 | 1458.10 | 1460.00 | 1460.90 | 1460.10 |
| 7204 | 1504.30 | 1511.30 | 1512.10 | 1511.70 |
| 7301 | 1541.40 | 1549.90 | 1550.00 | 1551.40 |
| 7302 | 1615.70 | 1630.70 | 1632.50 | 1631.90 |
| 7303 | 1671.60 | 1692.60 | 1694.90 | 1693.10 |
| 7304 | 1731.50 | 1757.50 | 1760.10 | 1757.50 |
| 7401 | 1784.30 | 1802.00 | 1804.00 | 1802.30 |
| 7402 | 1850.20 | 1900.30 | 1903.30 | 1901.90 |
| 7403 | 1969.10 | 2021.20 | 2024.80 | 2024.10 |
| 7404 | 2087.90 | 2131.90 | 2130.00 | 2137.80 |
| 7501 | 2157.20 | 2239.70 | 2244.10 | 2250.00 |
| 7502 | 2245.30 | 2347.10 | 2351.40 | 2361.00 |
| 7503 | 2323.50 | 2443.50 | 2447.30 | 2459.50 |
| 7504 | 2359.00 | 2493.70 | 2491.90 | 2505.80 |
| 7601 | 2447.00 | 2584.20 | 2585.90 | 2602.40 |
| 7602 | 2505.90 | 2657.40 | 2659.80 | 2675.70 |
| 7603 | 2603.00 | 2764.60 | 2766.40 | 2784.80 |
| 7604 | 2729.80 | 2903.10 | 2904.30 | 2924.00 |
| | 1 | 2 | 3 | 4 |

Fig.II.19

Deflators for GNP

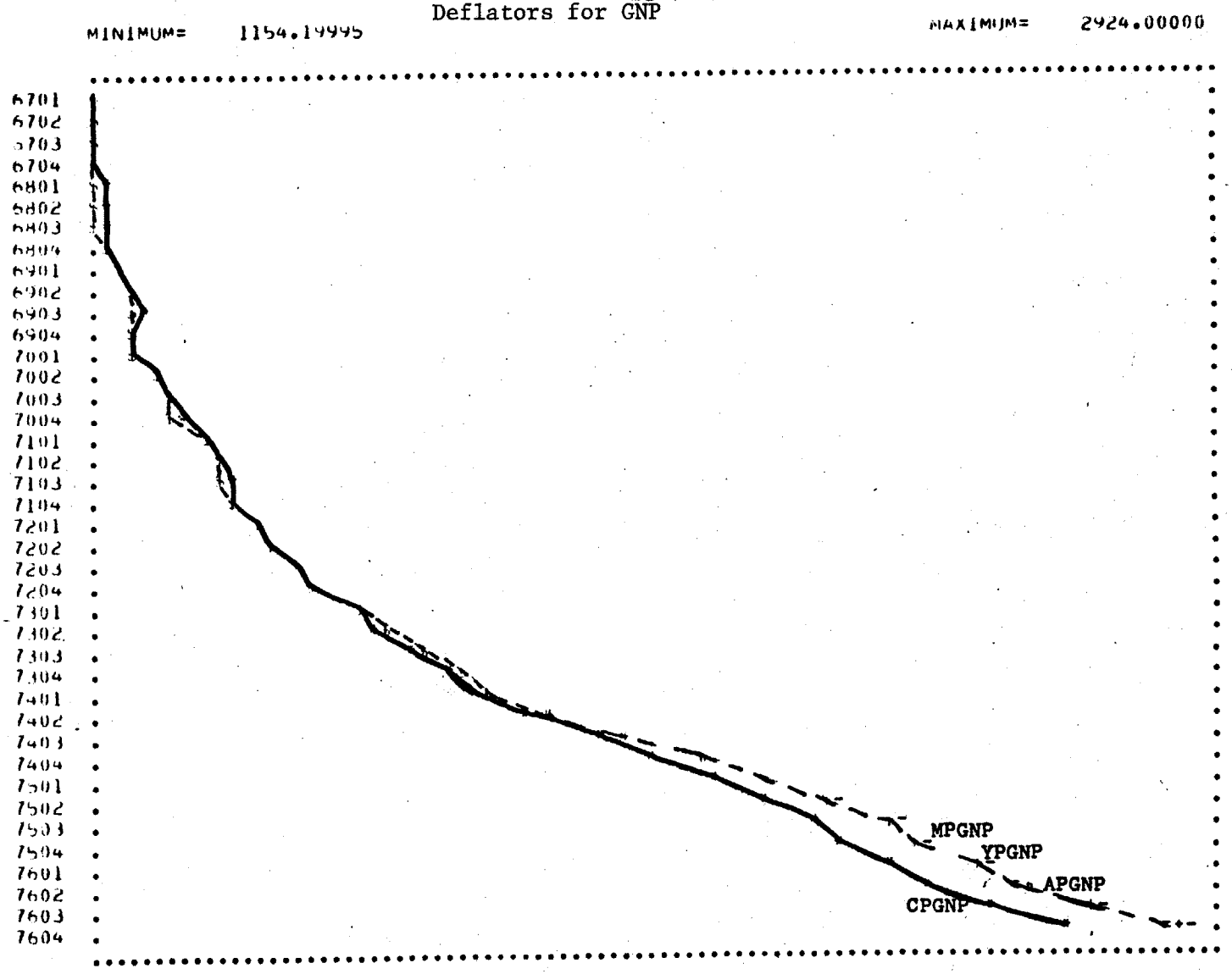


Table II.21 - Consumption Price Index, 1963=1000

CPC63=control solution
MPC63=moving average solution
YPC63=pro-cycle solution
APC63=anti-cycle solution

| | CPC63 | MPC63 | YPC63 | APC63 |
|---|---|---|---|---|
| 6701 | 1165.00 | 1166.00 | 1166.00 | 1166.00 |
| 6702 | 1165.40 | 1165.80 | 1165.80 | 1165.80 |
| 6703 | 1166.00 | 1165.40 | 1165.40 | 1165.40 |
| 6704 | 1167.40 | 1166.20 | 1166.20 | 1166.20 |
| 6801 | 1184.80 | 1183.00 | 1183.00 | 1183.10 |
| 6802 | 1188.60 | 1186.40 | 1186.40 | 1186.50 |
| 6803 | 1186.70 | 1184.40 | 1184.40 | 1184.30 |
| 6804 | 1189.80 | 1187.30 | 1187.30 | 1187.20 |
| 6901 | 1213.00 | 1209.90 | 1210.00 | 1210.10 |
| 6902 | 1237.60 | 1234.30 | 1234.40 | 1234.40 |
| 6903 | 1238.20 | 1237.00 | 1236.90 | 1237.00 |
| 6904 | 1220.60 | 1219.10 | 1218.80 | 1219.30 |
| 7001 | 1233.40 | 1233.60 | 1233.70 | 1234.00 |
| 7002 | 1237.60 | 1275.60 | 1275.50 | 1275.80 |
| 7003 | 1287.00 | 1291.40 | 1291.10 | 1291.40 |
| 7004 | 1288.40 | 1295.60 | 1295.50 | 1295.70 |
| 7101 | 1330.10 | 1333.40 | 1333.50 | 1333.90 |
| 7102 | 1356.10 | 1360.90 | 1360.90 | 1361.40 |
| 7103 | 1359.10 | 1364.80 | 1364.70 | 1365.20 |
| 7104 | 1370.60 | 1376.90 | 1377.00 | 1377.30 |
| 7201 | 1394.10 | 1401.50 | 1401.70 | 1402.30 |
| 7202 | 1417.60 | 1427.00 | 1427.20 | 1427.60 |
| 7203 | 1449.80 | 1461.40 | 1461.60 | 1461.80 |
| 7204 | 1478.00 | 1491.60 | 1491.90 | 1492.10 |
| 7301 | 1539.20 | 1554.60 | 1554.60 | 1555.40 |
| 7302 | 1607.40 | 1627.10 | 1627.50 | 1627.60 |
| 7303 | 1667.50 | 1692.10 | 1693.00 | 1692.50 |
| 7304 | 1708.20 | 1737.80 | 1738.90 | 1737.60 |
| 7401 | 1819.20 | 1854.30 | 1856.10 | 1854.10 |
| 7402 | 1914.70 | 1957.20 | 1959.60 | 1956.80 |
| 7403 | 2017.30 | 2069.70 | 2072.30 | 2070.20 |
| 7404 | 2106.50 | 2170.10 | 2172.40 | 2173.40 |
| 7501 | 2204.60 | 2282.40 | 2285.70 | 2289.50 |
| 7502 | 2311.40 | 2406.40 | 2409.80 | 2417.80 |
| 7503 | 2365.50 | 2476.60 | 2479.60 | 2491.00 |
| 7504 | 2388.90 | 2508.30 | 2511.60 | 2523.60 |
| 7601 | 2540.20 | 2669.80 | 2671.80 | 2687.10 |
| 7602 | 2661.60 | 2805.10 | 2807.00 | 2823.80 |
| 7603 | 2716.50 | 2869.90 | 2870.90 | 2889.30 |
| 7604 | 2886.80 | 3050.60 | 3051.20 | 3071.00 |
| | 1 | 2 | 3 | 4 |

Fig.II.20
Consumption price index, 1963=1000

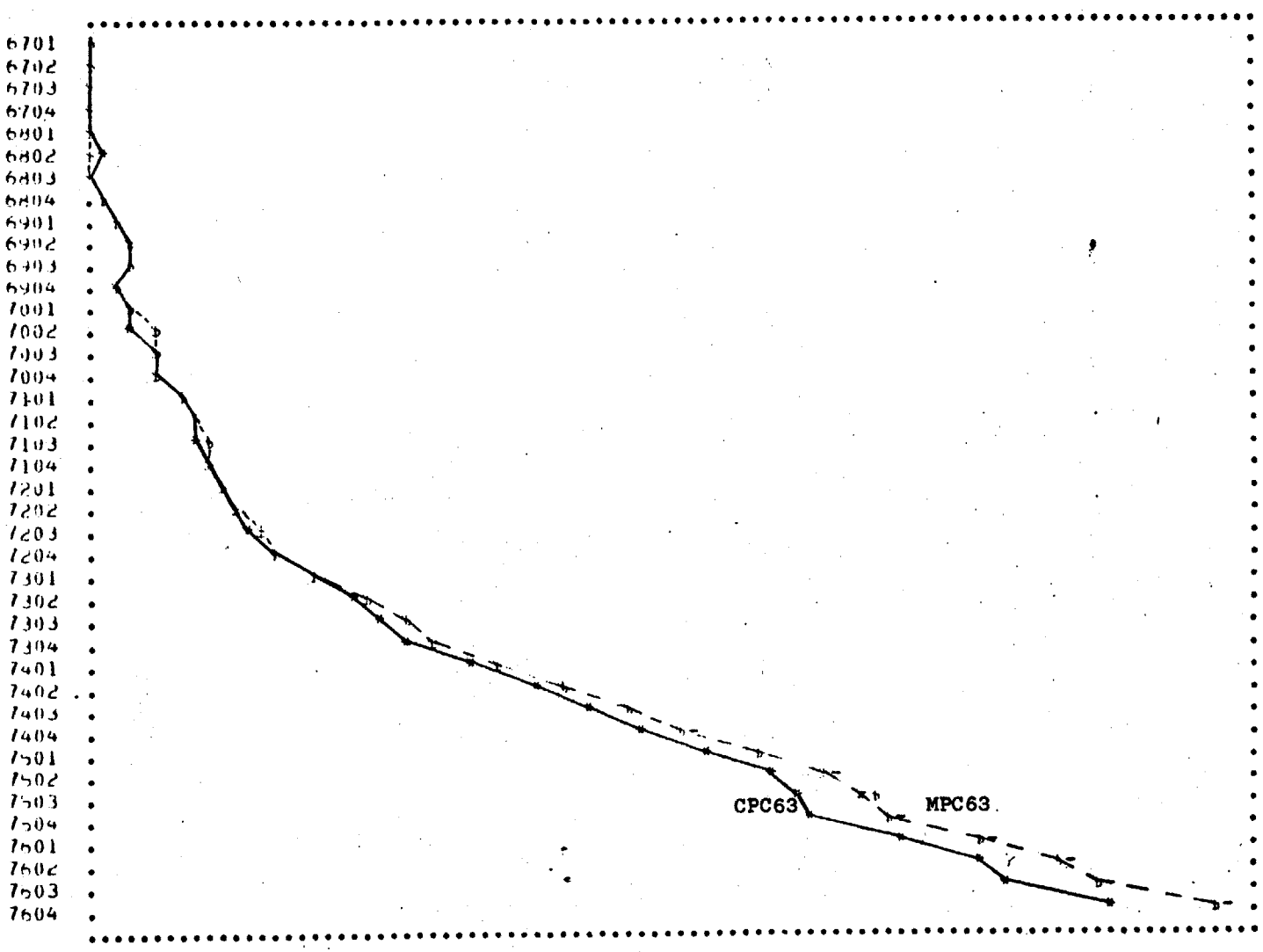
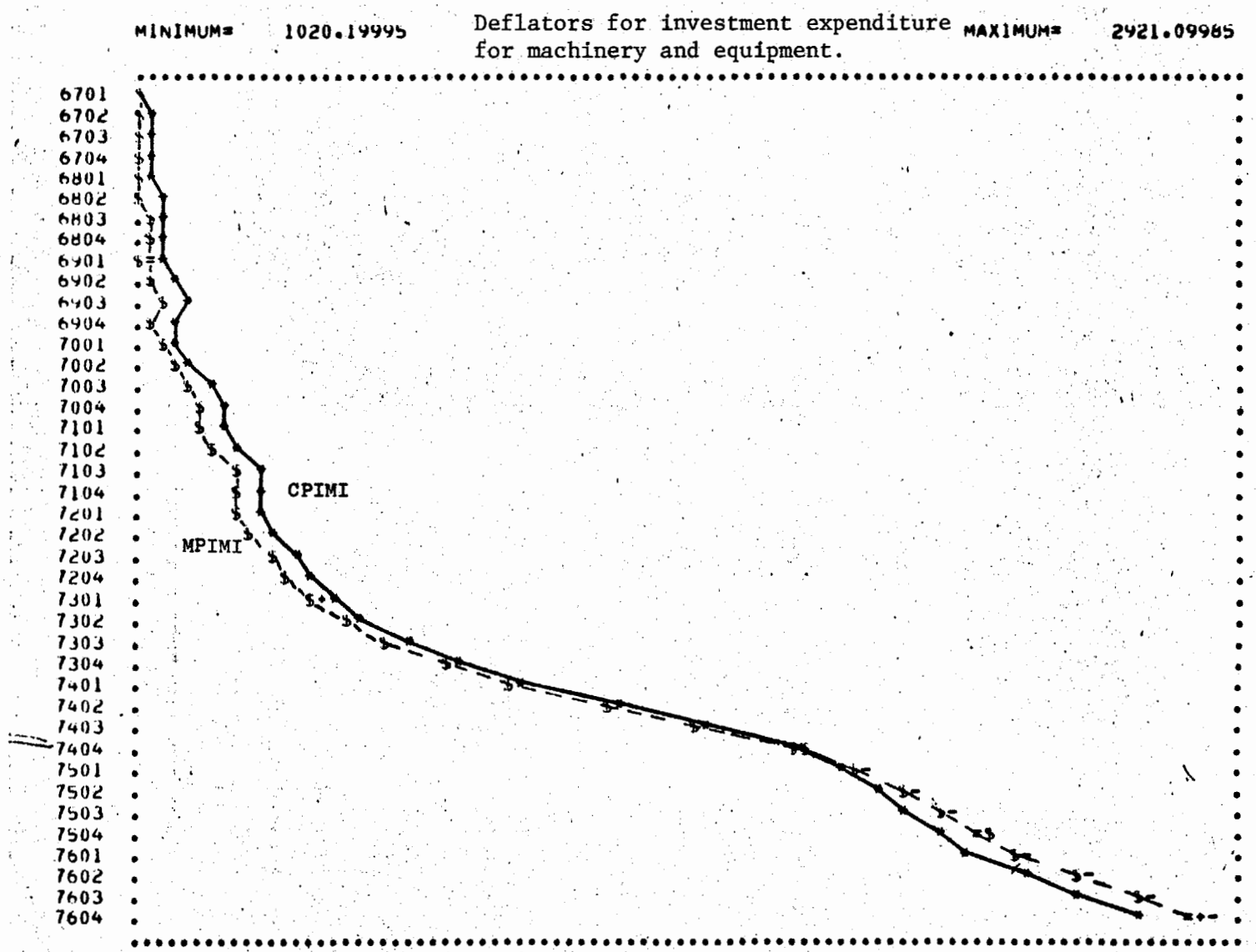


Table II.22 - Deflators for Investment Expenditure for Machineries and Equipments:

CPIMI=control solution
MPIMI=moving-average solution
YPIMI=pro-cycle solution
APIMI=anti-cycle solution

| | CPIMI | MPIMI | YPIMI | APIMI |
|---|---|---|---|---|
| 6701 | 1038.90 | 1021.50 | 1021.10 | 1020.20 |
| 6702 | 1049.70 | 1028.50 | 1027.90 | 1027.70 |
| 6703 | 1038.30 | 1032.10 | 1032.20 | 1032.10 |
| 6704 | 1036.30 | 1030.30 | 1030.90 | 1031.50 |
| 6801 | 1038.30 | 1030.10 | 1029.90 | 1028.30 |
| 6802 | 1066.70 | 1037.90 | 1037.90 | 1036.80 |
| 6803 | 1073.10 | 1044.10 | 1044.30 | 1044.60 |
| 6804 | 1078.00 | 1048.50 | 1048.80 | 1050.30 |
| 6901 | 1073.40 | 1042.30 | 1041.30 | 1041.40 |
| 6902 | 1091.30 | 1061.10 | 1058.50 | 1062.00 |
| 6903 | 1110.30 | 1075.70 | 1078.60 | 1080.10 |
| 6904 | 1088.00 | 1052.80 | 1055.90 | 1054.10 |
| 7001 | 1104.90 | 1070.40 | 1070.10 | 1067.50 |
| 7002 | 1123.10 | 1091.30 | 1092.00 | 1090.40 |
| 7003 | 1138.70 | 1121.90 | 1123.50 | 1124.00 |
| 7004 | 1142.60 | 1145.40 | 1149.60 | 1150.90 |
| 7101 | 1184.50 | 1145.40 | 1144.20 | 1146.80 |
| 7102 | 1210.60 | 1159.20 | 1170.20 | 1169.40 |
| 7103 | 1252.70 | 1210.30 | 1212.90 | 1212.00 |
| 7104 | 1252.00 | 1208.00 | 1208.90 | 1209.50 |
| 7201 | 1247.90 | 1201.30 | 1203.30 | 1199.50 |
| 7202 | 1279.80 | 1233.30 | 1235.80 | 1232.50 |
| 7203 | 1316.80 | 1240.20 | 1242.10 | 1243.50 |
| 7204 | 1332.80 | 1257.10 | 1259.20 | 1291.70 |
| 7301 | 1386.00 | 1340.90 | 1350.00 | 1341.30 |
| 7302 | 1434.80 | 1391.80 | 1395.30 | 1392.00 |
| 7303 | 1509.90 | 1458.40 | 1471.50 | 1471.20 |
| 7304 | 1605.10 | 1564.00 | 1571.30 | 1577.40 |
| 7401 | 1713.80 | 1680.60 | 1681.60 | 1687.70 |
| 7402 | 1878.10 | 1833.30 | 1850.70 | 1852.40 |
| 7403 | 2030.20 | 2015.00 | 2023.30 | 2024.00 |
| 7404 | 2194.40 | 2193.50 | 2203.50 | 2201.50 |
| 7501 | 2282.70 | 2300.40 | 2307.90 | 2315.00 |
| 7502 | 2351.50 | 2358.00 | 2375.20 | 2405.30 |
| 7503 | 2393.70 | 2447.70 | 2450.80 | 2459.40 |
| 7504 | 2450.50 | 2520.70 | 2529.10 | 2545.20 |
| 7601 | 2434.50 | 2574.90 | 2585.30 | 2602.20 |
| 7602 | 2594.90 | 2634.70 | 2694.80 | 2711.70 |
| 7603 | 2698.40 | 2745.00 | 2803.50 | 2820.90 |
| 7604 | 2795.10 | 2845.40 | 2901.80 | 2921.10 |
| | 1 | 2 | 3 | 4 |

Fig. II.21




Deflators for investment expenditure for machinery and equipment.

Table II.23 - Deflators, Investment Expenditure for Constructions:

CPIC=control solution
MPIC=moving-average solution
YPIC=pro-cycle solution
APIC=anti-cycle solution

| | CPIC | MPIC | YPIC | APIC |
|---|---|---|---|---|
| 6701 | 1171.70 | 1163.40 | 1163.20 | 1162.80 |
| 6702 | 1164.60 | 1144.90 | 1144.40 | 1143.60 |
| 6703 | 1167.30 | 1133.80 | 1133.30 | 1132.60 |
| 6704 | 1165.10 | 1117.10 | 1116.90 | 1116.60 |
| 6801 | 1173.60 | 1119.20 | 1119.20 | 1118.60 |
| 6802 | 1186.60 | 1128.60 | 1128.90 | 1127.80 |
| 6803 | 1188.40 | 1128.80 | 1129.10 | 1128.30 |
| 6804 | 1192.20 | 1131.70 | 1131.80 | 1131.40 |
| 6901 | 1217.60 | 1155.60 | 1155.30 | 1155.60 |
| 6902 | 1256.10 | 1193.20 | 1191.60 | 1194.20 |
| 6903 | 1271.10 | 1208.30 | 1206.50 | 1209.70 |
| 6904 | 1243.90 | 1179.00 | 1178.90 | 1180.20 |
| 7001 | 1263.90 | 1197.30 | 1197.90 | 1198.00 |
| 7002 | 1305.60 | 1235.90 | 1237.90 | 1235.30 |
| 7003 | 1333.90 | 1261.90 | 1264.80 | 1261.40 |
| 7004 | 1360.20 | 1289.20 | 1291.40 | 1290.30 |
| 7101 | 1410.00 | 1332.10 | 1333.90 | 1335.60 |
| 7102 | 1451.30 | 1371.00 | 1373.40 | 1375.50 |
| 7103 | 1476.40 | 1396.40 | 1399.20 | 1400.90 |
| 7104 | 1480.60 | 1399.80 | 1403.00 | 1403.80 |
| 7201 | 1508.60 | 1427.40 | 1432.30 | 1430.00 |
| 7202 | 1555.40 | 1474.10 | 1479.90 | 1479.90 |
| 7203 | 1597.60 | 1516.00 | 1521.40 | 1518.10 |
| 7204 | 1634.60 | 1554.50 | 1558.90 | 1557.10 |
| 7301 | 1737.20 | 1657.80 | 1666.00 | 1661.70 |
| 7302 | 1856.60 | 1780.90 | 1791.10 | 1785.10 |
| 7303 | 1948.30 | 1879.40 | 1890.90 | 1883.20 |
| 7304 | 2032.40 | 1975.10 | 1985.90 | 1980.70 |
| 7401 | 2275.50 | 2228.50 | 2240.70 | 2238.60 |
| 7402 | 2422.30 | 2369.50 | 2401.70 | 2408.50 |
| 7403 | 2578.10 | 2573.20 | 2587.90 | 2600.50 |
| 7404 | 2671.40 | 2697.90 | 2716.10 | 2729.30 |
| 7501 | 2769.10 | 2841.80 | 2859.80 | 2886.30 |
| 7502 | 2871.60 | 2965.00 | 2980.00 | 3007.90 |
| 7503 | 2953.00 | 3072.00 | 3085.50 | 3109.50 |
| 7504 | 3049.00 | 3185.80 | 3196.50 | 3221.60 |
| 7601 | 3116.80 | 3255.90 | 3268.80 | 3293.60 |
| 7602 | 3265.60 | 3405.70 | 3419.70 | 3446.60 |
| 7603 | 3380.60 | 3525.80 | 3540.50 | 3569.30 |
| 7604 | 3444.40 | 3596.50 | 3610.50 | 3640.70 |
| | 1 | 2 | 3 | 4 |

Fig. II.22

Deflator for investment expenditure in construction.

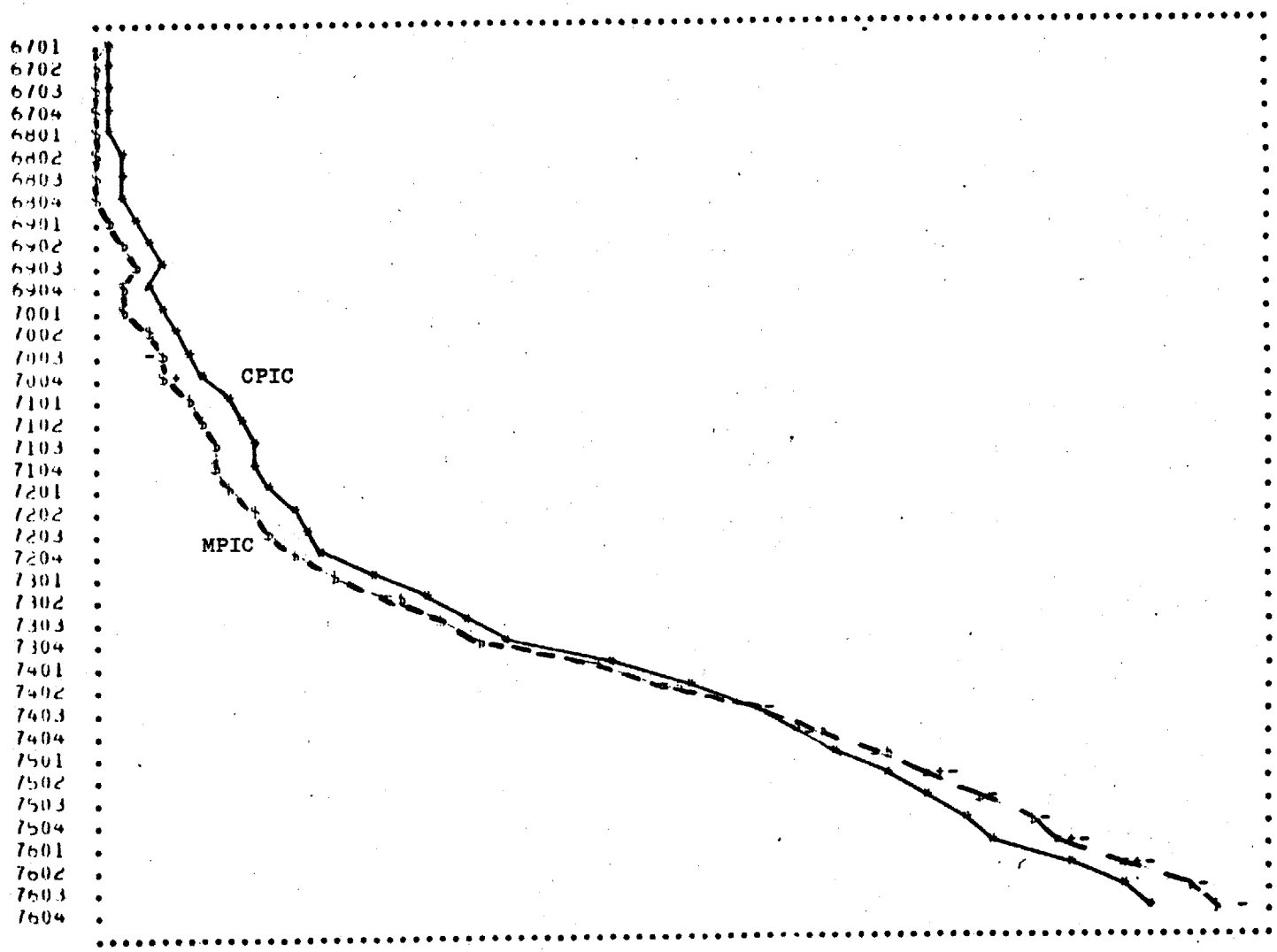


Table II.24 - Export price index, 1963=100

CPXCSI=control solution MPXCSI=moving-average solution
YPXCSI=pro-cycle solution APXCSI=Anti-cycle solution

| | CPXCSI | MPXCSI | YPXCSI | APXCSI |
|---|---|---|---|---|
| 6701 | 102.200 | 102.200 | 102.200 | 102.200 |
| 6702 | 102.400 | 102.300 | 102.300 | 102.300 |
| 6703 | 102.400 | 102.200 | 102.200 | 102.200 |
| 6704 | 102.300 | 101.900 | 101.900 | 101.900 |
| 6801 | 102.300 | 101.800 | 101.800 | 101.800 |
| 6802 | 102.000 | 101.500 | 101.500 | 101.500 |
| 6803 | 101.700 | 101.200 | 101.200 | 101.200 |
| 6804 | 101.900 | 101.400 | 101.400 | 101.400 |
| 6901 | 102.500 | 102.100 | 102.100 | 102.100 |
| 6902 | 103.700 | 103.300 | 103.300 | 103.300 |
| 6903 | 104.500 | 104.200 | 104.200 | 104.200 |
| 6904 | 105.300 | 104.900 | 104.900 | 105.000 |
| 7001 | 106.400 | 106.100 | 106.100 | 106.100 |
| 7002 | 108.200 | 108.000 | 108.000 | 108.000 |
| 7003 | 109.100 | 109.300 | 109.300 | 109.300 |
| 7004 | 109.700 | 110.200 | 110.200 | 110.200 |
| 7101 | 111.600 | 112.300 | 112.400 | 112.400 |
| 7102 | 113.200 | 114.300 | 114.300 | 114.300 |
| 7103 | 114.500 | 115.600 | 115.600 | 115.700 |
| 7104 | 115.700 | 116.800 | 116.800 | 116.900 |
| 7201 | 116.800 | 118.000 | 118.000 | 118.000 |
| 7202 | 118.000 | 119.300 | 119.300 | 119.300 |
| 7203 | 119.300 | 120.300 | 120.800 | 120.800 |
| 7204 | 120.800 | 122.500 | 122.500 | 122.500 |
| 7301 | 124.300 | 126.200 | 126.200 | 126.200 |
| 7302 | 129.800 | 132.000 | 132.000 | 132.000 |
| 7303 | 136.100 | 138.700 | 139.800 | 138.700 |
| 7304 | 144.500 | 147.500 | 147.500 | 147.500 |
| 7401 | 159.200 | 162.800 | 162.800 | 162.800 |
| 7402 | 175.400 | 179.600 | 179.700 | 179.700 |
| 7403 | 190.500 | 195.500 | 195.500 | 195.600 |
| 7404 | 204.300 | 210.100 | 210.200 | 210.300 |
| 7501 | 204.100 | 210.800 | 211.000 | 211.100 |
| 7502 | 202.500 | 210.200 | 210.300 | 210.700 |
| 7503 | 207.600 | 216.200 | 216.200 | 216.700 |
| 7504 | 206.400 | 215.700 | 215.700 | 216.300 |
| 7601 | 213.100 | 226.100 | 226.100 | 226.900 |
| 7602 | 227.100 | 238.100 | 238.100 | 238.900 |
| 7603 | 236.600 | 248.200 | 248.100 | 249.000 |
| 7604 | 243.100 | 255.400 | 255.300 | 256.200 |
| | 1 | 2 | 3 | 4 |

Fig. II.23

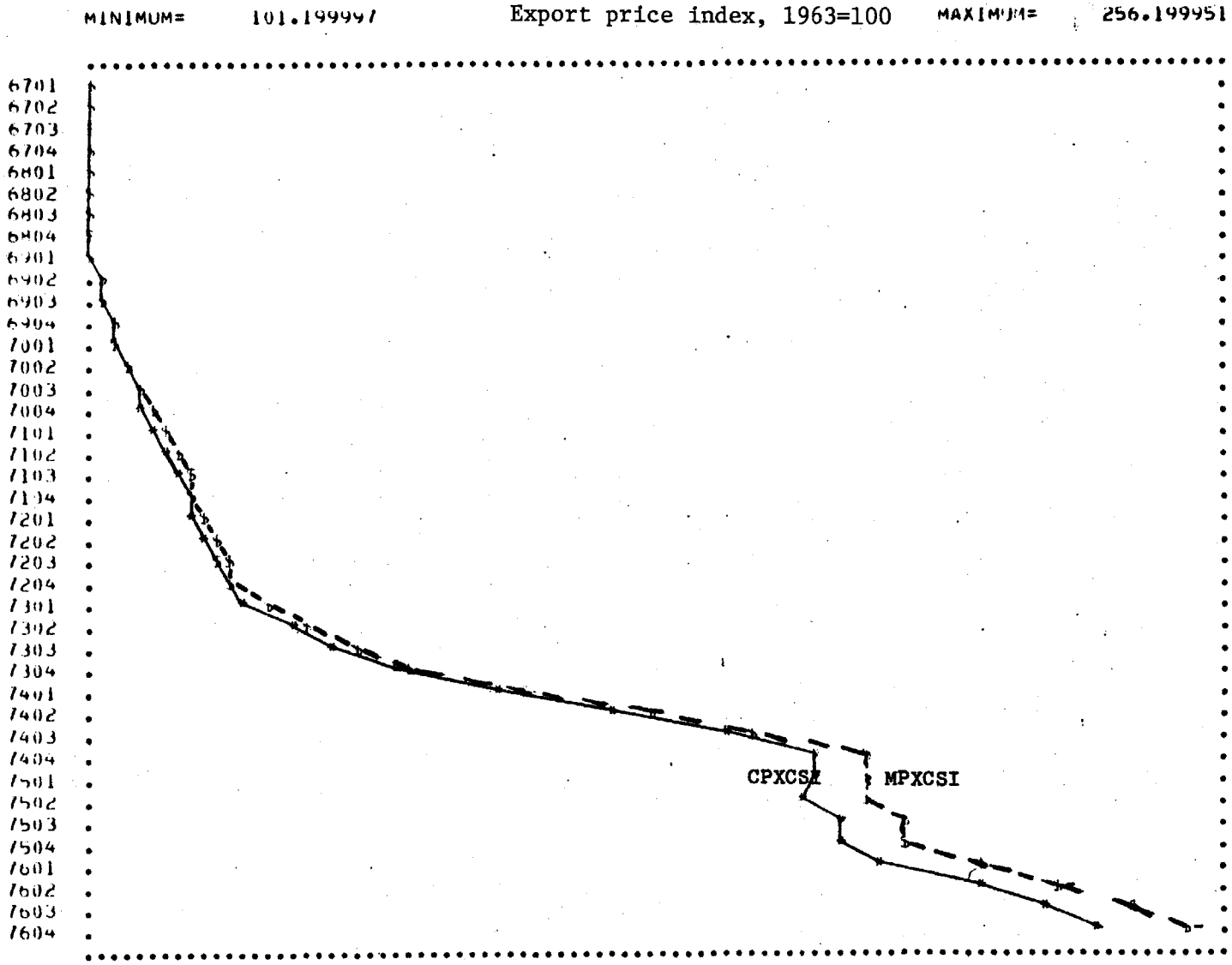

MINIMUM= 101.199997
Export price index, 1963=100
MAXIMUM= 256.199951
6701
6702
6703
6704
6801
6802
6803
6804
6901
6902
6903
6904
7001
7002
7003
7004
7101
7102
7103
7104
7201
7202
7203
7204
7301
7302
7303
7304
7401
7402
7403
7404
7501
7502
7503
7504
7601
7602
7603
7604
CPXCSI
MPXCSI

Table II.25 - Import Price Index, 1963=100

CPMCSI=control solution MPMCSI=moving-average solution
YPMCSI=pro-cycle solution APMCSI=anti-cycle solution

| | CPMCSI | MPMCSI | YPMCSI | APMCSI |
|---|---|---|---|---|
| 6701 | 105.200 | 105.200 | 105.200 | 105.200 |
| 6702 | 103.700 | 103.700 | 103.700 | 103.700 |
| 6703 | 104.400 | 104.400 | 104.400 | 104.400 |
| 6704 | 106.700 | 106.700 | 106.700 | 106.700 |
| 6801 | 105.400 | 105.400 | 105.400 | 105.400 |
| 6802 | 104.200 | 104.200 | 104.200 | 104.200 |
| 6803 | 104.100 | 104.100 | 104.100 | 104.100 |
| 6804 | 104.700 | 104.700 | 104.700 | 104.700 |
| 6901 | 105.000 | 105.000 | 105.000 | 105.000 |
| 6902 | 106.300 | 106.300 | 106.300 | 106.300 |
| 6903 | 106.700 | 106.700 | 106.700 | 106.700 |
| 6904 | 108.200 | 108.200 | 108.200 | 108.200 |
| 7001 | 111.000 | 111.000 | 111.000 | 111.000 |
| 7002 | 110.400 | 110.400 | 110.400 | 110.400 |
| 7003 | 111.400 | 111.400 | 111.400 | 111.400 |
| 7004 | 112.700 | 112.700 | 112.700 | 112.700 |
| 7101 | 115.000 | 115.000 | 115.000 | 115.000 |
| 7102 | 117.200 | 117.200 | 117.200 | 117.200 |
| 7103 | 120.000 | 120.200 | 120.000 | 120.000 |
| 7104 | 120.300 | 120.300 | 120.300 | 120.300 |
| 7201 | 119.400 | 119.400 | 119.400 | 119.400 |
| 7202 | 120.300 | 120.300 | 120.300 | 120.300 |
| 7203 | 121.700 | 121.700 | 121.700 | 121.700 |
| 7204 | 123.100 | 123.100 | 123.100 | 123.100 |
| 7301 | 128.500 | 128.500 | 128.500 | 128.500 |
| 7302 | 140.400 | 140.400 | 140.400 | 140.400 |
| 7303 | 151.400 | 151.400 | 151.400 | 151.400 |
| 7304 | 165.700 | 165.700 | 165.700 | 165.700 |
| 7401 | 209.800 | 209.800 | 209.800 | 209.800 |
| 7402 | 234.400 | 234.400 | 234.400 | 234.400 |
| 7403 | 246.000 | 246.000 | 246.000 | 246.000 |
| 7404 | 256.500 | 256.500 | 256.500 | 256.500 |
| 7501 | 258.000 | 258.000 | 258.000 | 258.000 |
| 7502 | 255.100 | 255.100 | 255.100 | 255.100 |
| 7503 | 258.100 | 258.100 | 258.100 | 258.100 |
| 7504 | 262.100 | 262.100 | 262.100 | 262.100 |
| 7601 | 296.300 | 296.400 | 296.400 | 296.400 |
| 7602 | 329.100 | 329.200 | 329.200 | 329.200 |
| 7603 | 328.200 | 328.300 | 328.300 | 328.300 |
| 7604 | 336.400 | 336.500 | 336.500 | 336.500 |
| | 1 | 2 | 3 | 4 |

Fig.II.24

Imports price index, 1963=100

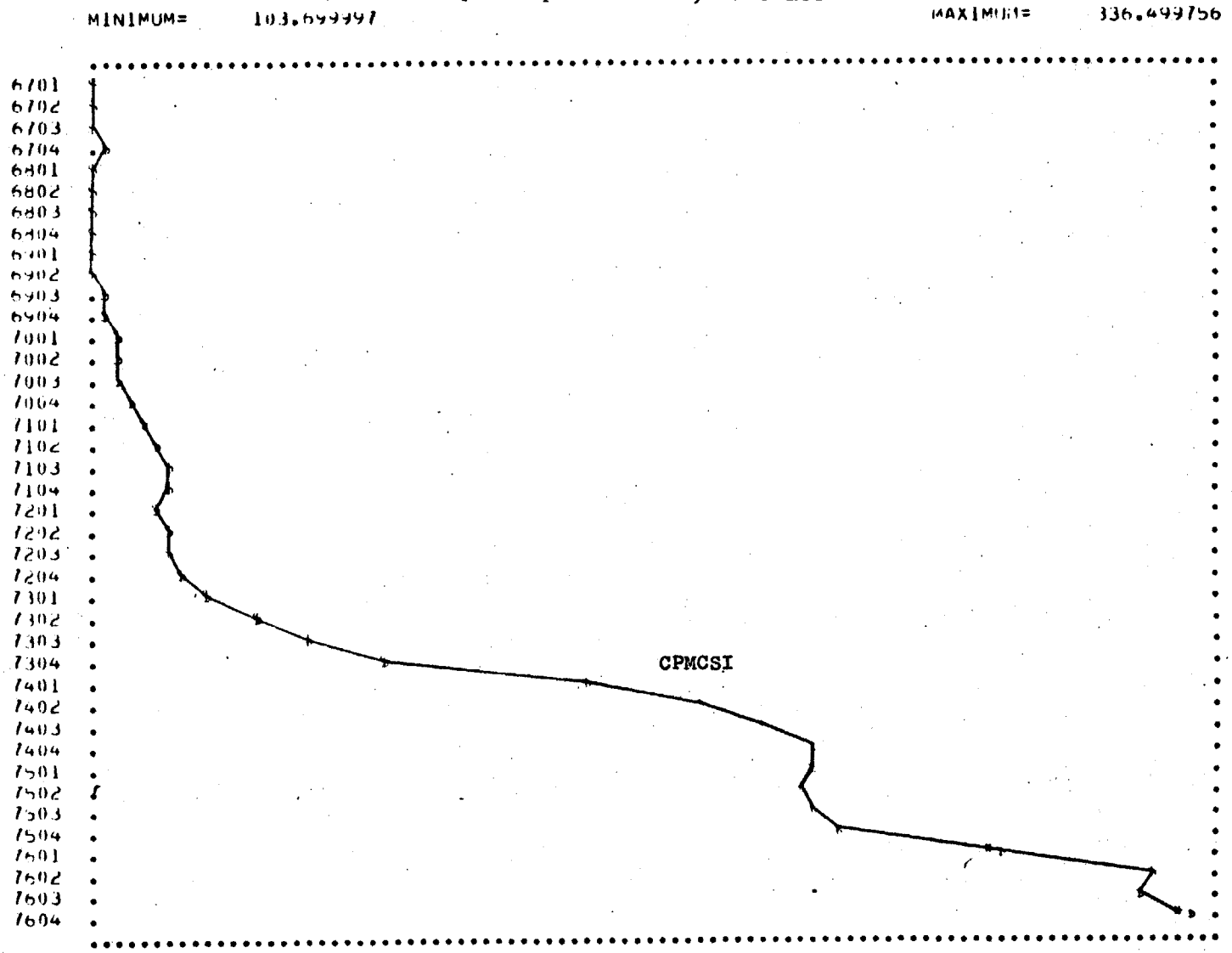
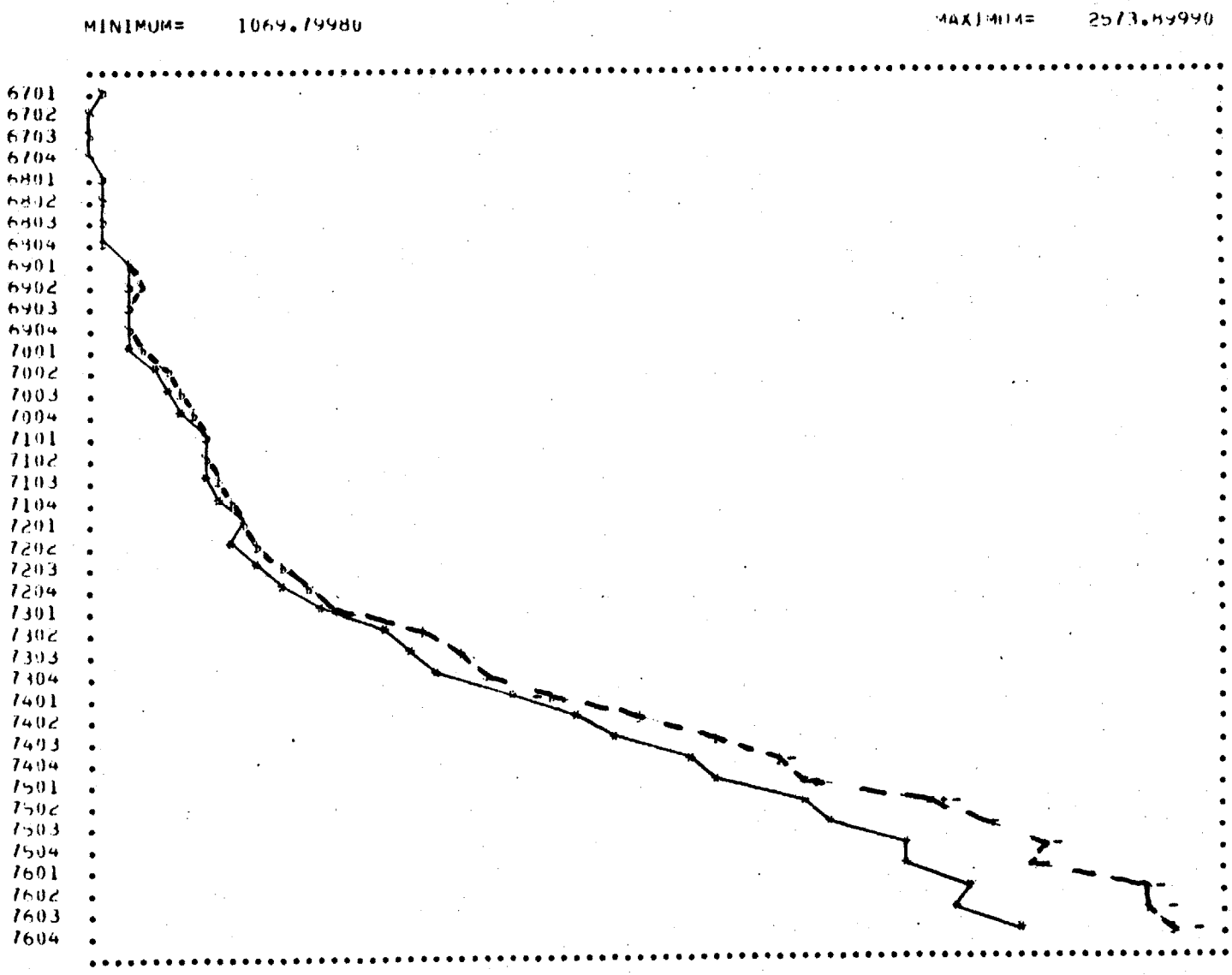


Fig.II.25 - PVIM- Deflator for Value Added in Manufacturings.



4.2 Wages, productivity and unit labor cost.

Important structural changes occurred in the Italian labor market during the 1970's.

Beginning with the well-known "autummo caldo" (Hot-Autumn) of 1969, a long series of administrative regulations on the working day, overtime, labor mobility within and between plants, together with the new wage indexation system of the Spring of 1975, have deeply modified the Italian industrial relations system. The growing rigidity of the labor market is indicated by the steady decline in labor productivity and also by the weak responses of firms to changes in the productive cycle.

The huge and steady increase in wages, both monetary and real, is shown in the first column of Table II.26. The annual rate of increase in hourly wages has always been consistently high. During the peak years of 1973-74, wages rose by over 30 percent. Only in 1976 did this index show a sharp decline in the rate of increase of wages, which went down to 12 percent. Thus, the decline of output per man-hour contributed to the increase in labor costs. Indeed, productivity, while relatively high in the early 1970's, became very poor in 1974-75, and only in 1976 showed important gains.

However, the key for interpreting the huge increase in unit labor costs shown in column "d" is the level of total worked hours.

The Government regulations, mentioned above, produced a sharp reduction in this index. From a level of 1800-1850 man-hours per year in late 1960's, the index fell to the surprisingly low figure of 1600 man-hours per year in the mid 1970's.

Clearly, the productivity of industrial plant has been severely affected by this decline. The interpretation of the effects produced by Government Corporation investments can be related to the above phenonemon.

As can be seen by comparing the path of the "control" solution and the one obtained from the moving-average case, column (by) and (bM), Government Corporation investments contributed to the decline in the total amount of man-hours worked.

Of the 350 man-hours lost between 1969 and 1975, a little less than one third would not have been lost had it not been for Government Corporation investments.

Therefore, the contribution that such expenditure made in terms of lower wages and a higher index for output-per-man-hour, has to be evaluated against lower levels of plant utilization. Thus, a precise measure of their effects cannot be adequately formulated. However, a clearer picture will perhaps emerge in the following section where the overall output/capital ratio, labor-income and cash-flow/capital ratios are considered.

Table II. 26

| | [a] Index Hourly Wages -%increase | | [b] Average hours Worked | | [c] Output per-man hour, %increase | | [d] Unit labor cost, %increase | | [e] Consumption Prices for Wage-indexation | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Y | M | Y | M | Y | M | Y | M | Y | M |
| 1968 | 4.40 | 3.31 | 1857 | 1861 | 7.35 | 6.78 | -2.88 | -3.30 | 1.92 | 1.81 |
| 1969 | 8.45 | 7.38 | 1816 | 1835 | 5.31 | 4.37 | 2.96 | 2.95 | 2.59 | 2.68 |
| 1970 | 16.03 | 15.37 | 1806 | 1869 | 9.58 | 3.40 | 7.96 | 11.48 | 5.55 | 6.27 |
| 1971 | 13.90 | 12.92 | 1695 | 1763 | 2.53 | 3.71 | 9.02 | 8.91 | 6.38 | 6.27 |
| 1972 | 19.35 | 20.05 | 1678 | 1762 | 8.31 | 7.27 | 10.15 | 12.36 | 7.84 | 8.33 |
| 1973 | 29.67 | 32.56 | 1653 | 1748 | 6.68 | 6.37 | 21.67 | 24.60 | 15.58 | 16.50 |
| 1974 | 32.06 | 38.21 | 1616 | 1709 | 1.14 | 1.61 | 30.43 | 36.10 | 23.31 | 24.90 |
| 1975 | 24.25 | 29.18 | 1578 | 1664 | - .23 | - .79 | 24.62 | 30.24 | 13.40 | 15.56 |
| 1976 | 11.80 | 11.58 | 1593 | 1680 | 11.62 | 12.01 | .17 | - .44 | 19.36 | 20.17 |

Table II.27 - Hourly Wage:

CWA=control solution MWA=moving-average solution
YWA=pro-cycle solution AWA=anti-cycle solution

| | CWA | MWA | YWA | AWA |
|---|---|---|---|---|
| 6701 | 577.300 | 577.700 | 577.700 | 577.700 |
| 6702 | 570.800 | 570.300 | 570.300 | 570.300 |
| 6703 | 572.200 | 570.000 | 569.900 | 569.800 |
| 6704 | 570.400 | 565.400 | 566.400 | 566.300 |
| 6801 | 579.200 | 573.200 | 573.200 | 573.200 |
| 6802 | 595.100 | 587.800 | 587.800 | 587.700 |
| 6803 | 596.400 | 587.600 | 587.600 | 587.400 |
| 6804 | 595.500 | 585.200 | 585.200 | 585.000 |
| 6901 | 619.100 | 606.400 | 606.400 | 606.300 |
| 6902 | 652.900 | 637.800 | 637.800 | 637.700 |
| 6903 | 660.500 | 644.700 | 644.500 | 644.600 |
| 6904 | 645.800 | 628.400 | 628.000 | 628.500 |
| 7001 | 660.800 | 641.500 | 641.400 | 641.700 |
| 7002 | 713.400 | 691.800 | 691.700 | 691.900 |
| 7003 | 742.800 | 719.200 | 719.200 | 719.200 |
| 7004 | 749.300 | 725.000 | 725.200 | 725.100 |
| 7101 | 792.600 | 761.200 | 761.700 | 761.800 |
| 7102 | 829.400 | 795.000 | 795.700 | 795.9[illegible] |
| 7103 | 842.600 | 807.800 | 808.700 | 809.000 |
| 7104 | 853.400 | 818.700 | 820.000 | 820.200 |
| 7201 | 887.700 | 853.300 | 855.000 | 855.200 |
| 7202 | 934.600 | 900.500 | 902.700 | 902.[illegible]00 |
| 7203 | 980.500 | 947.300 | 949.800 | 949.000 |
| 7204 | 1018.50 | 986.900 | 989.600 | 988.800 |
| 7301 | 1097.80 | 1066.80 | 1070.20 | 1069.00 |
| 7302 | 1198.30 | 1170.30 | 1175.30 | 1172.50 |
| 7303 | 1272.60 | 1250.50 | 1257.00 | 1252.70 |
| 7304 | 1320.70 | 1305.20 | 1315.60 | 1310.50 |
| 7401 | 1448.00 | 1444.80 | 1454.60 | 1448.70 |
| 7402 | 1526.70 | 1536.10 | 1546.00 | 1544.90 |
| 7403 | 1656.20 | 1670.90 | 1702.30 | 1706.90 |
| 7404 | 1744.10 | 1808.10 | 1821.00 | 1831.50 |
| 7501 | 1867.50 | 1973.90 | 1988.40 | 2012.30 |
| 7502 | 1990.30 | 2115.80 | 2128.40 | 2156.10 |
| 7503 | 2080.30 | 2230.70 | 2242.50 | 2268.10 |
| 7504 | 2167.00 | 2335.80 | 2346.10 | 2371.40 |
| 7601 | 2181.30 | 2354.20 | 2364.40 | 2390.30 |
| 7602 | 2262.60 | 2437.50 | 2447.30 | 2474.90 |
| 7603 | 2367.80 | 2547.00 | 2556.[illegible] | 2585.60 |
| 7604 | 2422.90 | 2606.40 | 2616.[illegible] | 2646.00 |
| | 1 | 2 | 3 | 4 |

Fig.II.26

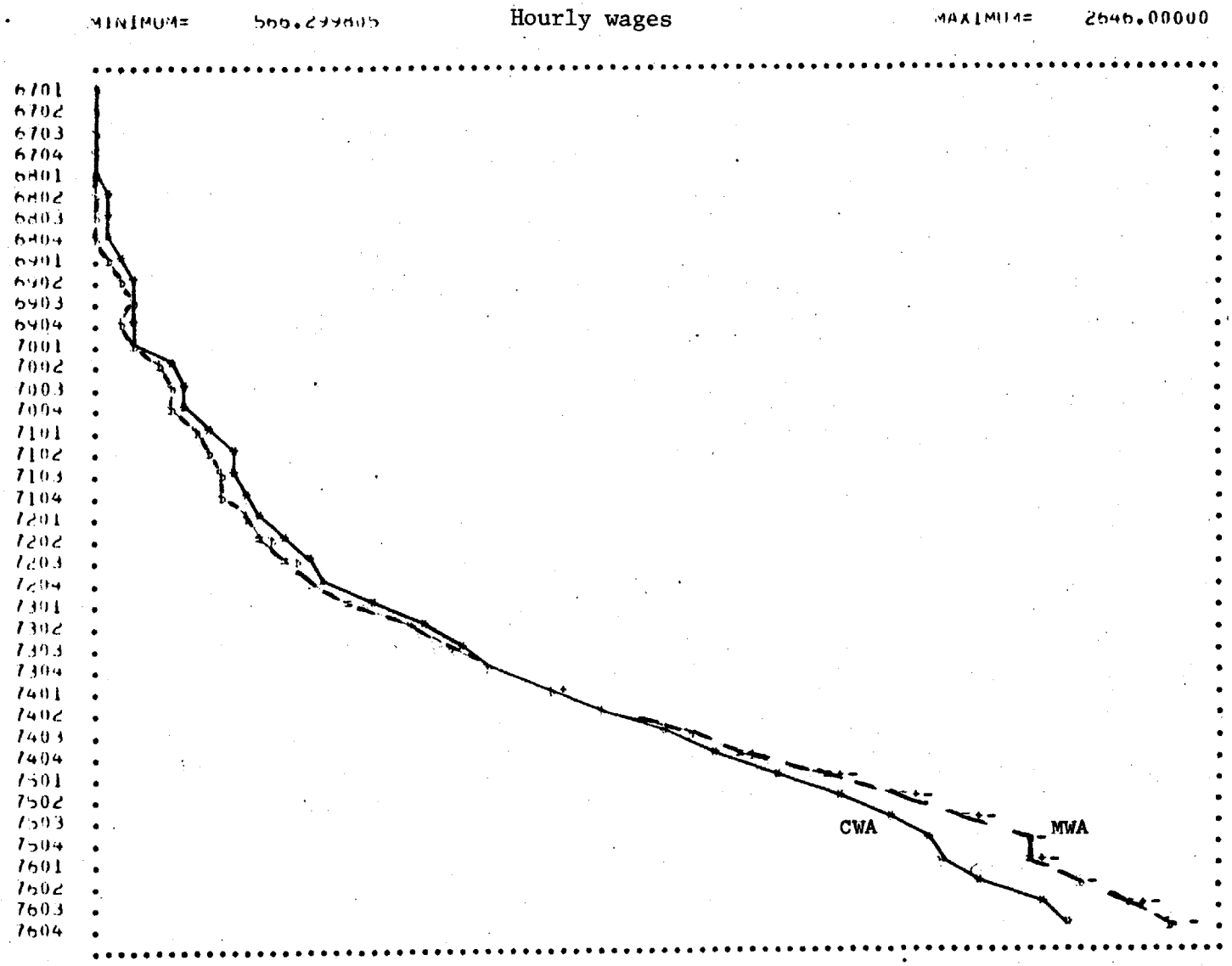

MINIMUM= 566.299805
Hourly wages
MAXIMUM= 2646.00000
6701
6702
6703
6704
6801
6802
6803
6804
6901
6902
6903
6904
7001
7002
7003
7004
7101
7102
7103
7104
7201
7202
7203
7204
7301
7302
7303
7304
7401
7402
7403
7404
7501
7502
7503
7504
7601
7602
7603
7604
CWA
MWA

Table II.28 - Average Worked Hours:
CQHA=control solution MQHA=moving average sol.
YQHA=pro-cycle solution AQHA=Anti-cycle solution
MANUFACTURINGS

| | CQHA | MQHA | YQHA | AQHA |
|---|---|---|---|---|
| 6701 | 434.600 | 442.300 | 442.300 | 441.600 |
| 6702 | 459.600 | 450.000 | 449.600 | 449.800 |
| 6703 | 459.300 | 451.900 | 452.300 | 452.500 |
| 6704 | 464.200 | 460.200 | 460.700 | 461.500 |
| 6801 | 461.300 | 459.900 | 459.700 | 458.400 |
| 6802 | 460.100 | 460.600 | 460.500 | 460.200 |
| 6803 | 465.700 | 467.500 | 467.700 | 468.600 |
| 6804 | 470.000 | 473.000 | 473.200 | 474.700 |
| 6901 | 464.300 | 468.800 | 469.000 | 467.400 |
| 6902 | 460.600 | 466.000 | 464.400 | 466.700 |
| 6903 | 457.600 | 462.600 | 463.400 | 463.300 |
| 6904 | 433.100 | 437.200 | 440.600 | 437.600 |
| 7001 | 464.500 | 471.200 | 470.300 | 468.600 |
| 7002 | 452.800 | 470.700 | 470.200 | 470.000 |
| 7003 | 446.300 | 465.000 | 465.800 | 467.200 |
| 7004 | 442.200 | 462.200 | 463.000 | 465.200 |
| 7101 | 430.200 | 446.400 | 445.300 | 445.700 |
| 7102 | 424.900 | 441.600 | 441.500 | 440.700 |
| 7103 | 420.200 | 437.200 | 437.400 | 437.000 |
| 7104 | 419.700 | 437.700 | 437.600 | 437.900 |
| 7201 | 425.000 | 444.800 | 444.100 | 443.200 |
| 7202 | 419.200 | 439.800 | 439.200 | 439.200 |
| 7203 | 414.900 | 435.700 | 435.000 | 436.300 |
| 7204 | 418.900 | 441.300 | 440.300 | 441.600 |
| 7301 | 409.500 | 432.600 | 433.800 | 431.300 |
| 7302 | 416.200 | 440.400 | 438.800 | 439.400 |
| 7303 | 413.500 | 437.200 | 435.300 | 437.100 |
| 7304 | 414.300 | 438.000 | 436.100 | 439.200 |
| 7401 | 409.800 | 433.300 | 433.200 | 432.600 |
| 7402 | 408.200 | 431.300 | 430.800 | 431.100 |
| 7403 | 400.200 | 423.200 | 422.100 | 421.200 |
| 7404 | 397.800 | 420.400 | 419.300 | 417.900 |
| 7501 | 397.900 | 420.700 | 418.700 | 418.900 |
| 7502 | 392.700 | 414.400 | 412.900 | 412.400 |
| 7503 | 391.200 | 411.900 | 410.700 | 410.200 |
| 7504 | 395.800 | 416.600 | 415.400 | 415.500 |
| 7601 | 403.000 | 424.900 | 424.500 | 424.200 |
| 7602 | 397.900 | 419.600 | 418.400 | 418.400 |
| 7603 | 396.500 | 415.200 | 416.600 | 416.500 |
| 7604 | 395.300 | 417.000 | 414.800 | 415.000 |
| | 1 | 2 | 3 | 4 |

**Fig.II.27**

Average worked hours

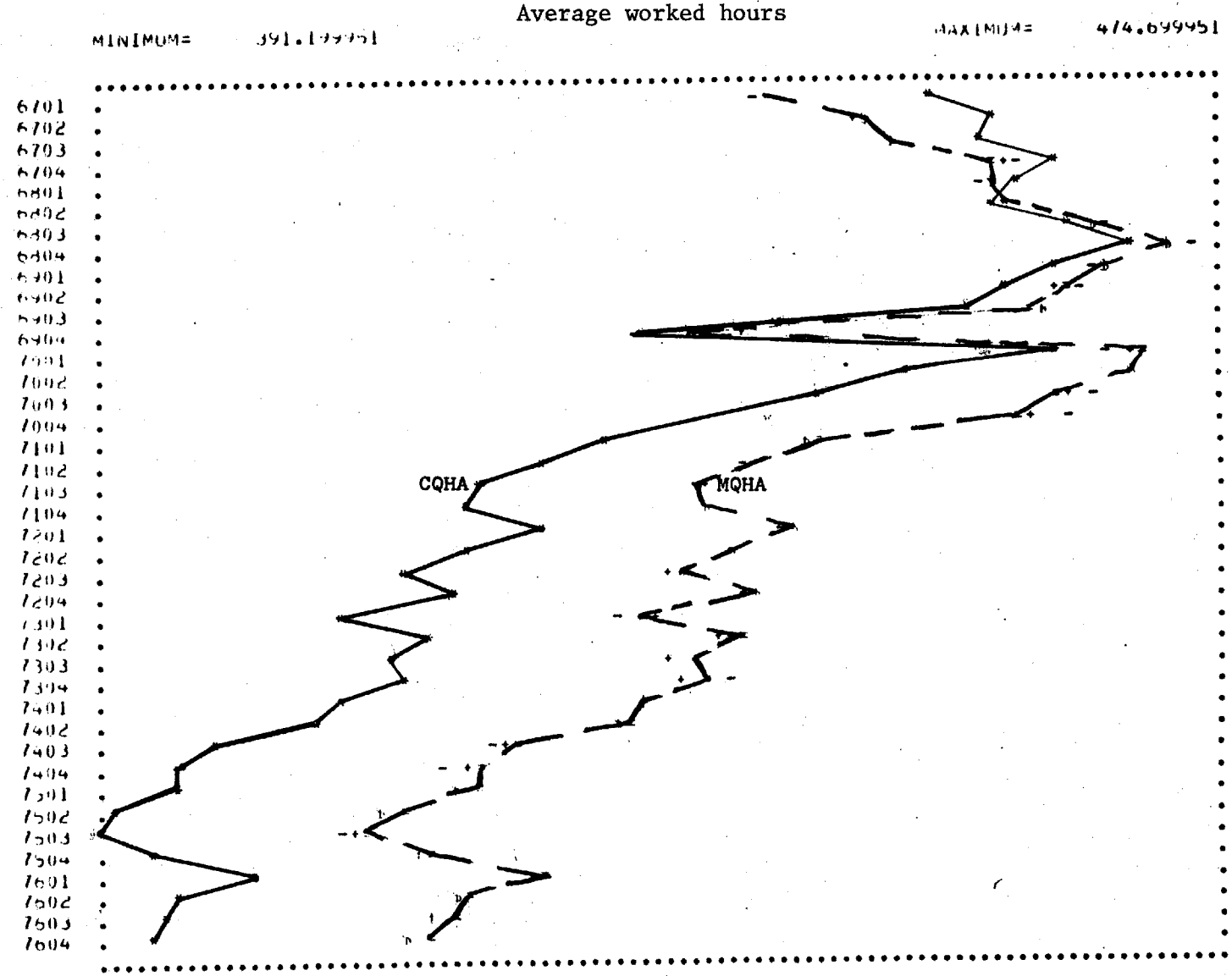


Table II.29 - Output-per-man-hour, manufacturing
CETA=control solution  META=moving-average solution
YETA=pro-cycle solution  AETA=anti-cycle solution

| | CETA | META | YETA | AETA |
|---|---|---|---|---|
| 6701 | 1201.60 | 1188.10 | 1187.90 | 1187.10 |
| 6702 | 1222.10 | 1207.00 | 1206.50 | 1206.50 |
| 6703 | 1239.00 | 1221.90 | 1222.10 | 1222.00 |
| 6704 | 1262.70 | 1244.80 | 1245.30 | 1245.90 |
| 6801 | 1279.70 | 1260.50 | 1260.30 | 1258.90 |
| 6802 | 1299.10 | 1278.00 | 1277.80 | 1277.00 |
| 6803 | 1327.10 | 1303.60 | 1303.70 | 1304.10 |
| 6804 | 1355.60 | 1329.30 | 1329.60 | 1330.90 |
| 6901 | 1378.20 | 1349.70 | 1348.80 | 1348.20 |
| 6902 | 1403.40 | 1372.20 | 1370.00 | 1372.70 |
| 6903 | 1429.50 | 1393.80 | 1393.90 | 1394.80 |
| 6904 | 1427.70 | 1387.40 | 1391.00 | 1388.30 |
| 7001 | 1494.30 | 1450.00 | 1447.50 | 1447.30 |
| 7002 | 1511.50 | 1426.40 | 1426.20 | 1424.90 |
| 7003 | 1520.50 | 1427.60 | 1428.90 | 1429.00 |
| 7004 | 1564.50 | 1434.60 | 1437.00 | 1438.40 |
| 7101 | 1597.40 | 1500.90 | 1497.50 | 1501.50 |
| 7102 | 1594.60 | 1492.70 | 1494.80 | 1491.00 |
| 7103 | 1585.80 | 1476.00 | 1481.30 | 1478.40 |
| 7104 | 1604.10 | 1487.90 | 1493.20 | 1494.70 |
| 7201 | 1681.30 | 1554.00 | 1561.30 | 1553.10 |
| 7202 | 1674.60 | 1548.10 | 1551.70 | 1546.20 |
| 7203 | 1669.40 | 1535.50 | 1537.60 | 1542.00 |
| 7204 | 1737.50 | 1596.10 | 1597.10 | 1604.90 |
| 7301 | 1684.80 | 1544.90 | 1564.30 | 1543.10 |
| 7302 | 1771.10 | 1625.40 | 1630.70 | 1623.90 |
| 7303 | 1792.50 | 1642.60 | 1644.30 | 1647.70 |
| 7304 | 1853.50 | 1697.90 | 1696.90 | 1717.10 |
| 7401 | 1867.10 | 1711.90 | 1724.60 | 1724.90 |
| 7402 | 1906.90 | 1752.20 | 1760.80 | 1768.50 |
| 7403 | 1873.90 | 1723.70 | 1732.10 | 1731.90 |
| 7404 | 1874.70 | 1725.40 | 1734.80 | 1727.60 |
| 7501 | 1896.60 | 1751.40 | 1753.30 | 1757.30 |
| 7502 | 1854.30 | 1708.80 | 1712.60 | 1711.50 |
| 7503 | 1832.10 | 1680.00 | 1686.60 | 1682.30 |
| 7504 | 1870.40 | 1711.80 | 1718.10 | 1717.50 |
| 7601 | 2038.70 | 1871.30 | 1880.80 | 1881.80 |
| 7602 | 2033.00 | 1865.50 | 1877.30 | 1875.00 |
| 7603 | 2059.90 | 1890.30 | 1899.30 | 1896.30 |
| 7604 | 2087.70 | 1917.40 | 1919.40 | 1918.90 |
| | 1 | 2 | 3 | 4 |

fig. II.28

Output per manhour, manufacturing.

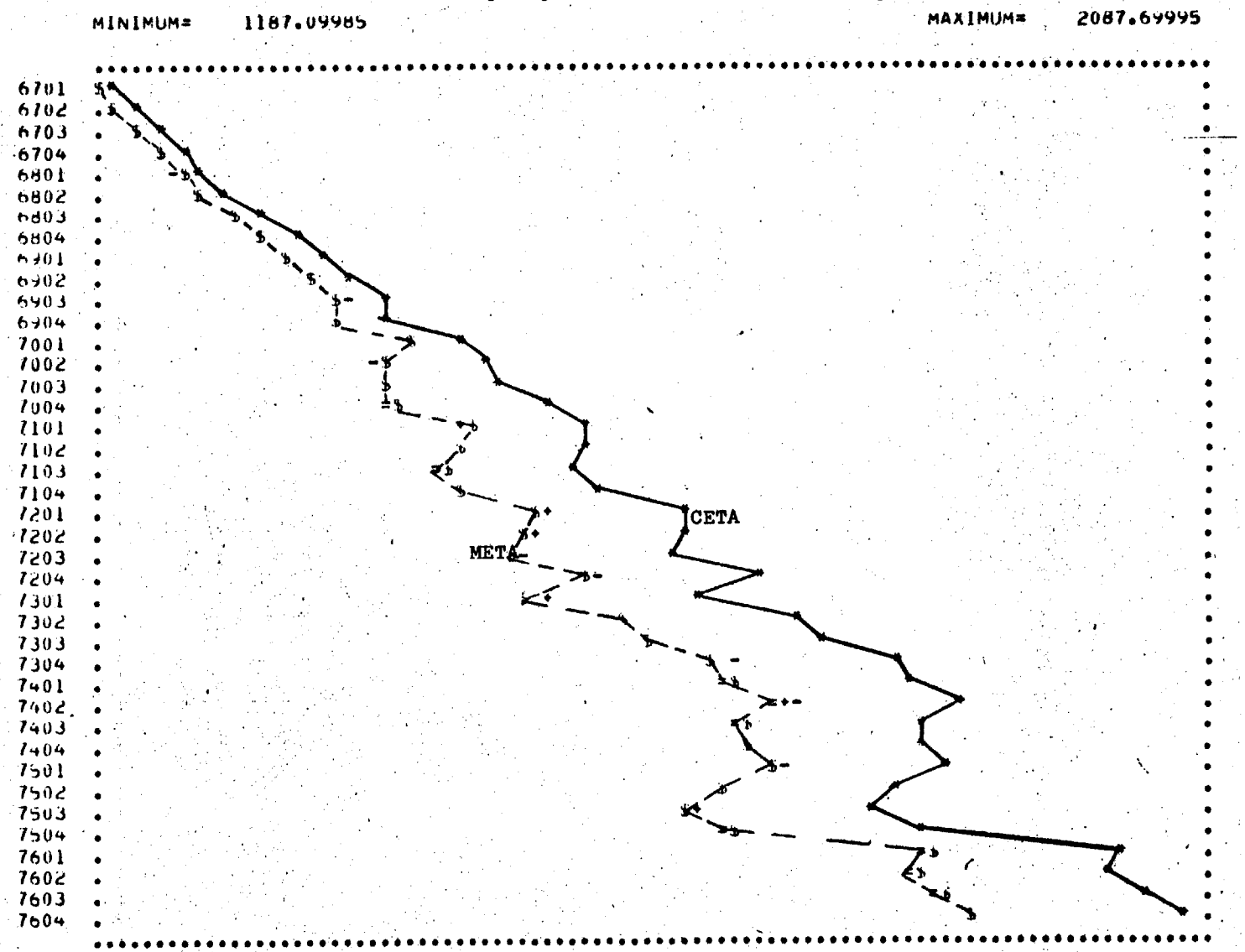


Table II.30 - Unit Labor Cost, Manufacturing

CCL=control solution MCL=moving-average solution

YCL=pro-cycle solution ACL=anti-cycle solution

| | CCL | MCL | YCL | ACL |
|---|---|---|---|---|
| 6701 | 48.0000 | 48.6000 | 48.6000 | 48.7000 |
| 6702 | 46.7000 | 47.3000 | 47.3000 | 47.3000 |
| 6703 | 46.2000 | 46.6000 | 46.6000 | 46.6000 |
| 6704 | 45.2000 | 45.5000 | 45.5000 | 45.5000 |
| 6801 | 45.3000 | 45.5000 | 45.5000 | 45.5000 |
| 6802 | 45.8000 | 46.0000 | 46.0000 | 46.0000 |
| 6803 | 44.9000 | 45.1000 | 45.1000 | 45.0000 |
| 6804 | 43.9000 | 44.0000 | 44.0000 | 44.0000 |
| 6901 | 44.9000 | 44.9000 | 45.0000 | 45.0000 |
| 6902 | 46.5000 | 46.5000 | 46.6000 | 46.5000 |
| 6903 | 46.2000 | 46.3000 | 46.2000 | 46.2000 |
| 6904 | 45.2000 | 45.3000 | 45.1000 | 45.3000 |
| 7001 | 44.2000 | 44.2000 | 44.2000 | 44.3000 |
| 7002 | 47.2000 | 48.5000 | 48.5000 | 48.6000 |
| 7003 | 48.8000 | 50.4000 | 50.3000 | 50.3000 |
| 7004 | 48.8000 | 50.5000 | 50.5000 | 50.4000 |
| 7101 | 49.6000 | 50.7000 | 50.9000 | 50.7000 |
| 7102 | 52.0000 | 53.3000 | 53.2000 | 53.4000 |
| 7103 | 53.1000 | 54.7000 | 54.6000 | 54.7000 |
| 7104 | 53.2000 | 55.0000 | 54.9000 | 54.9000 |
| 7201 | 52.8000 | 54.7000 | 54.8000 | 55.1000 |
| 7202 | 55.8000 | 58.2000 | 58.2000 | 58.4000 |
| 7203 | 58.7000 | 61.7000 | 61.8000 | 61.5000 |
| 7204 | 58.6000 | 61.8000 | 62.0000 | 61.6000 |
| 7301 | 65.2000 | 69.0000 | 68.4000 | 69.3000 |
| 7302 | 67.7000 | 72.9000 | 72.1000 | 72.2000 |
| 7303 | 71.0000 | 76.1000 | 76.4000 | 76.0000 |
| 7304 | 71.3000 | 77.0000 | 77.5000 | 76.3000 |
| 7401 | 77.6000 | 84.4000 | 84.3000 | 84.0000 |
| 7402 | 80.1000 | 87.7000 | 87.3000 | 87.4000 |
| 7403 | 88.4000 | 98.1000 | 98.3000 | 98.6000 |
| 7404 | 93.0000 | 104.800 | 105.000 | 106.000 |
| 7501 | 98.5000 | 112.700 | 113.400 | 114.500 |
| 7502 | 107.300 | 123.800 | 124.300 | 126.000 |
| 7503 | 113.500 | 132.800 | 133.000 | 134.800 |
| 7504 | 115.900 | 136.500 | 136.500 | 138.100 |
| 7601 | 107.000 | 125.800 | 125.300 | 127.000 |
| 7602 | 111.300 | 130.700 | 130.400 | 132.000 |
| 7603 | 114.900 | 134.700 | 134.600 | 136.300 |
| 7604 | 116.100 | 135.900 | 136.300 | 137.900 |
| | 1 | 2 | 3 | 4 |

Fig.II.29

Unit labor cost, manufacturing

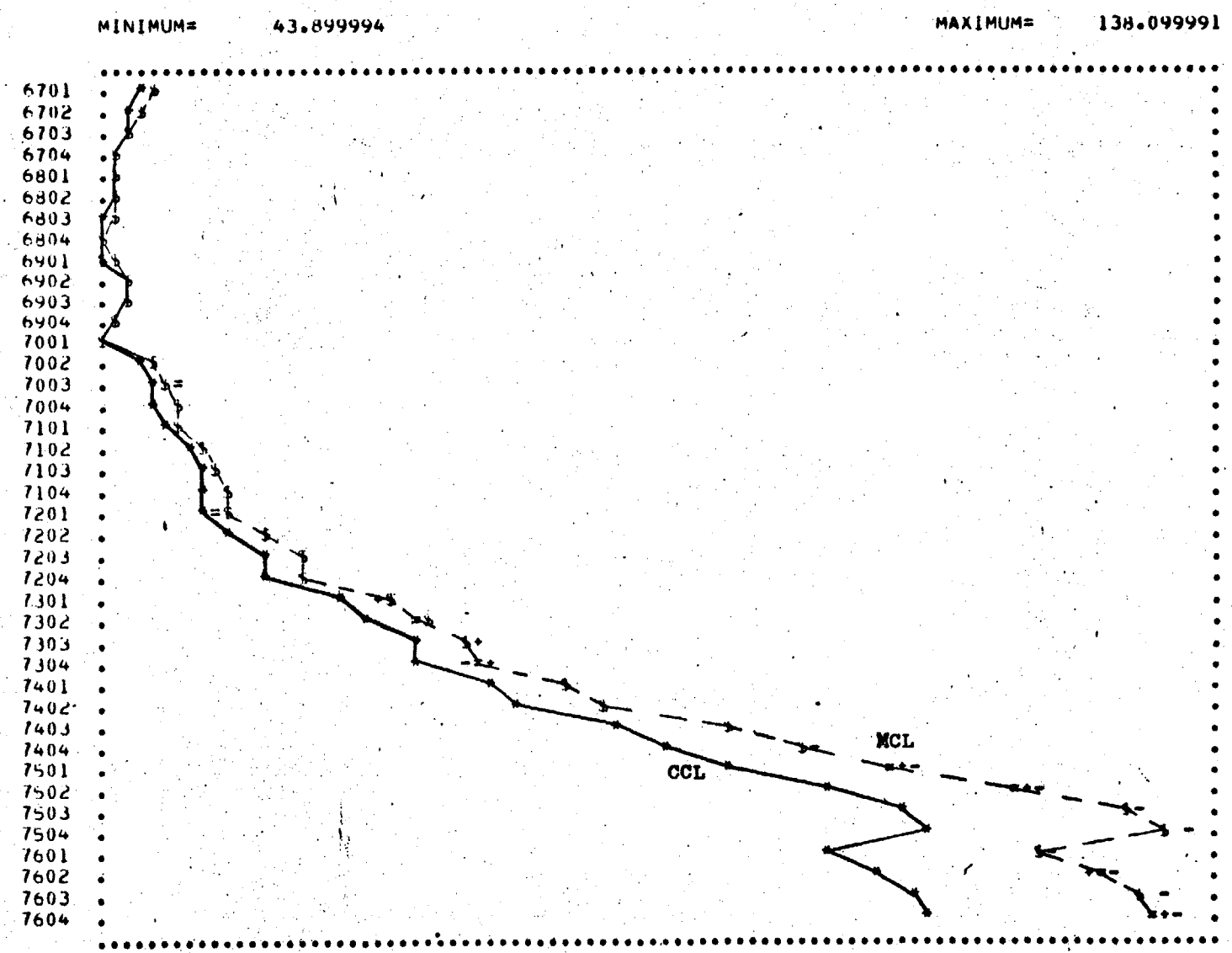


Table II.31 - Consumption Price index computed by the basket goods for wage indexation:

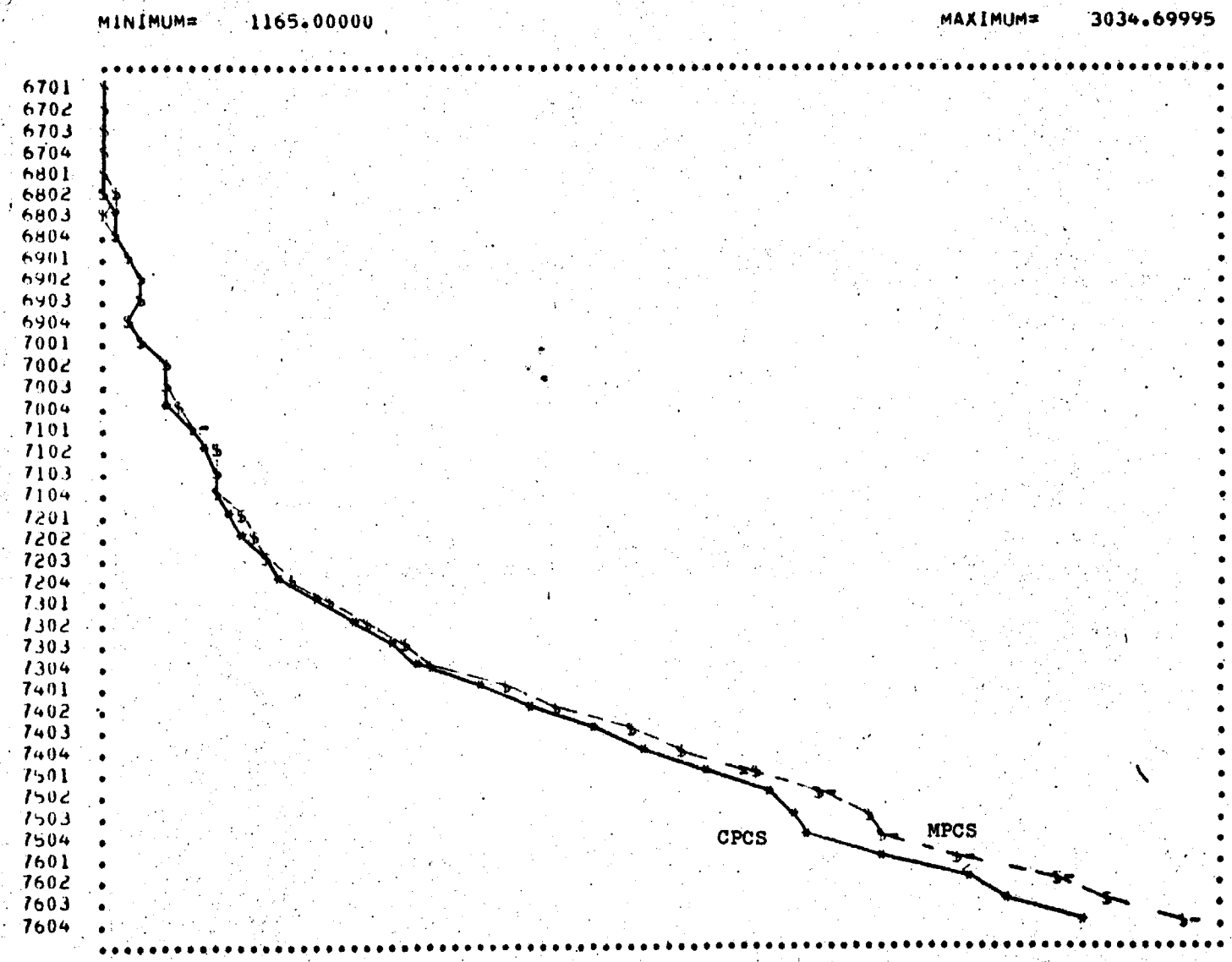
CPCS=control solution MPCS=moving-average solution

YPCS=pro-cycle solution APCS=anti-cycle solution

| | CPCS | MPCS | YPCS | APCS |
|---|---|---|---|---|
| 6701 | 1165.00 | 1166.00 | 1166.00 | 1166.00 |
| 6702 | 1165.40 | 1165.80 | 1165.80 | 1165.80 |
| 6703 | 1166.00 | 1165.40 | 1165.40 | 1165.40 |
| 6704 | 1167.40 | 1166.20 | 1166.20 | 1166.20 |
| 6801 | 1184.80 | 1183.00 | 1183.00 | 1183.10 |
| 6802 | 1188.60 | 1186.40 | 1186.40 | 1186.50 |
| 6803 | 1186.70 | 1184.40 | 1184.40 | 1184.30 |
| 6804 | 1189.80 | 1187.30 | 1187.30 | 1187.20 |
| 6901 | 1213.00 | 1209.90 | 1210.00 | 1210.10 |
| 6902 | 1237.60 | 1234.30 | 1234.40 | 1234.40 |
| 6903 | 1238.20 | 1237.00 | 1236.90 | 1237.00 |
| 6904 | 1220.60 | 1219.10 | 1218.90 | 1219.30 |
| 7001 | 1233.40 | 1233.60 | 1233.70 | 1234.00 |
| 7002 | 1273.60 | 1275.60 | 1275.50 | 1275.80 |
| 7003 | 1287.00 | 1291.40 | 1291.10 | 1291.40 |
| 7004 | 1288.40 | 1295.60 | 1295.50 | 1295.70 |
| 7101 | 1330.10 | 1333.40 | 1333.50 | 1339.90 |
| 7102 | 1356.10 | 1360.90 | 1360.90 | 1361.40 |
| 7103 | 1359.10 | 1364.80 | 1364.70 | 1365.20 |
| 7104 | 1370.60 | 1376.90 | 1377.00 | 1377.30 |
| 7201 | 1394.10 | 1401.50 | 1401.70 | 1402.30 |
| 7202 | 1417.60 | 1427.00 | 1427.20 | 1427.60 |
| 7203 | 1449.80 | 1461.40 | 1461.60 | 1461.80 |
| 7204 | 1478.00 | 1491.60 | 1491.90 | 1492.10 |
| 7301 | 1539.20 | 1554.60 | 1554.60 | 1555.40 |
| 7302 | 1607.40 | 1627.10 | 1627.50 | 1627.60 |
| 7303 | 1667.50 | 1692.10 | 1693.00 | 1692.50 |
| 7304 | 1708.20 | 1737.80 | 1738.90 | 1737.60 |
| 7401 | 1819.20 | 1854.30 | 1856.10 | 1854.10 |
| 7402 | 1914.70 | 1957.20 | 1959.60 | 1956.80 |
| 7403 | 2017.30 | 2069.70 | 2072.30 | 2070.20 |
| 7404 | 2106.50 | 2170.60 | 2172.40 | 2173.40 |
| 7501 | 2204.60 | 2282.40 | 2285.70 | 2289.50 |
| 7502 | 2311.40 | 2406.40 | 2409.80 | 2417.80 |
| 7503 | 2365.50 | 2476.60 | 2479.60 | 2491.00 |
| 7504 | 2388.90 | 2508.30 | 2511.10 | 2523.60 |
| 7601 | 2515.10 | 2644.70 | 2646.50 | 2661.70 |
| 7602 | 2660.30 | 2804.00 | 2805.40 | 2822.40 |
| 7603 | 2732.50 | 2886.10 | 2887.10 | 2905.60 |
| 7604 | 2851.40 | 3014.40 | 3015.00 | 3034.70 |
| | 1 | 2 | 3 | 4 |

Fig.II.30

Consumption price index for wage indexation



## 4.3 Distribution

The poor performance of the Italian economy, combined with the deep changes in the labor-market, and the huge increase in real wages have produced the most relevant income redistribution ever experienced in an industrial country.

Unfortunately the inadequate official data on income distribution in Italy, which considers only labor and non-labor income shares, do not provide the necessary analytic framework to investigate income distribution among the primary factors. However, from the model we used, several interesting considerations can be made about the performance of the manufacturing sector.

Table II.32 reports the series of value added in manufacturing, and the output/capital ratios for the two main simulations. As can be seen from the series CVIMP, the output/capital ratio increased from a level of 15 percent at the beginning of 1967 to 21 percent during 1970. After that time, however, it began a continuous decline reaching the level of 15 percent in 1975. In 1976, a light gain occurred. A complete absence of Government Corporation investments would have produced consistently higher ratios. (See the column referring to the variable MVIMP, and also Figure II.31).

Indeed, under this case, the output/capital ratio for manufacturing would have been higher by one half percentage point in the early 1970's and by over 4 to 5 percentage points in more recent years.

Thus, Government Corporation expenditure on investment goods has contributed to the growth of domestic production. But, once such investments have been incorporated into new plants, they have resulted in low

output/capital ratios. And these low ratios seem to be due to lower plant utilization. Indeed, the differentials in the ratios mean an increase in the stock of capital proportionally greater than the addition to production of goods and services.

Within this framework, the redistribution of income in the Italian economy, can be more easily explained. First, however, let us consider the different profiles calculated for the main income shares: labor-income and cash-flows.

Table II.37 and Figure II.36 report the total amounts of labor-income for the whole system. One impressive result is that from 1973 onwards, the level of labor-income would have been considerably higher had there been no Government Corporation investments. In 1976, the amount by which it would have been higher is around 4,000 billion lire.

Clearly, the poorer performance of the production sectors had heavily limited the level of income to be distributed, and it has also affected the absolute level of each share.

This effect is confirmed for the manufacturing sector in Table II. 34 and Figure II.33. Almost one half of the differential in total labor income, around 1700-1800 billion lire in 1976, was lost within manufacturing. This result can now be compared with the effects produced on the cash-flows[2] of firms. Their cash-flows are quite steady until mid-1972. Then a consistent increase is registered during the 1973-74 recovery. But the most relevant increase is produced only in 1976.

The contribution of Government Corporation investments seems to be positive. Around 200-300 billion lire per quarter of additional cash

flows are reported in the control solution, including Government Corporation investments. Now, traditional relation between investments and cash-flows can be discussed.

As is well known, the main theoretical problem is the correct identification of the phenomenon. Do cash-flows push investments, or do investments generate cash-flows? Obviously, we cannot give a definite answer. But a simple comparison of profiles can be considered.

Investment expenditure in Italy was quite low in the early 1970's. In the same period, the trend of cash-flows was quite steady. The high level of Government Corporation investments did not produce a significant difference in cash-flows.

In the first quarter of 1976, while investments were still declining, cash-flows jumped to the peak level of the period and remained quite high for the whole of 1976. Investments, on the other hand, showed an increase only in the second part of 1976.

To arrive at an index of income distribution, we have produced the ratios between cash-flows and labor-income for manufacturing. This index is shown in Table II.37 under the two solutions considered.

The heavy income redistribution is revealed clearly by this table. Indeed, the ratio increased by .17 between 1967 and 1969, after which time the cash-flows present a sharply declining path with respect to the labor share. At the end of 1975, they are reduced to only 95 percent of labor income. The recovery of 1976 seems, however, to have reversed the distribution in favor of cash-flows, which moved up to 135 percent of labor income.

Government Corporation investments seem to have contributed to the

formation of cash-flows. Indeed, much lower ratios would have been registered if these investments had not been included in the simulation.

Table II.32- CVIM=Value added in Manufacturings,control sol.
MVIM=Value added in Manufacturings,moving-average sol.
CVIMP=Output/Capital ratio,manufacturings,control
MVIMP=Output/Capital ratio,manufacturings,moving-aver.

| | a CVIM | b MVIM | c CVIMP | d MVIMP |
|---|---|---|---|---|
| 6701 | 2522.30 | 2412.50 | .157260 | .150415 |
| 6702 | 2594.20 | 2480.80 | .161226 | .155670 |
| 6703 | 2628.20 | 2511.40 | .163202 | .159297 |
| 6704 | 2712.40 | 2603.50 | .168508 | .167458 |
| 6801 | 2732.70 | 2631.40 | .169835 | .171784 |
| 6802 | 2767.10 | 2668.90 | .171967 | .176806 |
| 6803 | 2869.00 | 2768.80 | .178182 | .186065 |
| 6804 | 2972.00 | 2869.40 | .184634 | .195924 |
| 6901 | 3021.60 | 2923.20 | .187920 | .203068 |
| 6902 | 3083.10 | 2989.00 | .191974 | .210864 |
| 6903 | 3161.10 | 3048.30 | .196727 | .218797 |
| 6904 | 2992.50 | 2869.00 | .186198 | .209477 |
| 7001 | 3417.60 | 3287.50 | .214455 | .246939 |
| 7002 | 3414.70 | 3270.10 | .213615 | .249535 |
| 7003 | 3419.00 | 3266.00 | .211005 | .249707 |
| 7004 | 3445.90 | 3279.40 | .208462 | .250008 |
| 7101 | 3519.60 | 3336.60 | .208199 | .252125 |
| 7102 | 3486.10 | 3293.00 | .201053 | .245539 |
| 7103 | 3432.60 | 3219.80 | .192927 | .236762 |
| 7104 | 3473.40 | 3248.50 | .190607 | .236244 |
| 7201 | 3720.40 | 3486.00 | .199556 | .251077 |
| 7202 | 3674.50 | 3434.60 | .192738 | .245048 |
| 7203 | 3632.20 | 3375.00 | .185831 | .237615 |
| 7204 | 3847.20 | 3576.00 | .192408 | .249284 |
| 7301 | 3641.80 | 3384.40 | .178527 | .234438 |
| 7302 | 3921.10 | 3649.90 | .188384 | .248212 |
| 7303 | 3969.40 | 3683.80 | .185749 | .243160 |
| 7304 | 4157.30 | 3852.20 | .189307 | .246078 |
| 7401 | 4176.00 | 3871.30 | .185047 | .239279 |
| 7402 | 4288.70 | 3984.40 | .184881 | .238192 |
| 7403 | 4141.60 | 9849.60 | .173688 | .569167 |
| 7404 | 4119.60 | 3828.20 | .169061 | .215191 |
| 7501 | 4173.20 | 3894.80 | .168026 | .213574 |
| 7502 | 4006.50 | 3723.60 | .158871 | .200105 |
| 7503 | 3913.40 | 3605.60 | .153227 | .190564 |
| 7504 | 4029.40 | 3698.90 | .156233 | .193039 |
| 7601 | 4522.60 | 4168.70 | .173078 | .213996 |
| 7602 | 4485.80 | 4131.50 | .170043 | .209789 |
| 7603 | 4563.00 | 4201.10 | .171229 | .210645 |
| 7604 | 4643.40 | 4278.30 | .172477 | .211609 |
| | 1 | 2 | 5 | 6 |

Fig.II.31

Value added in manufacturing

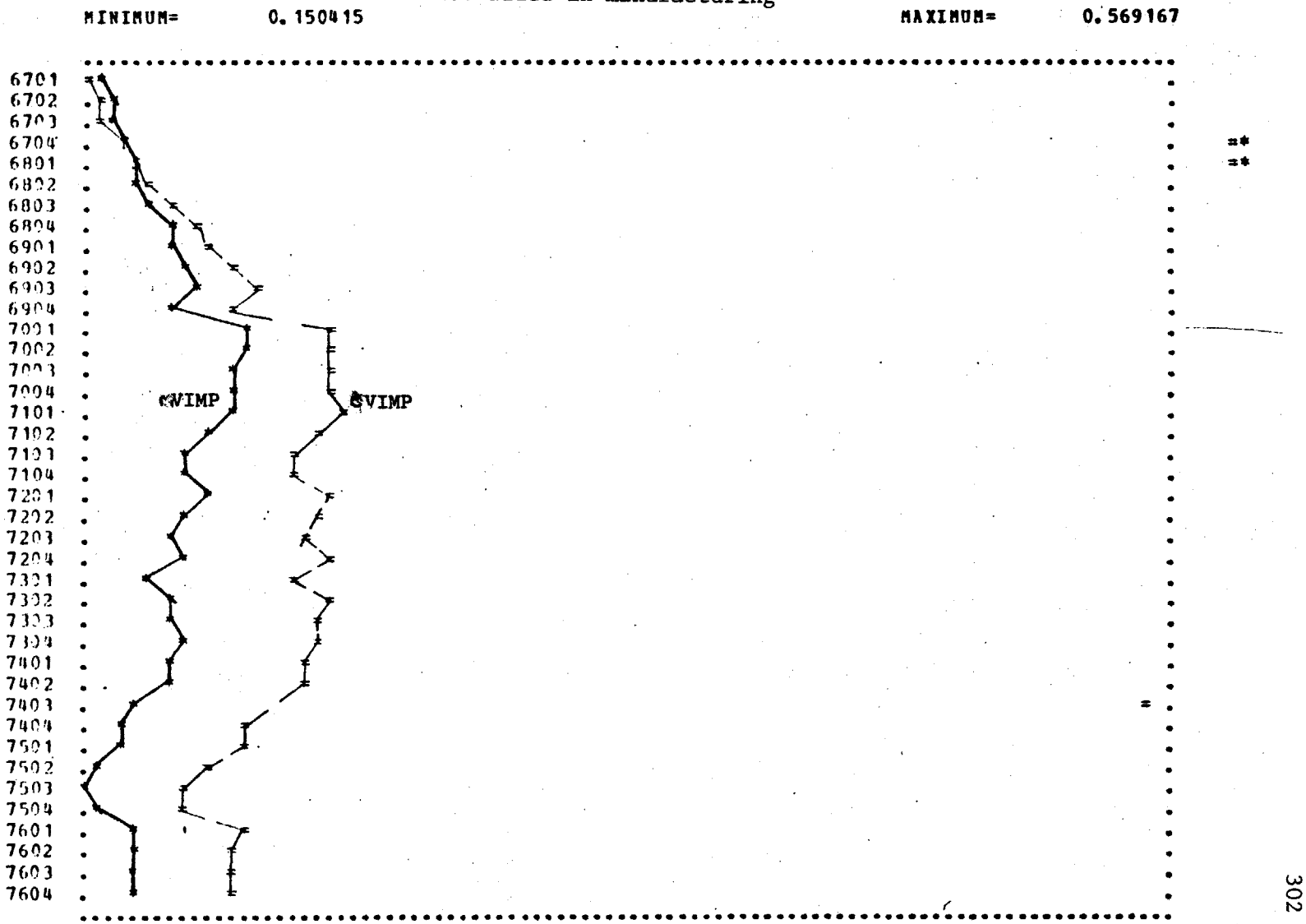


Table II.33 - Total Labor Income, current prices
billions of lire
CRETR=control solution MRETR=moving-average solution
YRETR=pro-cycle solution ARETR=anti-cycle solution

| | CRETR | MRETR | YRETR | ARETR |
|---|---|---|---|---|
| 6701 | 3359.90 | 3290.30 | 3289.00 | 3285.30 |
| 6702 | 3377.90 | 3313.10 | 3310.80 | 3311.20 |
| 6703 | 3427.90 | 3362.60 | 3364.30 | 3364.50 |
| 6704 | 3489.70 | 3431.90 | 3434.60 | 3438.70 |
| 6801 | 3511.70 | 3457.30 | 3456.20 | 3449.00 |
| 6802 | 3608.90 | 3557.20 | 3556.80 | 3554.00 |
| 6803 | 3688.90 | 3637.70 | 3638.50 | 3642.40 |
| 6804 | 3755.60 | 3703.60 | 3704.80 | 3712.70 |
| 6901 | 3843.20 | 3789.30 | 3784.30 | 3780.90 |
| 6902 | 4005.10 | 3947.40 | 3936.20 | 3951.90 |
| 6903 | 4134.80 | 4072.00 | 4075.70 | 4077.20 |
| 6904 | 3929.50 | 3858.10 | 3878.60 | 3862.30 |
| 7001 | 4214.80 | 4143.30 | 4138.00 | 4127.40 |
| 7002 | 4413.30 | 4409.40 | 4406.50 | 4404.40 |
| 7003 | 4573.90 | 4570.90 | 4577.10 | 4587.00 |
| 7004 | 4626.40 | 4629.80 | 4638.80 | 4654.50 |
| 7101 | 4870.70 | 4819.30 | 4813.80 | 4818.20 |
| 7102 | 5022.30 | 4964.40 | 4968.00 | 4962.50 |
| 7103 | 5088.60 | 5030.80 | 5038.20 | 5035.50 |
| 7104 | 5144.90 | 5093.30 | 5100.10 | 5103.70 |
| 7201 | 5487.10 | 5449.50 | 5452.80 | 5444.00 |
| 7202 | 5610.10 | 5584.70 | 5591.30 | 5586.80 |
| 7203 | 5889.70 | 5874.00 | 5879.70 | 5887.60 |
| 7204 | 6078.80 | 6083.90 | 6088.30 | 6098.90 |
| 7301 | 6415.90 | 6443.70 | 6478.40 | 6441.00 |
| 7302 | 6933.10 | 6993.20 | 7003.90 | 6991.90 |
| 7303 | 7397.60 | 7485.60 | 7495.10 | 7496.00 |
| 7304 | 7958.50 | 8091.50 | 8101.80 | 8124.10 |
| 7401 | 8447.00 | 8633.30 | 8681.30 | 8653.30 |
| 7402 | 8849.10 | 9102.00 | 9137.20 | 9142.90 |
| 7403 | 9334.90 | 9704.90 | 9743.10 | 9751.40 |
| 7404 | 9677.60 | 10175.7 | 10220.1 | 10238.7 |
| 7501 | 10309.5 | 11010.0 | 11038.9 | 11149.0 |
| 7502 | 10704.9 | 11467.3 | 11493.2 | 11601.7 |
| 7503 | 11271.5 | 12106.6 | 12137.6 | 12230.7 |
| 7504 | 11840.0 | 12760.7 | 12780.9 | 12888.2 |
| 7601 | 12279.5 | 13253.6 | 13301.0 | 13399.0 |
| 7602 | 12667.3 | 13645.9 | 13671.8 | 13783.8 |
| 7603 | 13446.7 | 14449.6 | 14461.6 | 14575.2 |
| 7604 | 13827.7 | 14852.3 | 14843.3 | 14969.6 |
| | 1 | 2 | 3 | 4 |

Fig.II.32

Total labor income

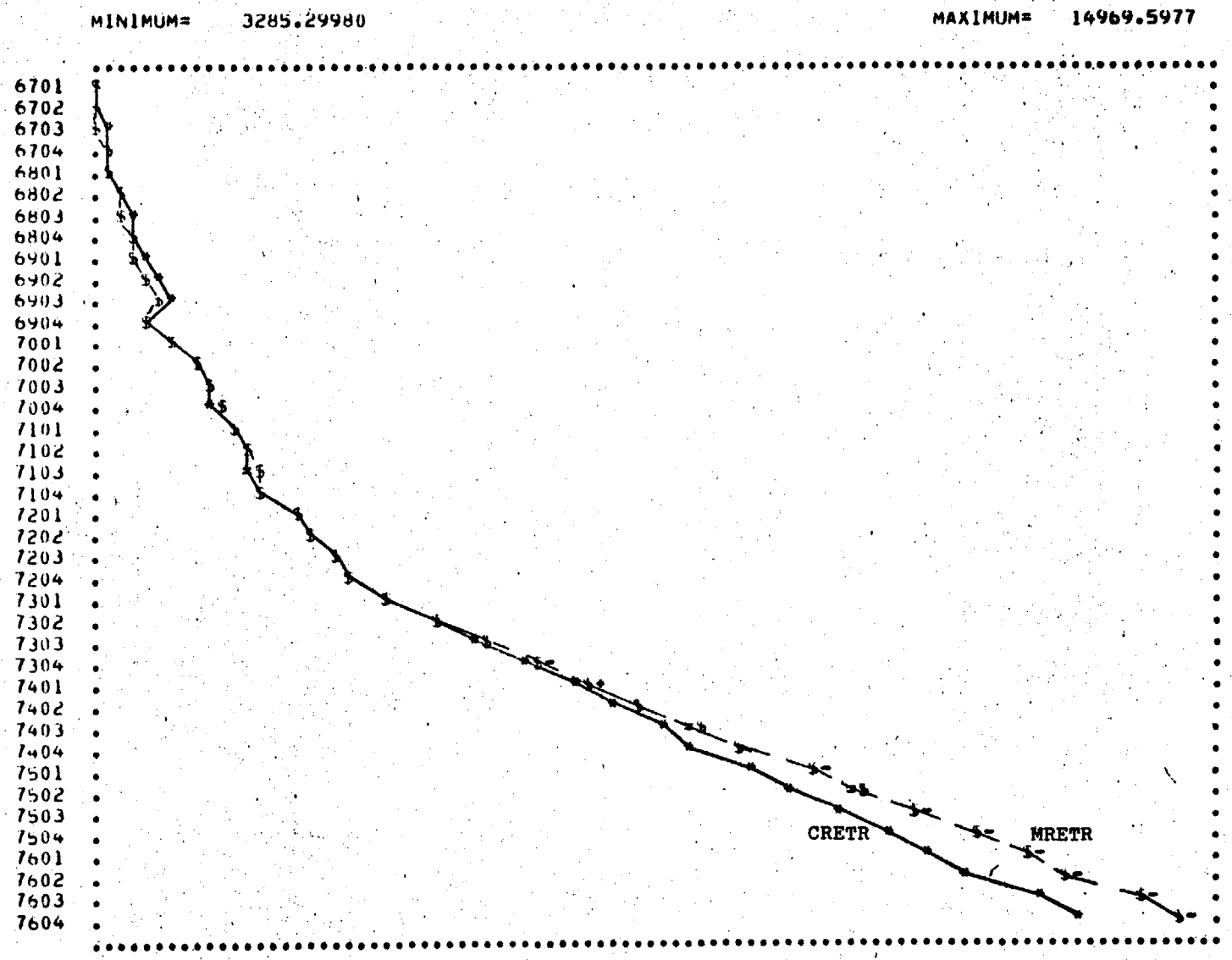


Table II.34 - Labor Income in Manufacturings,billions of lire current prices:

CYLDA=control solution MYLDA=moving-average solution
YYLDA=pro-cycle solution AYLDA=anti-cycle solution

| | CYLDA | MYLDA | YYLDA | AYLDA |
|---|---|---|---|---|
| 6701 | 1211.80 | 1173.00 | 1172.20 | 1170.20 |
| 6702 | 1211.70 | 1172.20 | 1170.90 | 1171.00 |
| 6703 | 1213.70 | 1171.50 | 1172.20 | 1172.20 |
| 6704 | 1225.20 | 1184.70 | 1186.10 | 1186.20 |
| 6801 | 1236.80 | 1196.60 | 1196.10 | 1192.20 |
| 6802 | 1267.70 | 1227.50 | 1227.30 | 1225.50 |
| 6803 | 1289.30 | 1248.10 | 1248.60 | 1250.30 |
| 6804 | 1305.60 | 1263.20 | 1263.90 | 1268.00 |
| 6901 | 1357.40 | 1313.30 | 1310.70 | 1309.90 |
| 6902 | 1436.60 | 1389.30 | 1393.20 | 1391.70 |
| 6903 | 1460.60 | 1410.00 | 1411.40 | 1412.90 |
| 6904 | 1353.50 | 1299.50 | 1310.10 | 1302.00 |
| 7001 | 1511.40 | 1454.40 | 1452.20 | 1446.30 |
| 7002 | 1611.70 | 1585.90 | 1584.80 | 1582.90 |
| 7003 | 1670.20 | 1642.90 | 1646.60 | 1651.00 |
| 7004 | 1682.60 | 1657.40 | 1662.90 | 1670.90 |
| 7101 | 1746.40 | 1692.20 | 1689.80 | 1692.80 |
| 7102 | 1813.30 | 1753.80 | 1756.10 | 1753.40 |
| 7103 | 1823.80 | 1762.10 | 1766.90 | 1765.30 |
| 7104 | 1848.00 | 1787.40 | 1792.20 | 1794.10 |
| 7201 | 1964.40 | 1904.00 | 1911.10 | 1905.60 |
| 7202 | 2030.60 | 1997.80 | 2002.70 | 1998.60 |
| 7203 | 2133.30 | 2042.10 | 2046.40 | 2049.80 |
| 7204 | 2255.20 | 2211.10 | 2214.50 | 2220.50 |
| 7301 | 2373.10 | 2336.90 | 2358.20 | 2336.80 |
| 7302 | 2652.90 | 2627.90 | 2637.20 | 2627.80 |
| 7303 | 2814.20 | 2804.40 | 2812.30 | 2810.40 |
| 7304 | 2962.30 | 2968.00 | 2973.20 | 2986.70 |
| 7401 | 3239.00 | 3257.30 | 3295.50 | 3283.10 |
| 7402 | 3433.70 | 3493.00 | 3515.50 | 3521.60 |
| 7403 | 3660.30 | 3776.50 | 3801.00 | 3807.90 |
| 7404 | 3832.60 | 4011.80 | 4040.20 | 4050.20 |
| 7501 | 4109.30 | 4349.70 | 4409.10 | 4466.90 |
| 7502 | 4300.50 | 4610.40 | 4627.70 | 4684.20 |
| 7503 | 4443.50 | 4797.50 | 4806.50 | 4853.90 |
| 7504 | 4668.40 | 5047.40 | 5062.10 | 5116.90 |
| 7601 | 4839.00 | 5244.30 | 5273.50 | 5324.70 |
| 7602 | 4992.30 | 5398.40 | 5419.60 | 5476.00 |
| 7603 | 5245.10 | 5660.70 | 5674.90 | 5731.90 |
| 7604 | 5389.00 | 5815.60 | 5816.70 | 5881.00 |
| | 1 | 2 | 3 | 4 |

Fig.II.33
Labor income in manufacturing

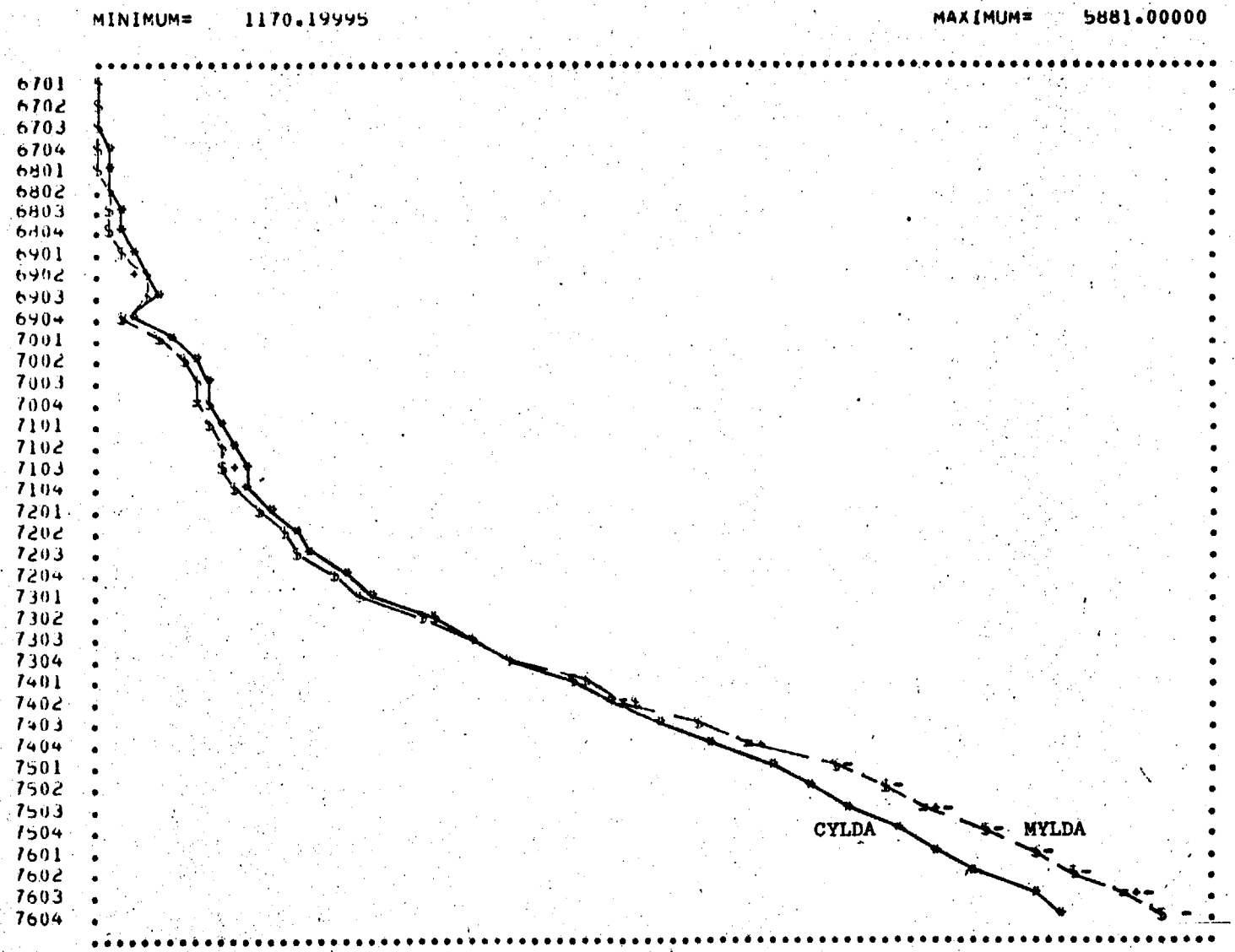


Table II.35 – Cash-Flows, Manufacturings,
current prices, billions of lire
CCASHF=control solution MCASHF=moving-average sol.
YCASHF=pro-cycle solution ACASHF=anti-cycle solution

| | CCASHF | MCASHF | YCASHF | ACASHF |
|---|---|---|---|---|
| 6701 | 1480.50 | 1438.10 | 1437.30 | 1435.20 |
| 6702 | 1533.10 | 1460.00 | 1478.40 | 1478.00 |
| 6703 | 1524.30 | 1456.70 | 1457.00 | 1456.40 |
| 6704 | 1542.20 | 1476.00 | 1476.70 | 1477.60 |
| 6801 | 1547.30 | 1470.40 | 1470.00 | 1466.80 |
| 6802 | 1659.10 | 1578.10 | 1578.20 | 1575.80 |
| 6803 | 1638.90 | 1551.10 | 1551.60 | 1552.40 |
| 6804 | 1707.50 | 1613.60 | 1614.30 | 1617.80 |
| 6901 | 1754.10 | 1654.80 | 1651.90 | 1650.70 |
| 6902 | 1878.10 | 1779.10 | 1771.40 | 1782.70 |
| 6903 | 1962.10 | 1853.00 | 1852.50 | 1857.30 |
| 6904 | 1882.80 | 1769.50 | 1779.70 | 1772.70 |
| 7001 | 2073.10 | 1949.60 | 1947.90 | 1940.80 |
| 7002 | 2109.50 | 1949.30 | 1990.40 | 1984.80 |
| 7003 | 2134.80 | 2000.20 | 2006.60 | 2006.90 |
| 7004 | 2157.60 | 2017.20 | 2024.60 | 2031.60 |
| 7101 | 2169.60 | 2009.00 | 2003.70 | 2012.50 |
| 7102 | 2240.40 | 2080.50 | 2085.00 | 2081.10 |
| 7103 | 2266.60 | 2080.00 | 2089.10 | 2085.90 |
| 7104 | 2284.90 | 2088.60 | 2096.80 | 2099.60 |
| 7201 | 2572.20 | 2357.70 | 2363.30 | 2346.60 |
| 7202 | 2450.60 | 2244.80 | 2252.20 | 2241.90 |
| 7203 | 2481.10 | 2256.00 | 2260.50 | 2247.20 |
| 7204 | 2710.60 | 2462.00 | 2483.00 | 2469.80 |
| 7301 | 2749.10 | 2520.50 | 2559.10 | 2518.20 |
| 7302 | 2932.40 | 2713.30 | 2724.20 | 2711.60 |
| 7303 | 3033.00 | 2790.50 | 2795.80 | 2801.20 |
| 7304 | 3428.10 | 3169.20 | 3167.30 | 3212.10 |
| 7401 | 3441.70 | 3177.10 | 3205.70 | 3207.60 |
| 7402 | 3714.30 | 3450.20 | 3478.80 | 3503.00 |
| 7403 | 3445.90 | 3570.60 | 3593.90 | 3592.90 |
| 7404 | 4096.40 | 3808.40 | 3837.40 | 3815.60 |
| 7501 | 4400.30 | 4121.20 | 4125.90 | 4140.40 |
| 7502 | 4133.10 | 3868.50 | 3879.70 | 3880.40 |
| 7503 | 4218.20 | 3912.00 | 3930.60 | 3928.10 |
| 7504 | 4456.80 | 4130.10 | 4147.20 | 4156.90 |
| 7601 | 6143.60 | 5823.10 | 5872.20 | 5869.00 |
| 7602 | 6155.40 | 5864.60 | 5900.50 | 5904.50 |
| 7603 | 6693.60 | 6379.70 | 6407.80 | 6412.10 |
| 7604 | 7279.80 | 6962.40 | 6984.90 | 6982.90 |
| | 1 | 2 | 3 | 4 |

Fig.II.34
Cash-flows, manufacturing

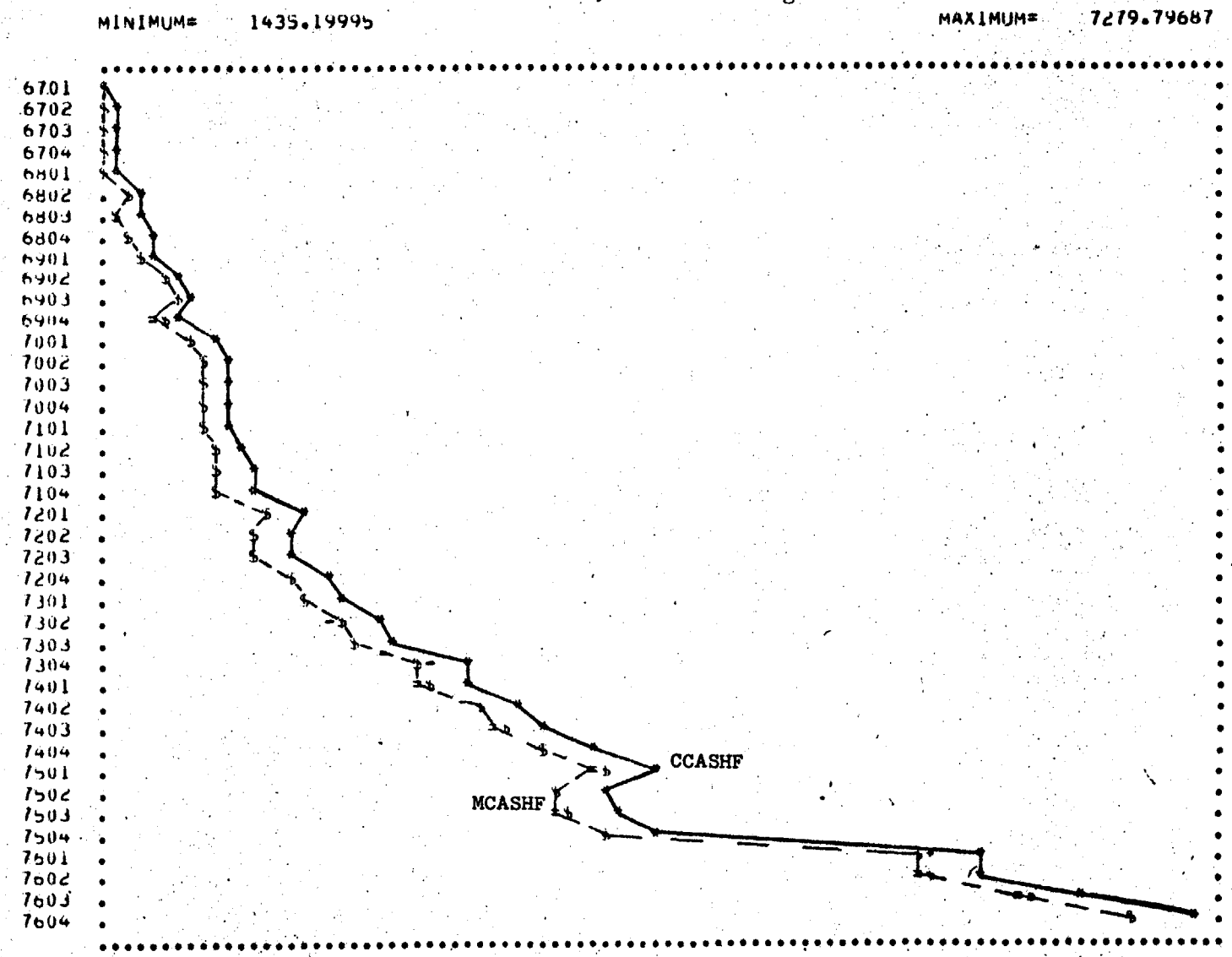


TABLE II.36

| | CYLDA/CKINV | MYLDA/MKINV | CCASHF/CKINV | MCASHF/MKINV |
|---|---|---|---|---|
| 6701 | .075 | .073 | .0923 | .0897 |
| 6702 | .075 | .073 | .0954 | .0929 |
| 6703 | .075 | .073 | .0946 | .0924 |
| 6704 | .076 | .076 | .0958 | .0949 |
| 6801 | .077 | .078 | .0962 | .0960 |
| 6802 | .079 | .081 | .1031 | .1045 |
| 6803 | .080 | .084 | .1018 | .1042 |
| 6804 | .081 | .086 | .1061 | .1102 |
| 6901 | .084 | .091 | .1091 | .1150 |
| 6902 | .089 | .098 | .1168 | .1255 |
| 6903 | .091 | .101 | .1221 | .1330 |
| 6904 | .084 | .095 | .1171 | .1292 |
| 7001 | .095 | .109 | .1301 | .1464 |
| 7002 | .101 | .121 | .1320 | .1518 |
| 7003 | .103 | .126 | .1318 | .1532 |
| 7004 | .102 | .126 | .1305 | .1539 |
| 7101 | .103 | .128 | .1283 | .1518 |
| 7102 | .105 | .131 | .1292 | .1551 |
| 7103 | .103 | .130 | .1274 | .1529 |
| 7104 | .101 | .130 | .1254 | .1519 |
| 7201 | .105 | .137 | .1380 | .1698 |
| 7202 | .108 | .143 | .1285 | .1602 |
| 7203 | .109 | .147 | .1269 | .1588 |
| 7204 | .113 | .154 | .1356 | .1730 |
| 7301 | .116 | .162 | .1348 | .1746 |
| 7302 | .127 | .179 | .1409 | .1845 |
| 7303 | .132 | .185 | .1419 | .1842 |
| 7304 | .135 | .190 | .1561 | .2024 |
| 7401 | .146 | .202 | .1525 | .1964 |
| 7402 | .148 | .209 | .1601 | .2069 |
| 7403 | .154 | .218 | .1613 | .2063 |
| 7404 | .157 | .226 | .1681 | .2141 |
| 7501 | .165 | .241 | .1772 | .2260 |
| 7502 | .170 | .248 | .1639 | .2079 |
| 7503 | .174 | .253 | .1652 | .2068 |
| 7504 | .181 | .263 | .1728 | .2155 |
| 7601 | .185 | .269 | .2351 | .2989 |
| 7602 | .189 | .274 | .2333 | .2978 |
| 7603 | .197 | .284 | .2512 | .3199 |
| 7604 | .200 | .288 | .2704 | .3444 |

TABLE II 37

| | CCASHF/CYLDA | MCASHF/MYLDA |
|---|---|---|
| 6701 | 1.2217 | 1.2260 |
| 6702 | 1.2669 | 1.2626 |
| 6703 | 1.2559 | 1.2434 |
| 6704 | 1.2587 | 1.2459 |
| 6801 | 1.2510 | 1.2288 |
| 6802 | 1.3087 | 1.2856 |
| 6803 | 1.2711 | 1.2428 |
| 6804 | 1.3078 | 1.2774 |
| 6901 | 1.2922 | 1.2600 |
| 6902 | 1.3073 | 1.2806 |
| 6903 | 1.3434 | 1.3142 |
| 6904 | 1.3911 | 1.3617 |
| 7001 | 1.3716 | 1.3405 |
| 7002 | 1.3089 | 1.2544 |
| 7003 | 1.2782 | 1.2175 |
| 7004 | 1.2824 | 1.2171 |
| 7101 | 1.2423 | 1.1872 |
| 7102 | 1.2355 | 1.1863 |
| 7103 | 1.2428 | 1.1804 |
| 7104 | 1.2364 | 1.1685 |
| 7201 | 1.3094 | 1.2002 |
| 7202 | 1.1951 | 1.1236 |
| 7203 | 1.1630 | 1.0835 |
| 7204 | 1.2019 | 1.1225 |
| 7301 | 1.1584 | 1.0786 |
| 7302 | 1.1054 | 1.0325 |
| 7303 | 1.0762 | .9950 |
| 7304 | 1.1572 | 1.0678 |
| 7401 | 1.0626 | .9724 |
| 7402 | 1.0818 | .9906 |
| 7403 | 1.0507 | .9455 |
| 7404 | 1.0688 | .9493 |
| 7501 | 1.0708 | .9388 |
| 7502 | .9611 | .8390 |
| 7503 | .9493 | .8171 |
| 7504 | .9547 | .8847 |
| 7601 | 1.2696 | 1.1104 |
| 7602 | 1.2330 | 1.0864 |
| 7603 | 1.2762 | 1.1270 |
| 7604 | 1.3509 | 1.1972 |

5. The Foreign Account Sector

The growth of the Italian economy during the post-war period has long been export-led. Indeed, the increasing openness of the economy gave the industrial system the opportunity to compete in several world markets, and to gain an increasing share of world trade. During the 1950's and 1960's, the possibility of importing oil and raw materials at a relatively low price gave Italy the chance to become one of the world's major industrial countries. This positive opportunity, however, turned sour once oil and raw material prices started to increase at an accelerating rate. Under this new situation, the BOP deficit became a serious constraint, and pushed the Italian economy into a position worse than that of any other European country. Indeed, inflation,helped along by rising import prices, was amplified by the widely-based indexation system which in turn pushed up export prices. As a consequence, Italian products lost a relevant share in world markets. The trade balance deteriorated, and several lira devaluations followed. But this process also meant higher import prices and the circle began again. As is well known, this "vicious" circle has dominated the post-oil crisis era in Italy, and is not yet under control. Despite these serious difficulties, Italian exports have grown very consistently over the last decade. This period can be divided into two parts. As shown in Table II.38 and Figure II.36, Italian exports in current liras grew by an average rate of 15 percent in the first six years, and by an annual rate of over 30 percent in the last four years.

On the other hand, import flows increased in a similar way from 1967 until 1972. In the crisis years of 1973-74, they almost doubled and

the huge BOP deficit led Italian authorities to tightly control domestic demand. The 3.7 percent decrease in GNP (in real terms) stopped the growth of imports, which declined even at current price values. The 1976 recovery, however, showed how closely related are imports and growth. Indeed, they started again to accelerate at a considerable rate.

The impact of Government Corporation investments is shown in Table II.41, where the additional import/export flows are reported, together with the multipliers. These indices are defined for each quarter as the ratio of import/export flows to Government Corporation investment expenditure. In Table II.42, the total effect on the trade balance is considered.

If Government Corporation investments are excluded from the simulation, export flows increase until 1970 by around 100-150 billion lire per year. After that time, the impact of Government Corporation investments become increasingly positive. By 1976 export flows increase by 800 billion lire.

However, the additional import flows are always higher than the exports activated.

Therefore, the total impact on the trade balance, in current prices, is proven to have been always negative, with a peak contribution to the foreign accounts deficit of over 700 billion lire in 1974 and 800 billion in 1976.

The negative performance of the Italian BOP in recent years is obviously heavily influenced by huge price changes, coming both from astonishing domestic inflation and severe exchange devaluation. A correct measure of physical flows is therefore needed. Thus, in

Table II.43 and II.44, we report the values of import/export flows

The impact on export flows (see column 1 or Table II.45) is still negative until the third quarter of 1973, but is consistently more positive after that date.

The differentials on import flows are positive throughout the period, but these effects are overweighed by higher physical exports.

Therefore, the total impact on the trade balance in real terms starts to be positive (see column 5 of Table II.45) from the end of 1973.

The effect of Government Corporation investments of increasing industrial production capacity seems, therefore, to have contributed in a considerable measure to the increase in Italian export flows.

Table II.38 - EXPORTS, Current prices,billions lire

CXCSI=control solution MXCSI=moving-average solution
YXCSI=pro-cycle colution AXCSI=anti-cycle solution

| | CXCSI | MXCSI | YXCSI | AXCSI |
|---|---|---|---|---|
| 6701 | 1878.80 | 1892.00 | 1892.20 | 1892.90 |
| 6702 | 1941.60 | 1965.80 | 1966.50 | 1967.00 |
| 6703 | 1988.40 | 2025.30 | 2025.60 | 2026.20 |
| 6704 | 2026.50 | 2075.60 | 2075.50 | 2075.30 |
| 6801 | 2123.90 | 2169.90 | 2169.80 | 2170.60 |
| 6802 | 2217.80 | 2265.00 | 2264.40 | 2265.70 |
| 6803 | 2335.60 | 2382.80 | 2382.50 | 2382.80 |
| 6804 | 2428.30 | 2475.40 | 2475.30 | 2475.00 |
| 6901 | 2459.30 | 2503.90 | 2504.60 | 2503.40 |
| 6902 | 2573.20 | 2615.90 | 2618.80 | 2613.40 |
| 6903 | 2652.30 | 2692.80 | 2694.60 | 2690.50 |
| 6904 | 2549.70 | 2587.00 | 2584.70 | 2585.90 |
| 7001 | 2886.50 | 2924.70 | 2923.30 | 2924.90 |
| 7002 | 3057.30 | 3078.80 | 3074.60 | 3081.10 |
| 7003 | 3091.00 | 3103.50 | 3098.90 | 3103.20 |
| 7004 | 3232.60 | 3231.40 | 3229.90 | 3227.50 |
| 7101 | 3263.60 | 3247.40 | 3246.50 | 3241.20 |
| 7102 | 3349.60 | 3328.40 | 3326.20 | 3323.10 |
| 7103 | 3445.50 | 3409.10 | 3406.70 | 3406.50 |
| 7104 | 3572.20 | 3522.80 | 3520.80 | 3522.00 |
| 7201 | 3745.30 | 3680.30 | 3674.90 | 3683.20 |
| 7202 | 3834.10 | 3760.00 | 3756.10 | 3763.10 |
| 7203 | 3896.10 | 3815.10 | 3814.80 | 3816.10 |
| 7204 | 4177.40 | 4083.50 | 4087.10 | 4084.20 |
| 7301 | 3453.00 | 3371.30 | 3364.80 | 3370.00 |
| 7302 | 4333.70 | 4225.00 | 4220.10 | 4225.20 |
| 7303 | 4829.70 | 4702.30 | 4700.20 | 4705.00 |
| 7304 | 5317.30 | 5174.90 | 5177.00 | 5170.00 |
| 7401 | 5255.60 | 5108.10 | 5118.70 | 5093.60 |
| 7402 | 6046.60 | 5878.80 | 5888.20 | 5851.10 |
| 7403 | 6922.60 | 6730.20 | 6735.70 | 6705.20 |
| 7404 | 7632.20 | 7423.80 | 7419.70 | 7426.20 |
| 7501 | 7174.50 | 6993.60 | 7007.30 | 7007.70 |
| 7502 | 7138.80 | 6978.50 | 6996.00 | 7014.80 |
| 7503 | 7540.40 | 7378.50 | 7399.30 | 7422.50 |
| 7504 | 7614.40 | 7468.70 | 7493.30 | 7505.90 |
| 7601 | 8103.00 | 7953.10 | 7960.00 | 7984.20 |
| 7602 | 8991.40 | 8816.20 | 8818.60 | 8837.70 |
| 7603 | 10035.8 | 9812.90 | 9817.20 | 9831.60 |
| 7604 | 10857.9 | 10583.8 | 10599.1 | 10612.2 |
| | 1 | 2 | 3 | 4 |

Fig.II.36

Exports in current prices

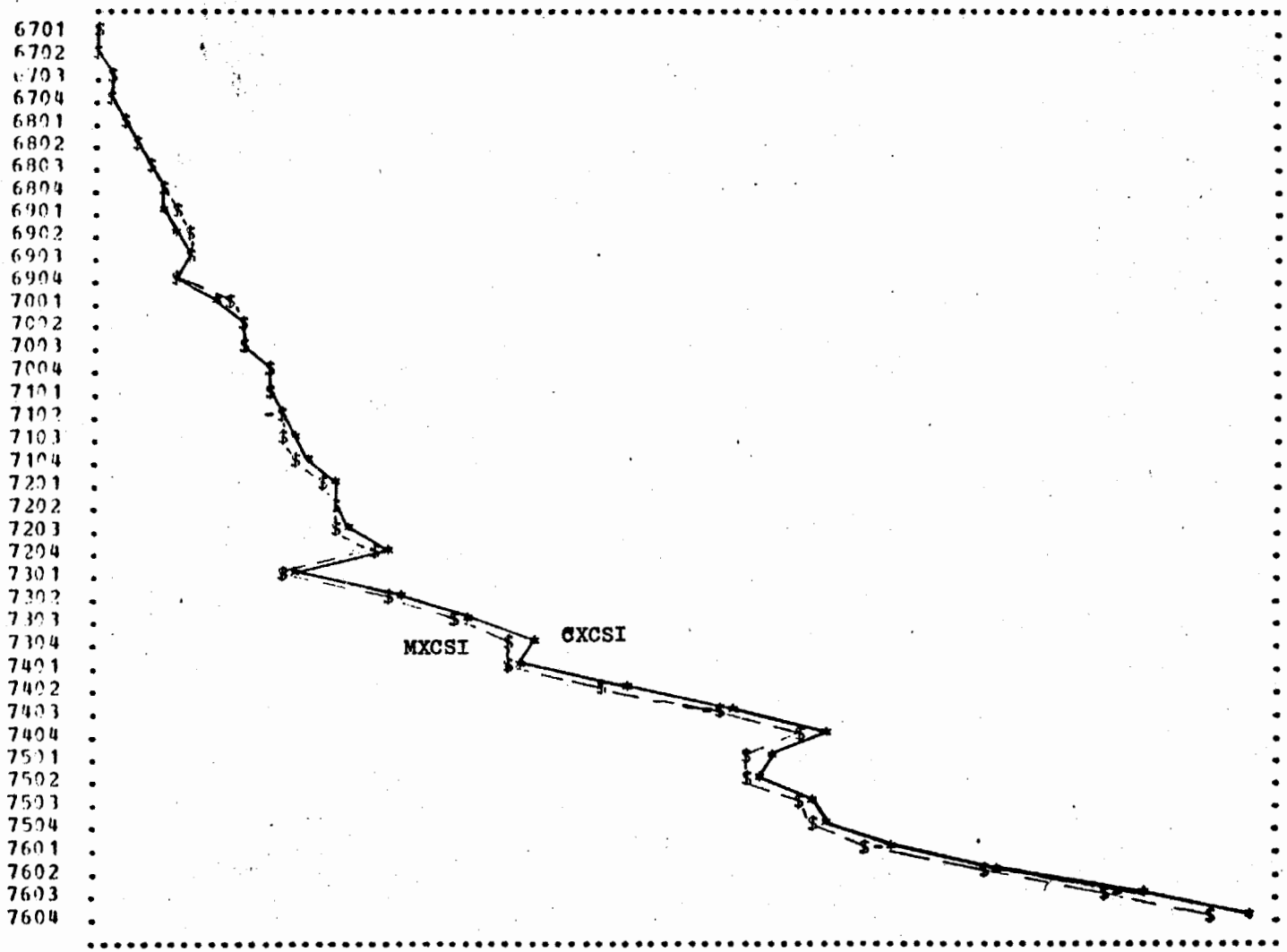


Table II.39 - Imports, current prices, billions lire

CMCSI=control solution MMCSI=moving-average solution
YMCSI=pro-cycle solution AMCSI=anti-cycle solution

| | CMCSI | MMCSI | YMCSI | AMCSI |
|---|---|---|---|---|
| 6701 | 1742.60 | 1721.80 | 1721.40 | 1720.30 |
| 6702 | 1691.60 | 1630.90 | 1629.50 | 1627.40 |
| 6703 | 1706.70 | 1698.30 | 1696.80 | 1695.40 |
| 6704 | 1838.70 | 1829.30 | 1828.60 | 1828.70 |
| 6801 | 1810.60 | 1687.10 | 1688.10 | 1687.60 |
| 6802 | 1975.80 | 1853.20 | 1853.40 | 1849.50 |
| 6803 | 2031.60 | 1911.20 | 1911.70 | 1909.20 |
| 6804 | 2072.20 | 1956.30 | 1957.30 | 1959.00 |
| 6901 | 2141.60 | 2026.40 | 2026.00 | 2029.10 |
| 6902 | 2267.00 | 2157.00 | 2151.70 | 2157.40 |
| 6903 | 2383.80 | 2276.00 | 2269.20 | 2280.40 |
| 6904 | 2512.50 | 2404.30 | 2406.80 | 2410.10 |
| 7001 | 2547.90 | 2433.00 | 2441.00 | 2433.50 |
| 7002 | 2714.10 | 2596.80 | 2600.10 | 2589.70 |
| 7003 | 2888.30 | 2768.80 | 2774.00 | 2766.10 |
| 7004 | 2999.90 | 2881.30 | 2890.10 | 2890.30 |
| 7101 | 3103.70 | 2983.00 | 2988.60 | 2996.80 |
| 7102 | 3160.20 | 3024.50 | 3025.00 | 3032.20 |
| 7103 | 3307.70 | 3161.10 | 3167.00 | 3166.80 |
| 7104 | 3399.70 | 3239.80 | 3250.10 | 3249.20 |
| 7201 | 3308.60 | 3140.20 | 3150.60 | 3145.10 |
| 7202 | 3511.40 | 3328.00 | 3337.40 | 3321.40 |
| 7203 | 3662.30 | 3471.30 | 3479.90 | 3469.90 |
| 7204 | 3917.10 | 3717.30 | 3721.90 | 3727.50 |
| 7301 | 3898.70 | 3688.50 | 3703.30 | 3699.10 |
| 7302 | 4796.60 | 4566.10 | 4597.90 | 4567.00 |
| 7303 | 5203.80 | 4951.30 | 4971.10 | 4953.10 |
| 7304 | 5643.30 | 5375.00 | 5383.30 | 5396.80 |
| 7401 | 6844.30 | 6510.30 | 6522.50 | 6559.20 |
| 7402 | 7331.20 | 6959.50 | 6990.40 | 7019.10 |
| 7403 | 7741.20 | 7360.70 | 7392.90 | 7426.40 |
| 7404 | 8070.30 | 7699.60 | 7738.70 | 7746.40 |
| 7501 | 7846.60 | 7497.60 | 7531.40 | 7530.70 |
| 7502 | 7929.70 | 7616.00 | 7633.80 | 7649.10 |
| 7503 | 7877.20 | 7589.20 | 7605.00 | 7614.00 |
| 7504 | 7923.30 | 7635.70 | 7652.30 | 7662.40 |
| 7601 | 7791.00 | 7439.70 | 7470.10 | 7484.50 |
| 7602 | 9441.50 | 9023.10 | 9083.80 | 9094.90 |
| 7603 | 9900.10 | 9474.30 | 9531.20 | 9547.30 |
| 7604 | 10491.2 | 10061.8 | 10097.5 | 10188.0 |
| | 1 | 2 | 3 | 4 |

Fig. II.37
Imports in current prices

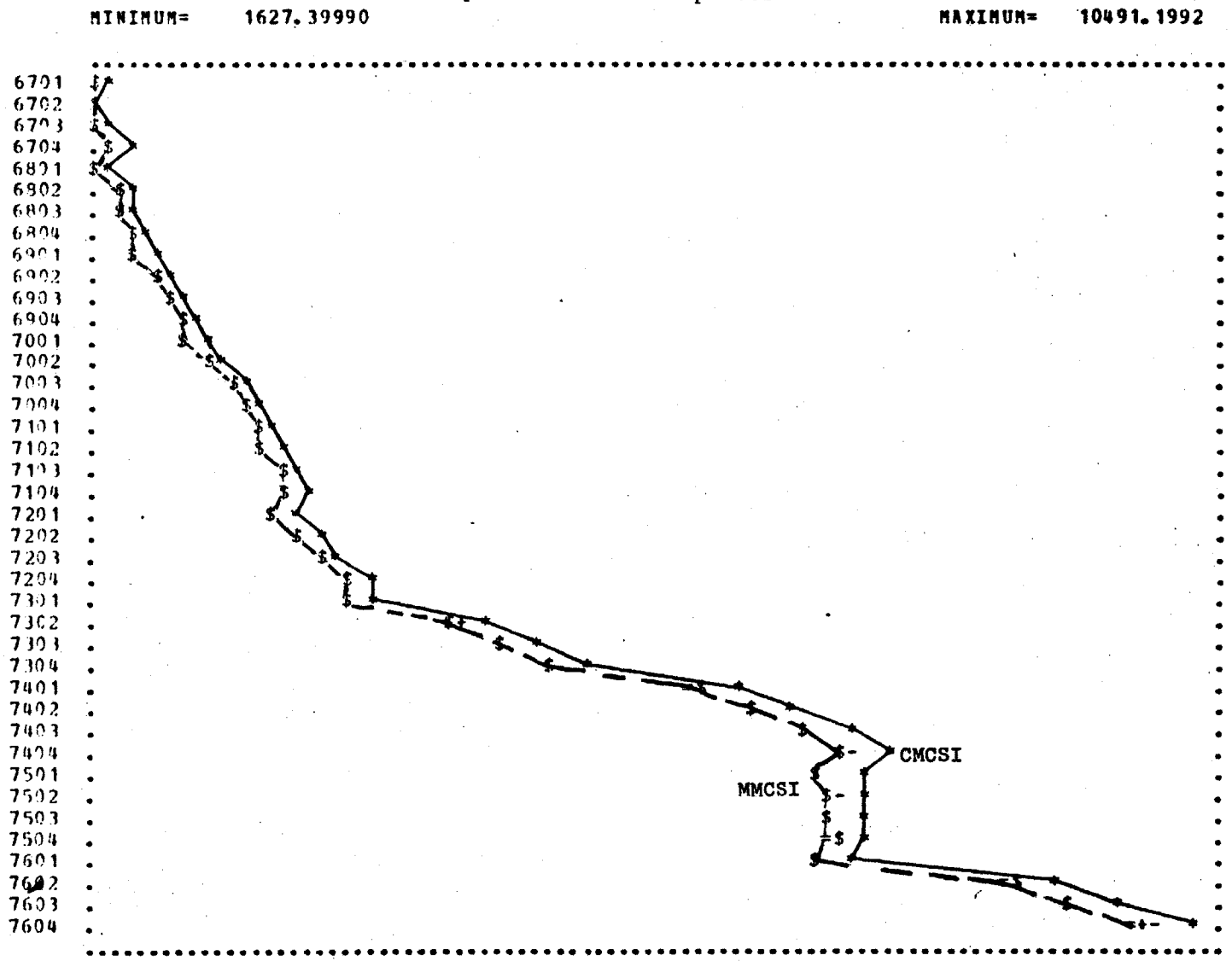


Table II.40 - Trade-balance, current prices, billions of lire

CBOP=control solution MBOP=moving-average solution
YBOP=pro-cycle solution ABOP=anti-cycle solution

| | CBOP | MBOP | YBOP | ABOP |
|---|---|---|---|---|
| 6701 | 136.200 | 170.200 | 170.800 | 172.600 |
| 6702 | 250.000 | 334.900 | 337.000 | 339.600 |
| 6703 | 201.700 | 327.000 | 328.800 | 330.800 |
| 6704 | 87.7998 | 247.300 | 246.900 | 246.600 |
| 6801 | 313.300 | 482.800 | 481.700 | 483.000 |
| 6802 | 242.000 | 411.800 | 411.000 | 416.200 |
| 6803 | 304.000 | 471.600 | 470.800 | 473.600 |
| 6804 | 356.100 | 519.100 | 518.000 | 516.000 |
| 6901 | 317.700 | 477.500 | 478.600 | 474.300 |
| 6902 | 306.200 | 458.200 | 467.100 | 456.000 |
| 6903 | 268.500 | 416.800 | 425.400 | 410.100 |
| 6904 | 37.2002 | 182.700 | 177.900 | 175.800 |
| 7001 | 338.600 | 491.700 | 482.300 | 491.400 |
| 7002 | 343.200 | 482.000 | 474.500 | 491.400 |
| 7003 | 202.700 | 334.700 | 324.900 | 337.100 |
| 7004 | 232.700 | 350.100 | 339.800 | 337.200 |
| 7101 | 159.900 | 264.400 | 257.900 | 244.400 |
| 7102 | 189.400 | 303.900 | 301.200 | 290.900 |
| 7103 | 137.800 | 248.000 | 239.700 | 239.700 |
| 7104 | 173.500 | 283.000 | 270.700 | 272.800 |
| 7201 | 436.700 | 540.100 | 524.300 | 538.100 |
| 7202 | 322.700 | 432.000 | 418.700 | 441.700 |
| 7203 | 233.800 | 343.800 | 334.900 | 346.200 |
| 7204 | 260.299 | 366.200 | 365.200 | 356.700 |
| 7301 | -445.700 | -317.200 | -339.500 | -329.100 |
| 7302 | -462.698 | -341.098 | -377.801 | -341.801 |
| 7303 | -374.098 | -249.000 | -270.898 | -248.098 |
| 7304 | -326.000 | -200.102 | -206.797 | -226.797 |
| 7401 | -1588.70 | -1402.20 | -1403.80 | -1465.60 |
| 7402 | -1284.60 | -1080.70 | -1102.20 | -1168.00 |
| 7403 | -818.602 | -630.500 | -657.199 | -721.199 |
| 7404 | -438.098 | -275.801 | -319.000 | -320.199 |
| 7501 | -672.102 | -504.000 | -524.102 | -523.000 |
| 7502 | -790.902 | -637.504 | -637.797 | -634.301 |
| 7503 | -336.801 | -210.703 | -205.703 | -191.504 |
| 7504 | -308.898 | -167.000 | -159.000 | -156.500 |
| 7601 | 312.000 | 513.398 | 489.902 | 499.703 |
| 7602 | -450.098 | -206.898 | -265.199 | -257.199 |
| 7603 | 135.699 | 338.602 | 286.000 | 284.301 |
| 7604 | 366.699 | 522.000 | 501.602 | 424.199 |
| | 1 | 2 | 3 | 4 |

Table II.41

DXCSI=Differentials on exports between control and moving average solutions
MUXCSI= export multipliers of G.C.investments=
DMCSI=Differentials on imports between control and moving average solution
MUMCSI= import multipliers of G.C. investments

| | DXCSI | MUXCSI | DMCSI | MUMCSI |
|---|---|---|---|---|
| 6701 | -13.2002 | -.857155E-01 | 20.8000 | .135065 |
| 6702 | -24.2000 | -.153164 | 60.7000 | .384177 |
| 6703 | -36.8999 | -.222289 | 88.4001 | .532531 |
| 6704 | -49.1001 | -.287135 | 110.400 | .645615 |
| 6801 | -46.0000 | -.261364 | 123.500 | .701705 |
| 6802 | -47.2002 | -.260775 | 122.600 | .677347 |
| 6803 | -47.2000 | -.245833 | 120.400 | .627083 |
| 6804 | -47.1001 | -.236684 | 115.900 | .582413 |
| 6901 | -44.6001 | -.227551 | 115.200 | .587755 |
| 6902 | -42.7000 | -.213500 | 110.000 | .550000 |
| 6903 | -40.5000 | -.183258 | 107.800 | .487782 |
| 6904 | -37.3000 | -.158724 | 108.200 | .460425 |
| 7001 | -38.2002 | -.152801 | 114.900 | .459600 |
| 7002 | -21.5000 | -.811321E-01 | 117.300 | .442642 |
| 7003 | -12.4998 | -.420867E-01 | 119.500 | .402357 |
| 7004 | 1.19995 | .389595E-02 | 118.600 | .385065 |
| 7101 | 16.2000 | .504671E-01 | 120.700 | .376012 |
| 7102 | 21.2000 | .638552E-01 | 135.700 | .409736 |
| 7103 | 36.3999 | .103703 | 146.600 | .417664 |
| 7104 | 49.4001 | .137605 | 158.900 | .442619 |
| 7201 | 65.0000 | .179558 | 168.400 | .465193 |
| 7202 | 74.0999 | .199730 | 183.400 | .494339 |
| 7203 | 81.0000 | .207692 | 191.000 | .489744 |
| 7204 | 93.8987 | .237718 | 199.800 | .505823 |
| 7301 | 81.7002 | .211658 | 210.200 | .544560 |
| 7302 | 108.699 | .292202 | 230.500 | .619624 |
| 7303 | 127.402 | .335269 | 252.500 | .664474 |
| 7304 | 142.398 | .367006 | 268.297 | .691487 |
| 7401 | 147.500 | .381137 | 334.000 | .863049 |
| 7402 | 167.801 | .446279 | 371.703 | .988572 |
| 7403 | 192.398 | .534440 | 380.500 | 1.05694 |
| 7404 | 208.402 | .605821 | 370.699 | 1.07761 |
| 7501 | 180.898 | .565308 | 349.000 | 1.09062 |
| 7502 | 160.301 | .508891 | 313.699 | .995871 |
| 7503 | 161.902 | .499699 | 288.000 | .888889 |
| 7504 | 145.699 | .440179 | 287.598 | .868875 |
| 7601 | 149.902 | .440889 | 351.301 | 1.03324 |
| 7602 | 175.199 | .539074 | 418.398 | 1.28738 |
| 7603 | 222.898 | .721354 | 425.801 | 1.37800 |
| 7604 | 274.102 | .961760 | 429.402 | 1.50667 |
| | 1 | 2 | 3 | 4 |

Fig. II.38

Trade balance in current prices

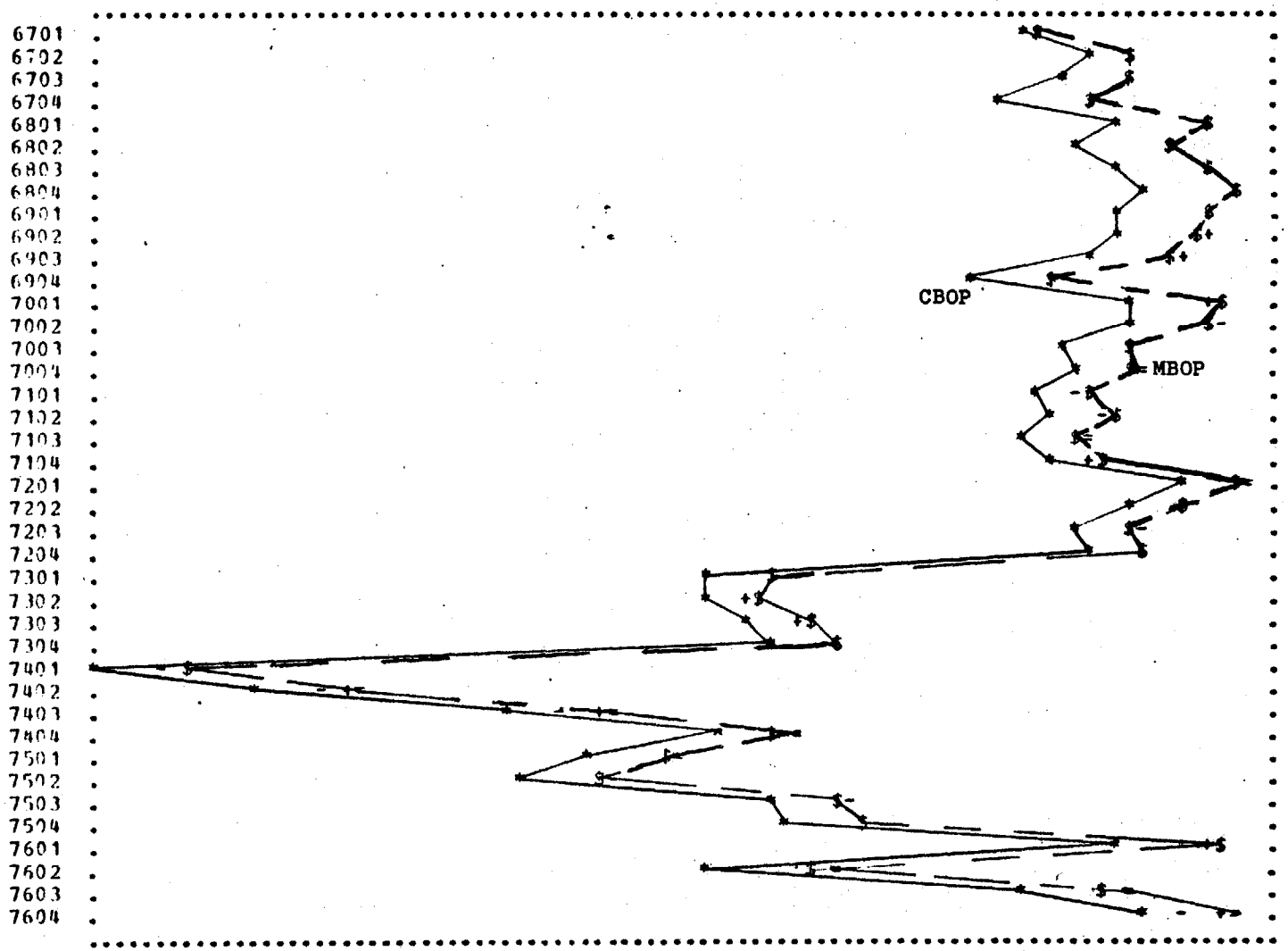


Table II.42-Effects of G.C. Investments on the Trade Balance, current prices billions of lire

| | BOPMON Quarterly | Annual |
|---|---|---|
| 6701 | -34.0002 | |
| 6702 | -84.8999 | |
| 6703 | -125.300 | -403.7 |
| 6704 | -159.500 | |
| 6801 | -169.500 | |
| 6802 | -169.800 | -669.9 |
| 6803 | -167.600 | |
| 6804 | -163.000 | |
| 6901 | -159.800 | |
| 6902 | -152.700 | -606.3 |
| 6903 | -148.300 | |
| 6904 | -145.500 | |
| 7001 | -153.100 | |
| 7002 | -138.800 | -541.3 |
| 7003 | -132.000 | |
| 7004 | -117.400 | |
| 7101 | -104.500 | |
| 7102 | -114.500 | -438.7 |
| 7103 | -110.200 | |
| 7104 | -109.500 | |
| 7201 | -103.400 | |
| 7202 | -109.300 | -428.6 |
| 7203 | -110.000 | |
| 7204 | -105.901 | |
| 7301 | -128.500 | |
| 7302 | -121.801 | -501.5 |
| 7303 | -125.098 | |
| 7304 | -125.898 | |
| 7401 | -186.500 | |
| 7402 | -203.902 | -740.8 |
| 7403 | -198.102 | |
| 7404 | -162.297 | |
| 7501 | -158.102 | |
| 7502 | -153.398 | -590.3 |
| 7503 | -126.098 | |
| 7504 | -141.898 | |
| 7601 | -201.398 | |
| 7602 | -243.199 | -802.8 |
| 7603 | -202.902 | |
| 7604 | -155.301 | |

1

Fig.II.39

MINIMUM= -243.199219 Effects of government corporation investments on the trade balance in current prices MAXIMUM= -34.000244

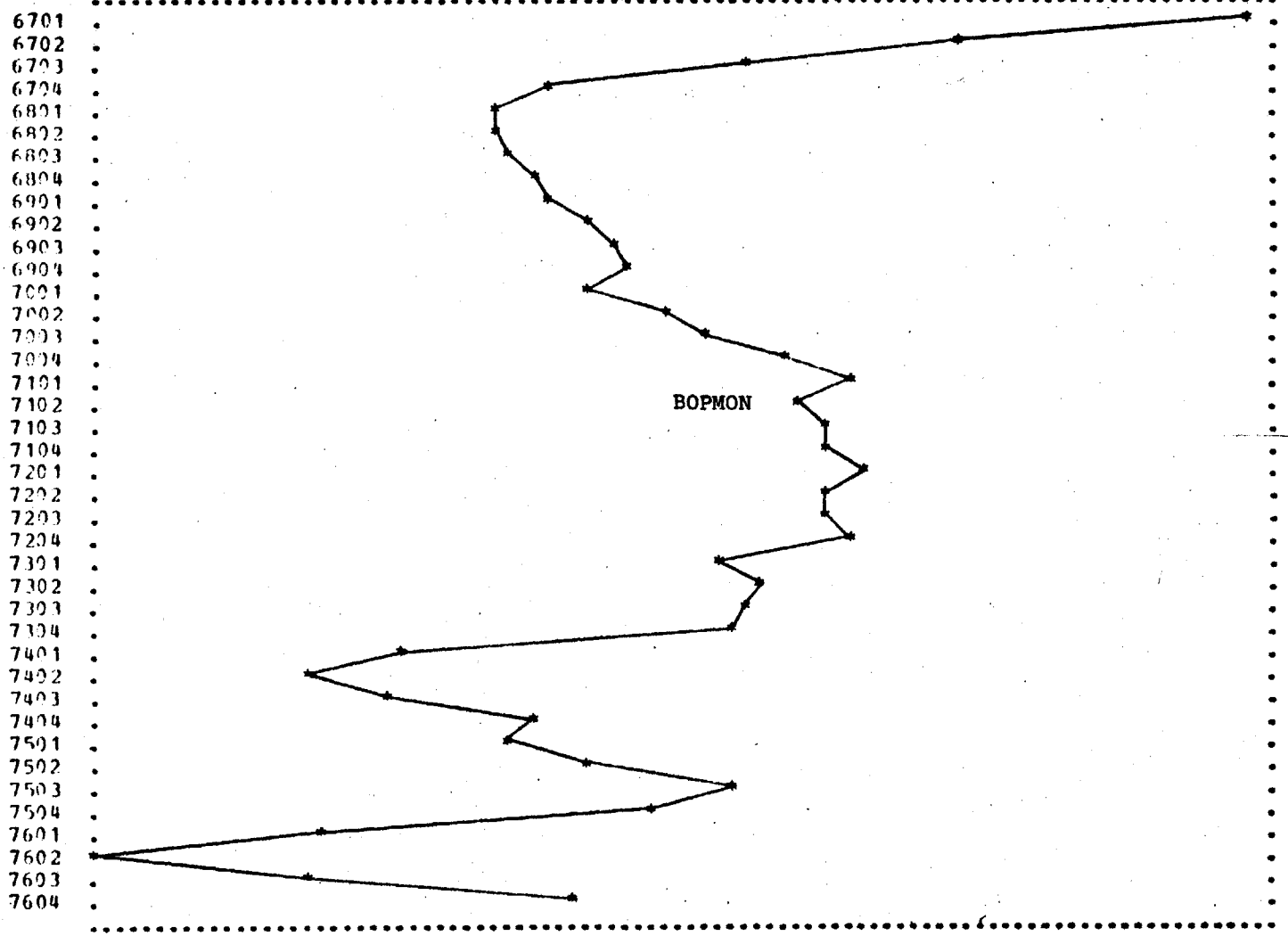


Table II.43 - Exports, 1963 prices, billions lire

CXCS63=control solution MXCS63=moving average solution
YXCS63=pro-cycle solution AXCS63=anti-cycle solution

| | CXCS63 | MXCS63 | YXCS63 | AXCS63 |
|---|---|---|---|---|
| 6701 | 1839.00 | 1852.00 | 1852.00 | 1852.00 |
| 6702 | 1896.00 | 1922.00 | 1922.00 | 1923.00 |
| 6703 | 1941.00 | 1982.00 | 1983.00 | 1983.00 |
| 6704 | 1980.00 | 2037.00 | 2037.00 | 2037.00 |
| 6801 | 2075.00 | 2132.00 | 2132.00 | 2133.00 |
| 6802 | 2174.00 | 2232.00 | 2232.00 | 2233.00 |
| 6803 | 2296.00 | 2355.00 | 2354.00 | 2355.00 |
| 6804 | 2384.00 | 2441.00 | 2441.00 | 2441.00 |
| 6901 | 2399.00 | 2452.00 | 2453.00 | 2452.00 |
| 6902 | 2481.00 | 2532.00 | 2535.00 | 2529.00 |
| 6903 | 2538.00 | 2585.00 | 2587.00 | 2582.00 |
| 6904 | 2422.00 | 2465.00 | 2463.00 | 2463.00 |
| 7001 | 2714.00 | 2757.00 | 2755.00 | 2756.00 |
| 7002 | 2826.00 | 2851.00 | 2847.00 | 2853.00 |
| 7003 | 2832.00 | 2840.00 | 2835.00 | 2840.00 |
| 7004 | 2948.00 | 2933.00 | 2931.00 | 2929.00 |
| 7101 | 2925.00 | 2891.00 | 2889.00 | 2884.00 |
| 7102 | 2960.00 | 2913.00 | 2911.00 | 2907.00 |
| 7103 | 3009.00 | 2948.00 | 2946.00 | 2944.00 |
| 7104 | 3088.00 | 3016.00 | 3014.00 | 3014.00 |
| 7201 | 3207.00 | 3120.00 | 3115.00 | 3122.00 |
| 7202 | 3251.00 | 3153.00 | 3149.00 | 3155.00 |
| 7203 | 3266.00 | 3159.00 | 3159.00 | 3160.00 |
| 7204 | 3457.00 | 3333.00 | 3336.00 | 3333.00 |
| 7301 | 2778.00 | 2671.00 | 2666.00 | 2670.00 |
| 7302 | 3339.00 | 3200.00 | 3196.00 | 3200.00 |
| 7303 | 3548.00 | 3390.00 | 3387.00 | 3391.00 |
| 7304 | 3681.00 | 3509.00 | 3509.00 | 3506.00 |
| 7401 | 3302.00 | 3138.00 | 3144.00 | 3129.00 |
| 7402 | 3448.00 | 3272.00 | 3277.00 | 3257.00 |
| 7403 | 3634.00 | 3443.00 | 3445.00 | 3429.00 |
| 7404 | 3735.00 | 3533.00 | 3530.00 | 3531.00 |
| 7501 | 3515.00 | 3317.00 | 3321.00 | 3320.00 |
| 7502 | 3525.00 | 3319.00 | 3326.00 | 3330.00 |
| 7503 | 3632.00 | 3413.00 | 3422.00 | 3425.00 |
| 7504 | 3689.00 | 3463.00 | 3475.00 | 3470.00 |
| 7601 | 3750.00 | 3517.00 | 3520.00 | 3519.00 |
| 7602 | 3959.00 | 3708.00 | 3704.00 | 3700.00 |
| 7603 | 4242.00 | 3954.00 | 3956.00 | 3948.00 |
| 7604 | 4466.00 | 4145.00 | 4152.00 | 4142.00 |
| | 1 | 2 | 3 | 4 |

Fig.II.40

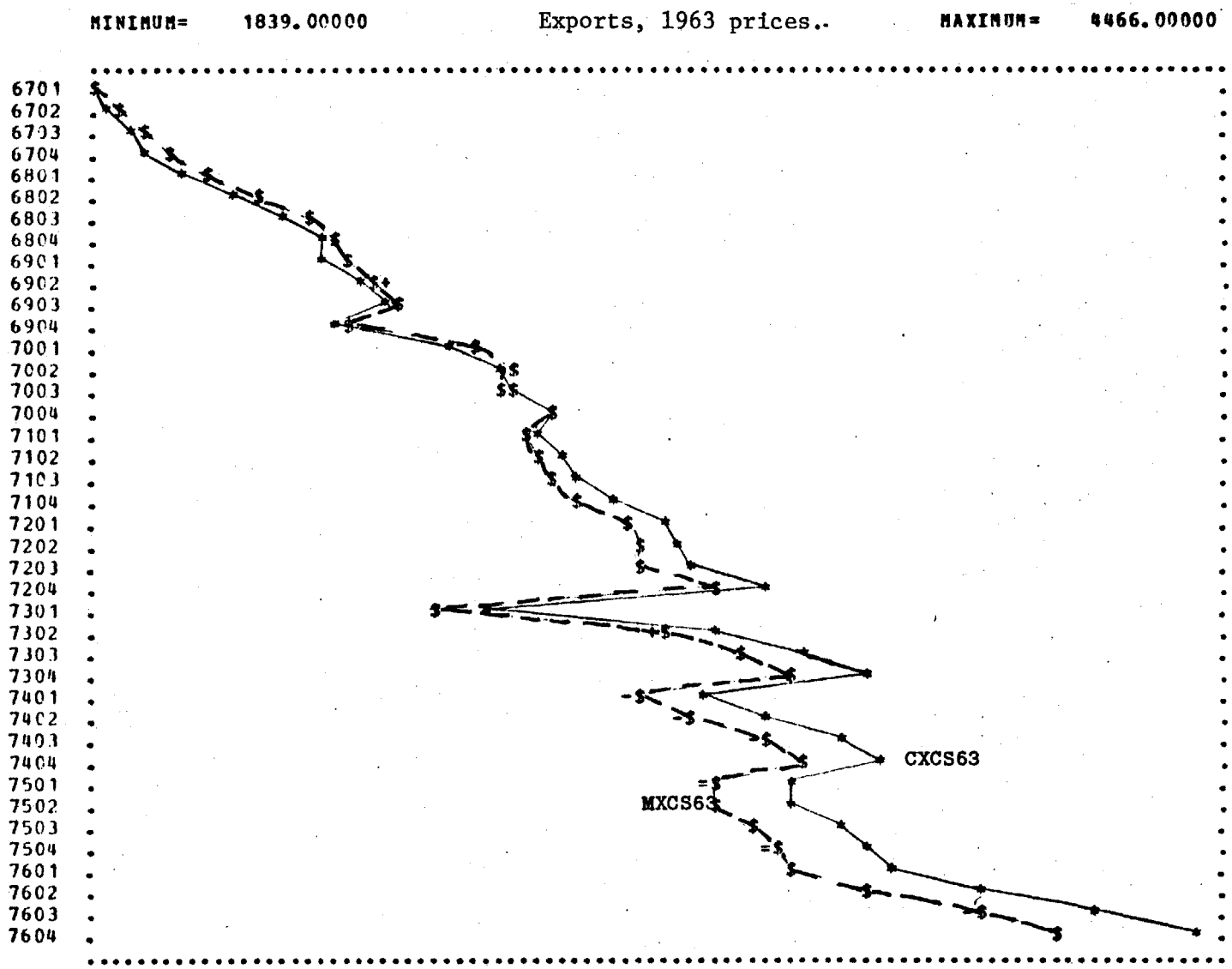

MINIMUM= 1839.00000
Exports, 1963 prices..
MAXIMUM= 4466.00000
6701
6702
6703
6704
6801
6802
6803
6804
6901
6902
6903
6904
7001
7002
7003
7004
7101
7102
7103
7104
7201
7202
7203
7204
7301
7302
7303
7304
7401
7402
7403
7404
7501
7502
7503
7504
7601
7602
7603
7604
CXCS63
MXCS63

Table II.44 - Imports, billions of 1963 lire

CMCS63=control solution MMCS63=moving-average solution
YMCS63=pro-cycle solution AMCS63=anti-cycle solution

| | CMCS63 | MMCS63 | YMCS63 | AMCS63 |
|---|---|---|---|---|
| 6701 | 1657.00 | 1637.00 | 1637.00 | 1636.00 |
| 6702 | 1631.00 | 1537.00 | 1572.00 | 1570.00 |
| 6703 | 1711.00 | 1626.00 | 1625.00 | 1624.00 |
| 6704 | 1817.00 | 1714.00 | 1714.00 | 1714.00 |
| 6801 | 1718.00 | 1601.00 | 1602.00 | 1602.00 |
| 6802 | 1897.00 | 1779.00 | 1779.00 | 1776.00 |
| 6803 | 1952.00 | 1836.00 | 1837.00 | 1835.00 |
| 6804 | 1980.00 | 1869.00 | 1870.00 | 1871.00 |
| 6901 | 2040.00 | 1931.00 | 1930.00 | 1933.00 |
| 6902 | 2133.00 | 2030.00 | 2025.00 | 2030.00 |
| 6903 | 2234.00 | 2133.00 | 2127.00 | 2138.00 |
| 6904 | 2322.00 | 2222.00 | 2224.00 | 2227.00 |
| 7001 | 2296.00 | 2192.00 | 2200.00 | 2193.00 |
| 7002 | 2459.00 | 2352.00 | 2355.00 | 2346.00 |
| 7003 | 2594.00 | 2486.00 | 2491.00 | 2484.00 |
| 7004 | 2662.00 | 2556.00 | 2564.00 | 2564.00 |
| 7101 | 2698.00 | 2593.00 | 2598.00 | 2605.00 |
| 7102 | 2697.00 | 2581.00 | 2582.00 | 2587.00 |
| 7103 | 2755.00 | 2633.00 | 2638.00 | 2638.00 |
| 7104 | 2825.00 | 2693.00 | 2702.00 | 2701.00 |
| 7201 | 2772.00 | 2631.00 | 2640.00 | 2635.00 |
| 7202 | 2920.00 | 2767.00 | 2775.00 | 2762.00 |
| 7203 | 3009.00 | 2852.00 | 2859.00 | 2851.00 |
| 7204 | 3182.00 | 3020.00 | 3024.00 | 3028.00 |
| 7301 | 3034.00 | 2870.00 | 2882.00 | 2978.00 |
| 7302 | 3415.00 | 3251.00 | 3274.00 | 3252.00 |
| 7303 | 3437.00 | 3271.00 | 3283.00 | 3272.00 |
| 7304 | 3406.00 | 3244.00 | 3249.00 | 3257.00 |
| 7401 | 3262.00 | 3103.00 | 3109.00 | 3126.00 |
| 7402 | 3127.00 | 2969.00 | 2982.00 | 2994.00 |
| 7403 | 3146.00 | 2992.00 | 3005.00 | 3018.00 |
| 7404 | 3146.00 | 3002.00 | 3017.00 | 3020.00 |
| 7501 | 3041.00 | 2905.00 | 2919.00 | 2918.00 |
| 7502 | 3108.00 | 2985.00 | 2992.00 | 2998.00 |
| 7503 | 3052.00 | 2940.00 | 2947.00 | 2950.00 |
| 7504 | 3023.00 | 2913.00 | 2919.00 | 2923.00 |
| 7601 | 2629.00 | 2510.00 | 2520.00 | 2525.00 |
| 7602 | 2868.00 | 2741.00 | 2760.00 | 2763.00 |
| 7603 | 3016.00 | 2886.00 | 2903.00 | 2908.00 |
| 7604 | 3118.00 | 2991.00 | 3001.00 | 3007.00 |
| | 1 | 2 | 3 | 4 |

Fig.II.41

MINIMUM= 1537.00000 Imports, 1963 prices MAXIMUM= 3437.00000

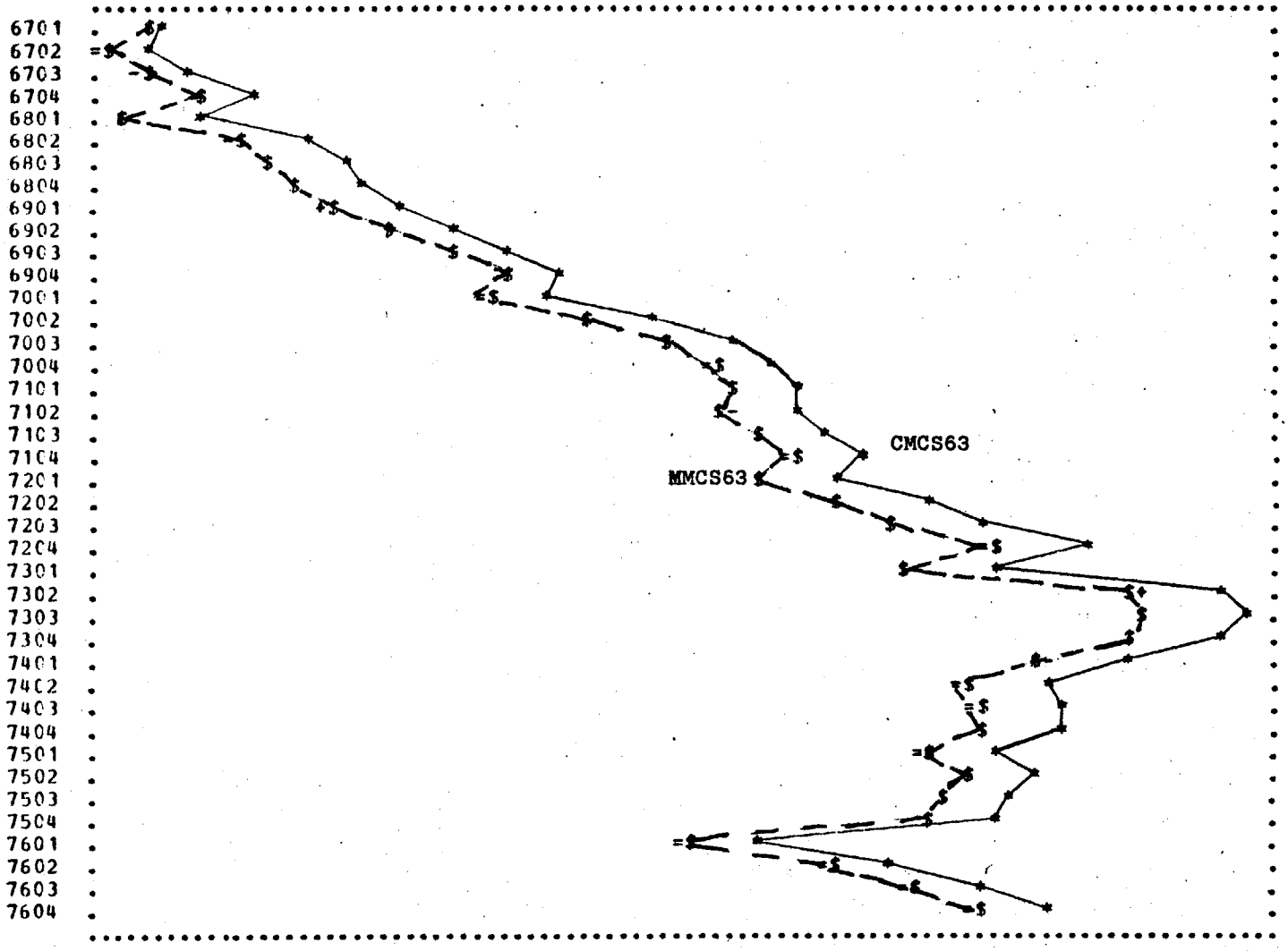


Table II.45

DXCS63=Differentials on exports between control and moving average solutions, constant prices

MUXCS= Export multipliers of G.C.Investments, constant prices

DMCS63=Differentials on imports between control and moving average solutions, constant prices

MUMCS= Import multipliers of G.C.Investments, constant prices

BOPREA=Effects of G.C. Investments on the Balance of Trade, billions of 1963 lire.

| | DXCS63 | MUXCS | DMCS63 | MUMCS | BOPREA |
|---|---|---|---|---|---|
| 6701 | -13.0000 | -.944150E-01 | 20.0000 | .129370 | -33.0000 |
| 6702 | -26.0000 | -.154357 | 44.0000 | .394937 | -120.000 |
| 6703 | -41.0000 | -.240450 | 59.0000 | .512043 | -129.000 |
| 6704 | -57.0000 | -.333433 | 101.000 | .902334 | -160.000 |
| 6801 | -57.0000 | -.323464 | 117.000 | .864773 | -174.000 |
| 6802 | -58.0000 | -.320442 | 116.000 | .851434 | -176.000 |
| 6803 | -59.0000 | -.317242 | 115.000 | .804187 | -175.000 |
| 6804 | -57.0000 | -.295942 | 111.000 | .757759 | -166.000 |
| 6901 | -53.0000 | -.271408 | 109.000 | .756122 | -162.000 |
| 6902 | -51.0000 | -.255000 | 103.000 | .715000 | -154.000 |
| 6903 | -47.0000 | -.242571 | 101.000 | .657014 | -148.000 |
| 6904 | -43.0000 | -.192779 | 100.000 | .625532 | -143.000 |
| 7001 | -43.0000 | -.177000 | 104.000 | .616000 | -147.000 |
| 7002 | -25.0000 | -.944396E-01 | 107.000 | .603774 | -132.000 |
| 7003 | -8.00000 | -.259360E-01 | 108.000 | .563636 | -115.000 |
| 7004 | 15.0000 | .487013E-01 | 105.000 | .544136 | -91.0000 |
| 7101 | 34.0000 | .105919 | 103.000 | .527103 | -71.0000 |
| 7102 | 47.0000 | .141566 | 116.000 | .549349 | -69.0000 |
| 7103 | 61.0000 | .173789 | 122.000 | .549574 | -61.0000 |
| 7104 | 72.0000 | .200357 | 132.000 | .567035 | -60.0000 |
| 7201 | 87.0000 | .240331 | 141.000 | .594303 | -54.0000 |
| 7202 | 98.0000 | .264151 | 153.000 | .612349 | -55.0000 |
| 7203 | 107.000 | .274359 | 157.000 | .602334 | -50.0000 |
| 7204 | 124.000 | .313424 | 162.000 | .610127 | -38.0000 |
| 7301 | 107.000 | .277202 | 164.000 | .624376 | -57.0000 |
| 7302 | 139.000 | .373056 | 164.000 | .640850 | -25.0000 |
| 7303 | 156.000 | .415789 | 165.000 | .636042 | -8.00000 |
| 7304 | 172.000 | .443249 | 162.000 | .617326 | 10.0000 |
| 7401 | 164.000 | .423773 | 154.000 | .618033 | 9.00000 |
| 7402 | 176.000 | .460685 | 154.000 | .620213 | 18.0000 |
| 7403 | 191.000 | .530556 | 154.000 | .627778 | 37.0000 |
| 7404 | 202.000 | .557209 | 144.000 | .615035 | 54.0000 |
| 7501 | 196.000 | .618750 | 134.000 | .625000 | 62.0000 |
| 7502 | 206.000 | .653468 | 123.000 | .590476 | 83.0000 |
| 7503 | 219.000 | .673926 | 112.000 | .565079 | 107.000 |
| 7504 | 226.000 | .682779 | 110.000 | .532426 | 116.000 |
| 7601 | 233.000 | .695294 | 117.000 | .550000 | 114.000 |
| 7602 | 251.000 | .772308 | 127.000 | .590769 | 124.000 |
| 7603 | 288.000 | .932039 | 130.000 | .620712 | 158.000 |
| 7604 | 321.000 | 1.12632 | 127.000 | .645014 | 194.000 |
| | 1 | 2 | 3 | 4 | 5 |

**Fig.II.42**

Effects of government corporation investments on the trade balance, 1963 prices

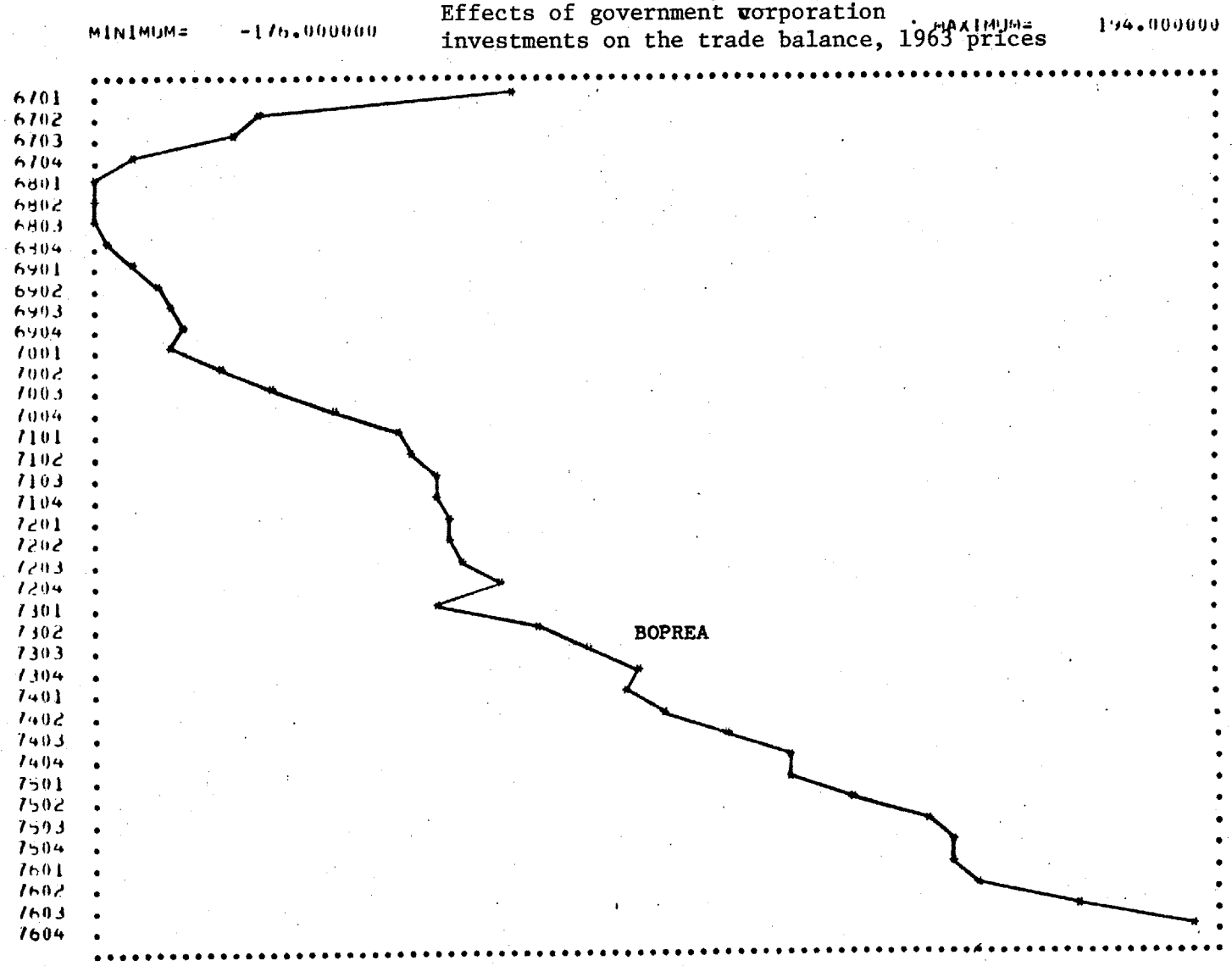
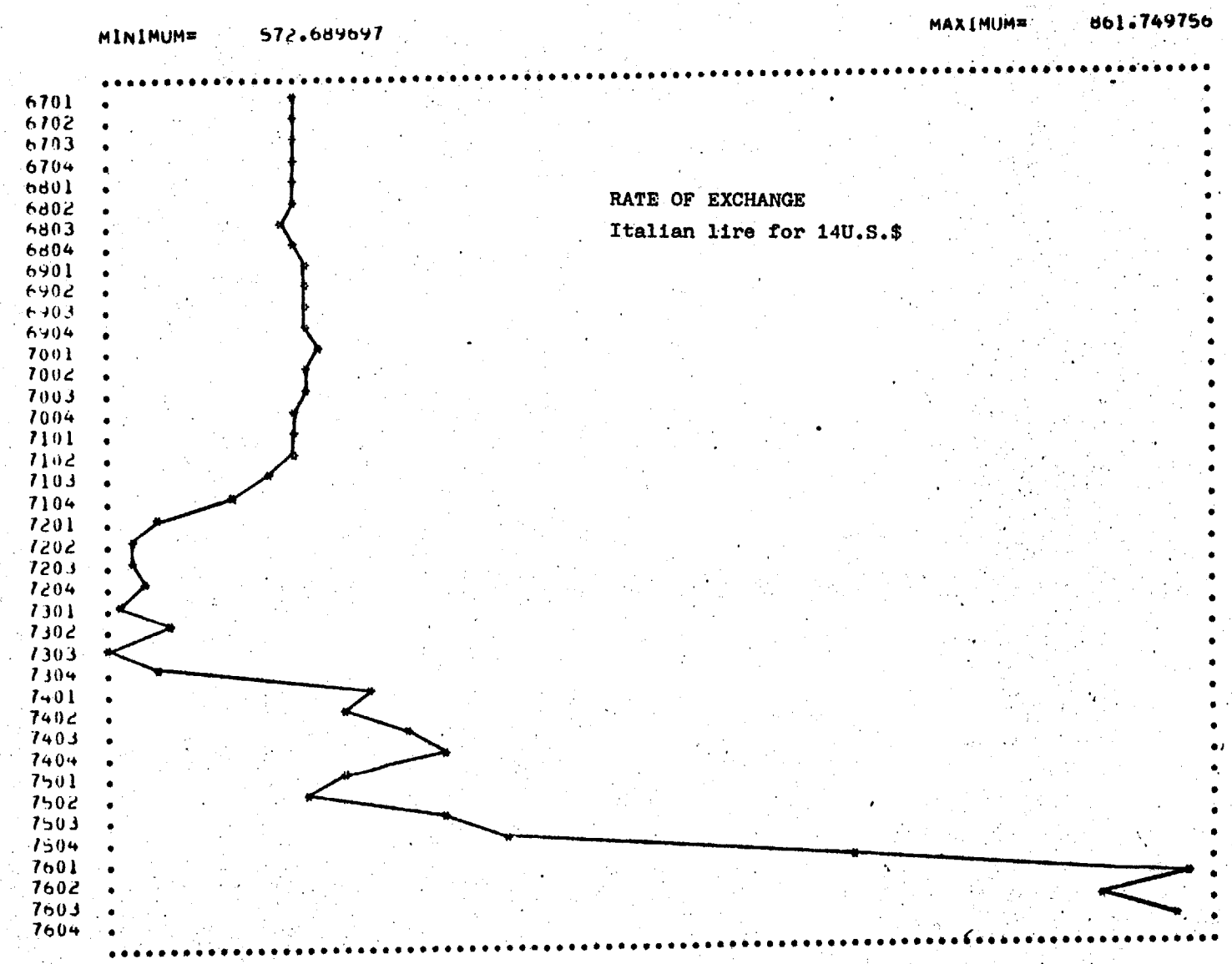


Table II.46 - G.C.Investment multipliers on the Trade Balance:

MUBRE= constant prices
MUBOP= current prices

| | MUBRE | MUBOP |
|---|---|---|
| 6701 | -.214286 | -.220781 |
| 6702 | -.759494 | -.537341 |
| 6703 | -.759036 | -.754820 |
| 6704 | -.935672 | -.932750 |
| 6801 | -.998636 | -.963068 |
| 6802 | -.972376 | -.938122 |
| 6803 | -.911458 | -.872916 |
| 6804 | -.844221 | -.819097 |
| 6901 | -.826531 | -.815306 |
| 6902 | -.770000 | -.763500 |
| 6903 | -.669683 | -.671040 |
| 6904 | -.608511 | -.619149 |
| 7001 | -.588000 | -.612400 |
| 7002 | -.498113 | -.523774 |
| 7003 | -.390572 | -.444444 |
| 7004 | -.295455 | -.381169 |
| 7101 | -.221184 | -.325545 |
| 7102 | -.207831 | -.344880 |
| 7103 | -.173789 | -.313961 |
| 7104 | -.167131 | -.305014 |
| 7201 | -.149171 | -.285635 |
| 7202 | -.149248 | -.294609 |
| 7203 | -.128205 | -.282051 |
| 7204 | -.962025E-01 | -.268105 |
| 7301 | -.147668 | -.332902 |
| 7302 | -.672043E-01 | -.327421 |
| 7303 | -.210526E-01 | -.329204 |
| 7304 | .257732E-01 | -.324480 |
| 7401 | .129199E-01 | -.481912 |
| 7402 | .478723E-01 | -.542293 |
| 7403 | .102779 | -.522504 |
| 7404 | .168605 | -.471793 |
| 7501 | .193750 | -.525317 |
| 7502 | .263492 | -.486979 |
| 7503 | .330247 | -.389190 |
| 7504 | .350453 | -.428696 |
| 7601 | .335294 | -.592348 |
| 7602 | .381538 | -.748305 |
| 7603 | .511327 | -.656642 |
| 7604 | .680702 | -.544915 |
| | 1 | 2 |

Fig.II.4$


MINIMUM= 572.689697
MAXIMUM= 861.749756
RATE OF EXCHANGE
Italian lire for 14U.S.$
6701
6702
6703
6704
6801
6802
6803
6804
6901
6902
6903
6904
7001
7002
7003
7004
7101
7102
7103
7104
7201
7202
7203
7204
7301
7302
7303
7304
7401
7402
7403
7404
7501
7502
7503
7504
7601
7602
7603
7604

6. The Government Budget

The recent debate on Italy's economic difficulties has emphasized the negative contribution of overwhelming Government deficits. Indeed, while Government expenditure grew very fast in the last decade, Government revenue lagged behind. Until 1973 tax collection was very poor and the total tax-effort was still below 28 percent of GNP. Only during the last two years does the fiscal system seem to have performed more efficiently. Tax collection reached 33-34 percent of Italian GNP.

One of the key points, often underlined, is given by the increasingly negative contribution of the Government sector to savings formation.

Indeed, in Italy, private savings have always been produced at a considerable rate, still above 15-16 percent of GNP. These savings, however, have more and more been outweighed by negative Government savings.

This trend has been reinforced by the accentuated cycle that Italy experienced after the oil crisis.

As can be seen from the tables reported in this section, deficits and Government savings have deteriorated seriously during the recent period of stagnation. This deterioration clearly is due to the strong rigidity of Italian Government expenditure compared with the usual reaction of tax revenue to the level of activity.

Thus, to investigate the effects of Government Corporation investments it is necessary to recall their movements in the simulations we performed.

They are first considered as a demand push which activate higher levels of production. Once they are incorporated, they also give the opportunity to increase activity if demand conditions permit.

The impact is here seen in terms of Government current account deficits (Table II.48) and of Government saving (Table II.49). In the first part of the period, from 1967 to 1972, the higher investment demand of Government Corporation has contributed to sustain higher production.

Therefore, without this contribution, the Government would have collected fewer taxes, and would have run a higher deficit, both in current account and in total.

After 1973, however, Government Corporations made a much weaker contribution to investment demand, and the effects of previous investments on production capacity were obviously constrained by weak aggregate demand in both domestic and foreign markets.

Therefore, the impact of Government Corporation investments on Government deficits is positive but quite small during the last three years.

This outcome is, however, far too limited to evaluate the full effect of Government Corporation on Italian Government deficits. Indeed, Government Corporations ran into heavy losses in recent years, and the Government has always been requested to finance them.

This effect, which could be a relevant one, is not related to Government Corporation investment expenditure in itself, but to the management of their plants once they are put into production.

As we have seen before, Government Corporation investments seem to have adversely affected the output/capital ratio,

Unfortunately, it is not possible at this stage to focus on this impact in an analytic way.

Table II.47 – Balance on Government Current Accounts, billions of lire

CTIBAL=control solution MTIBAL=moving-average solution
YTIBAL=pro-cycle solution ATIBAL=anti-cycle solution

| | CTIBAL | annual | MTIBAL | annual | YTIBAL | ATIBAL |
|---|---|---|---|---|---|---|
| 6701 | 179.500 | | 173.500 | | 173.400 | 173.000 |
| 6702 | -43.5000 | 333.8 | -82.5000 | 135.5 | -83.4000 | -85.1000 |
| 6703 | 106.100 | | 46.4000 | | 47.2000 | 46.2000 |
| 6704 | 91.7000 | | -3.90000 | | -3.50000 | -3.30000 |
| 6801 | -81.3000 | | -169.700 | | -164.100 | -159.300 |
| 6802 | -291.500 | | -386.100 | | -385.700 | -388.500 |
| 6803 | -135.600 | | -217.000 | | -217.100 | -218.900 |
| 6804 | -179.500 | -687.9 | -263.300 | -1036.7 | -262.700 | -262.500 |
| 6901 | -2.60000 | | -76.5000 | | -76.2000 | -73.7000 |
| 6902 | 30.5000 | | -49.1000 | | -51.4000 | -49.2000 |
| 6903 | -333.200 | | -403.500 | | -401.900 | -400.800 |
| 6904 | -284.100 | -589.4 | -360.500 | -889.7 | -362.000 | -357.000 |
| 7001 | -309.300 | | -384.700 | | -378.900 | -381.900 |
| 7002 | -82.8000 | | -173.700 | | -171.000 | -177.800 |
| 7003 | -70.6000 | | -132.400 | | -148.800 | -156.000 |
| 7004 | .700000 | -461.9 | -82.5000 | -793.3 | -77.2000 | -80.2000 |
| 7101 | -241.800 | | -312.400 | | -307.500 | -303.300 |
| 7102 | -338.800 | | -433.700 | | -432.600 | -425.800 |
| 7103 | -390.000 | | -480.300 | | -475.000 | -474.400 |
| 7104 | -371.800 | -1342.2 | -487.500 | -1714.3 | -480.800 | -481.000 |
| 7201 | -799.600 | | -908.900 | | -902.300 | -903.100 |
| 7202 | -490.900 | | -628.500 | | -621.800 | -631.000 |
| 7203 | -865.400 | | -959.900 | | -979.300 | -986.200 |
| 7204 | -780.500 | -2936.4 | -914.500 | -3437.9 | -909.400 | -909.800 |
| 7301 | -649.500 | | -771.000 | | -763.400 | -763.100 |
| 7302 | -614.800 | | -761.200 | | -740.100 | -757.600 |
| 7303 | -1257.30 | | -1383.50 | | -1369.60 | -1381.70 |
| 7304 | -1387.70 | -4109.3 | -1721.50 | -4637.2 | -1709.00 | -1714.90 |
| 7401 | -437.700 | | -559.500 | | -551.300 | -537.000 |
| 7402 | -1029.90 | | -1167.00 | | -1157.20 | -1160.10 |
| 7403 | -358.500 | | -491.400 | | -471.400 | -455.200 |
| 7404 | -1109.50 | -2935.6 | -1242.10 | -3479.0 | -1217.30 | -1210.40 |
| 7501 | -2447.60 | | -2532.80 | | -2504.50 | -2506.50 |
| 7502 | -916.100 | | -979.500 | | -961.200 | -938.200 |
| 7503 | -1516.20 | | -1539.50 | | -1524.40 | -1447.00 |
| 7504 | -1809.20 | -6689.1 | -1844.00 | -6895.8 | -1827.70 | -1801.20 |
| 7601 | -2109.70 | | -2130.90 | | -2119.60 | -2091.90 |
| 7602 | -1949.20 | | -1954.00 | | -1955.70 | -1932.60 |
| 7603 | -2429.90 | | -2459.30 | | -2433.10 | -2413.90 |
| 7604 | -2262.40 | -8751.2 | -2276.30 | -8850.5 | -2252.50 | -2231.90 |
| | 1 | | 2 | | 3 | 4 |

Fig.II.44
Government deficit, current account

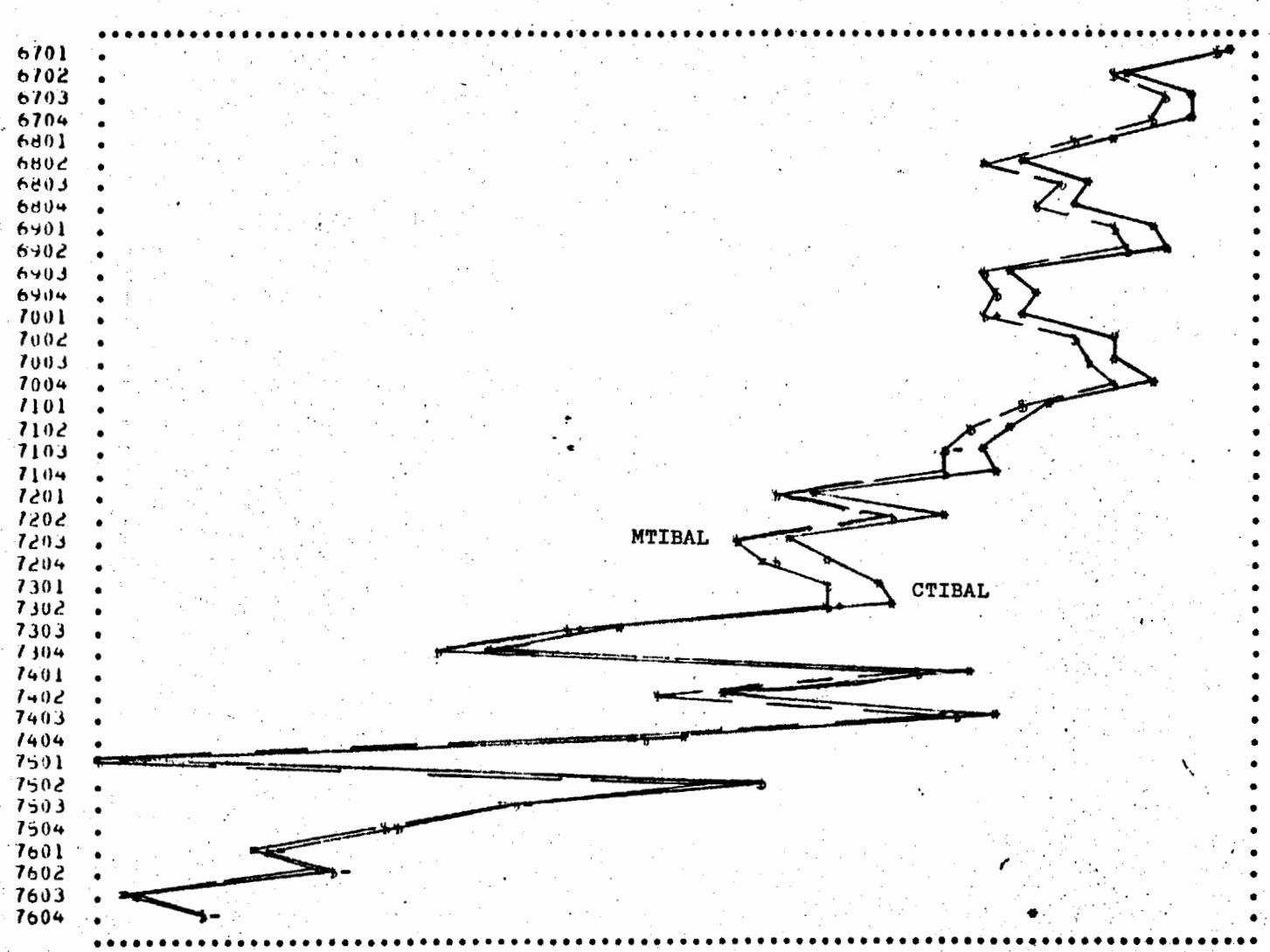


Table II.48 - Government Balance, billions of lire

CBG=control solution
YBG=pro-cycle solution
MBG=moving-average solution
ABG=anti-cycle solution

| | CBG | MBG | YBG | ABG |
|---|---|---|---|---|
| 6701 | -292.800 | -298.700 | -299.900 | -299.200 |
| 6702 | -305.800 | -344.800 | -345.700 | -347.400 |
| 6703 | -348.100 | -405.900 | -407.100 | -408.000 |
| 6704 | -457.500 | -553.200 | -552.700 | -552.500 |
| 6801 | -614.200 | -702.600 | -702.000 | -702.200 |
| 6802 | -446.300 | -541.000 | -540.600 | -543.300 |
| 6803 | -783.500 | -865.500 | -865.000 | -866.800 |
| 6804 | -751.800 | -835.600 | -835.000 | -834.800 |
| 6901 | -590.400 | -664.300 | -664.000 | -661.500 |
| 6902 | -78.2000 | -157.700 | -160.100 | -157.800 |
| 6903 | -1171.50 | -1241.80 | -1247.10 | -1238.80 |
| 6904 | -773.400 | -849.900 | -851.300 | -846.300 |
| 7001 | -1197.90 | -1273.30 | -1267.40 | -1270.50 |
| 7002 | -161.300 | -252.200 | -249.400 | -256.300 |
| 7003 | -923.500 | -1005.30 | 1001.86 | -1009.00 |
| 7004 | -711.300 | -794.500 | -789.200 | -792.200 |
| 7101 | -870.400 | -941.300 | -936.100 | -931.900 |
| 7102 | -456.100 | -551.000 | -549.900 | -542.900 |
| 7103 | -1430.10 | -1520.50 | -1516.20 | -1514.50 |
| 7104 | -963.600 | -1079.50 | -1072.80 | -1073.00 |
| 7201 | -1817.30 | -1926.60 | -1920.00 | -1920.40 |
| 7202 | -856.100 | -993.800 | -987.000 | -996.200 |
| 7203 | -1583.00 | -1703.50 | -1696.90 | -1703.80 |
| 7204 | -1345.00 | -1479.00 | -1473.96 | -1474.30 |
| 7301 | -2225.10 | -2340.70 | -2341.10 | -2338.50 |
| 7302 | -1014.40 | -1150.70 | -1139.70 | -1157.20 |
| 7303 | -151.500 | -1641.70 | -1627.90 | -1639.90 |
| 7304 | -2565.20 | -2699.00 | -2686.500 | -2692.40 |
| 7401 | -2181.30 | -2302.10 | -2294.90 | -2280.60 |
| 7402 | -1940.80 | -2097.90 | -2078.00 | -2071.00 |
| 7403 | -1306.80 | -1439.80 | -1419.70 | -1403.50 |
| 7404 | -1556.70 | -1689.40 | -1664.50 | -1657.50 |
| 7501 | -4891.20 | -4976.40 | -4952.10 | -4950.10 |
| 7502 | -1905.50 | -1958.90 | -1950.60 | -1927.60 |
| 7503 | -3236.00 | -3259.30 | -3244.20 | -3216.90 |
| 7504 | -3629.40 | -3664.20 | -3647.90 | -3621.40 |
| 7601 | -5069.80 | -5091.10 | -5079.80 | -5052.10 |
| 7602 | -3559.50 | -3594.30 | -3566.00 | -3542.90 |
| 7603 | -4170.50 | -4199.90 | -4173.80 | -4154.60 |
| 7604 | -3750.30 | -3764.20 | -3740.50 | -3719.80 |
| | 1 | 2 | 3 | 4 |

Fig.II.45

Government deficit, total

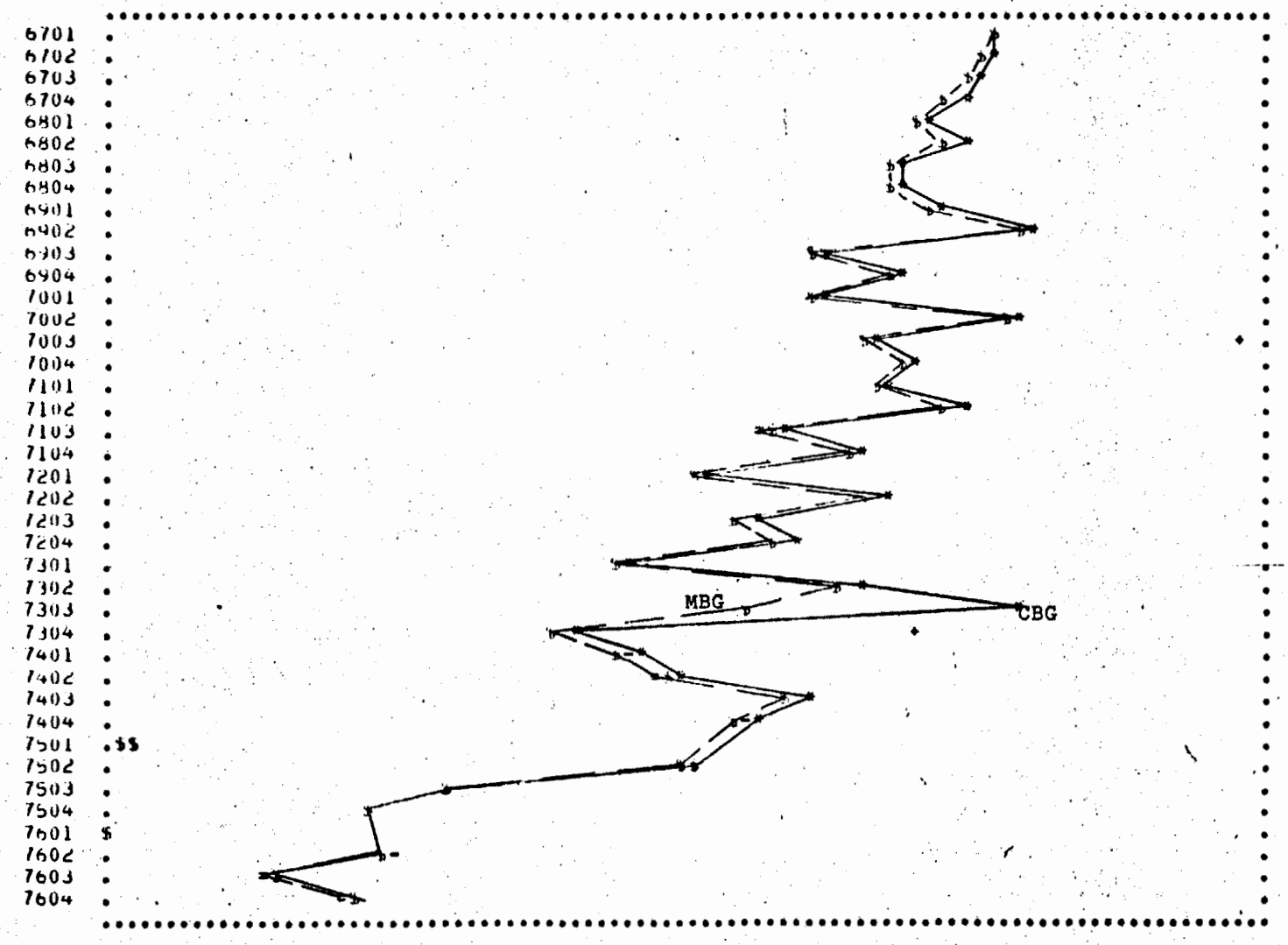


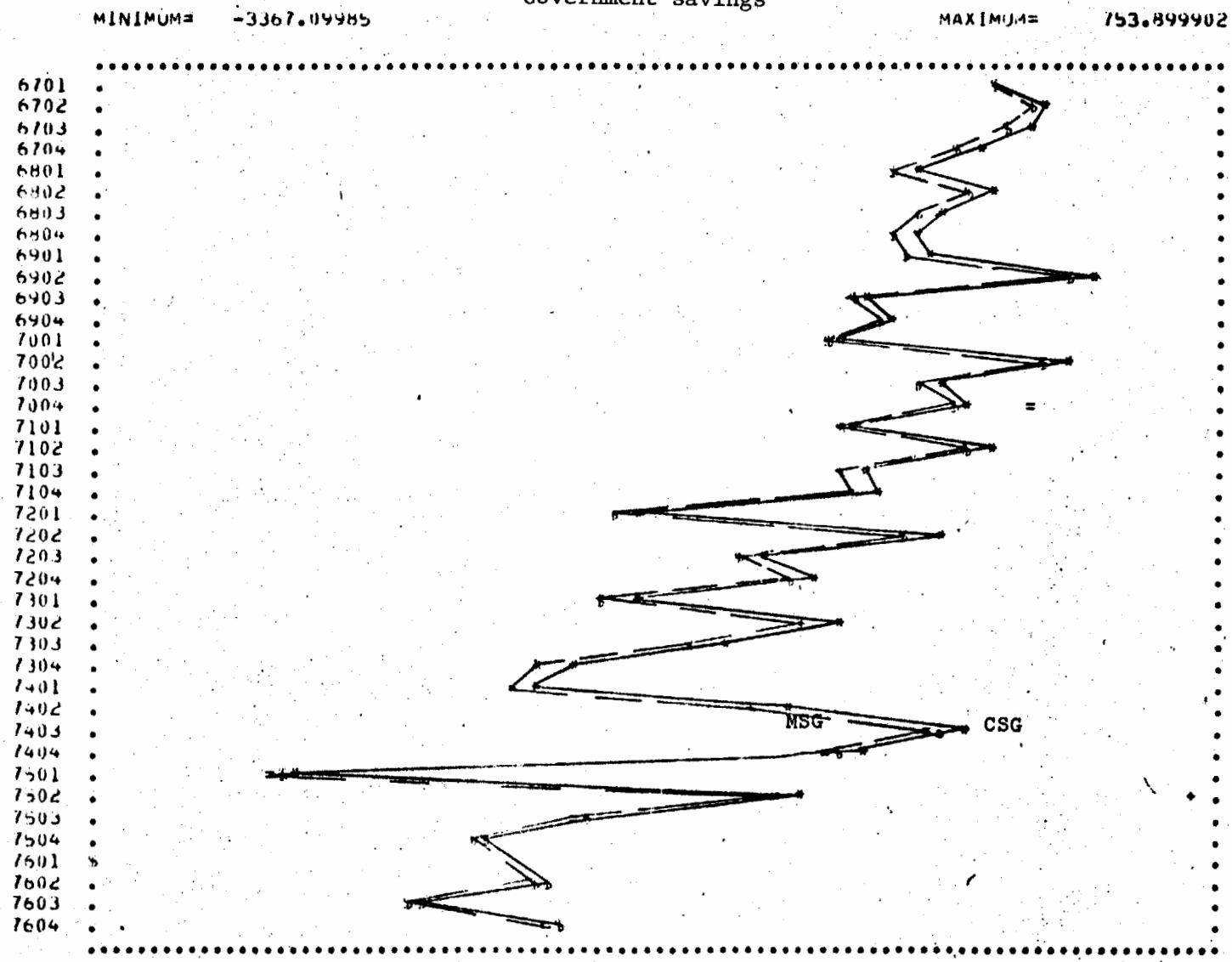
Table II.49 - Government Savings, billions of lire

CSG=control solution MSG=moving-average solution
YSG=pro-cycle solution ASG=anti-cycle solution

| | CSG | MSG | YSG | ASG |
|---|---|---|---|---|
| 6701 | 14.7000 | 12.6000 | 12.6000 | 12.3000 |
| 6702 | 190.600 | 151.600 | 150.700 | 149.000 |
| 6703 | 143.900 | 86.1000 | 84.9000 | 84.0000 |
| 6704 | -19.4000 | -115.000 | -114.600 | -114.400 |
| 6801 | -260.800 | -349.200 | -348.600 | -348.800 |
| 6802 | 11.0000 | -83.7000 | -83.3000 | -86.0000 |
| 6803 | -195.200 | -267.200 | -266.700 | -266.500 |
| 6804 | -252.800 | -336.500 | -336.000 | -335.800 |
| 6901 | -221.600 | -293.500 | -293.200 | -292.700 |
| 6902 | 404.700 | 325.200 | 322.800 | 325.100 |
| 6903 | -431.200 | -501.500 | -506.800 | -498.500 |
| 6904 | -341.400 | -417.900 | -419.300 | -414.300 |
| 7001 | -528.300 | -593.700 | -597.600 | -600.900 |
| 7002 | 291.400 | 200.500 | 203.300 | 196.400 |
| 7003 | -168.500 | -250.300 | -246.800 | -254.000 |
| 7004 | -55.6000 | 134.900 | -134.500 | -137.500 |
| 7101 | -492.700 | -563.600 | -558.400 | -554.200 |
| 7102 | 27.5000 | -67.4300 | -66.3000 | -59.3000 |
| 7103 | -476.800 | -567.200 | -562.900 | -561.200 |
| 7104 | -400.200 | -516.100 | -509.400 | -509.600 |
| 7201 | -1315.70 | -1425.00 | -1418.40 | -1419.20 |
| 7202 | -177.300 | -315.000 | -308.200 | -317.400 |
| 7203 | -817.900 | -933.400 | -931.800 | -938.700 |
| 7204 | -625.500 | -737.500 | -734.400 | -734.800 |
| 7301 | -1320.60 | -1440.20 | -1442.60 | -1440.30 |
| 7302 | -545.100 | -691.400 | -670.400 | -687.900 |
| 7303 | -983.900 | -1110.10 | -1090.30 | -1108.30 |
| 7304 | -1551.60 | -1665.40 | -1672.90 | -1678.80 |
| 7401 | -1673.90 | -1791.70 | -1787.50 | -1773.20 |
| 7402 | -738.200 | -893.300 | -873.400 | -868.400 |
| 7403 | -54.1000 | -197.100 | -177.000 | -160.800 |
| 7404 | -459.400 | -592.100 | -567.200 | -560.300 |
| 7501 | -2579.80 | -2695.00 | -2640.70 | -2636.70 |
| 7502 | -708.800 | -772.200 | 753.900 | -730.900 |
| 7503 | -1504.30 | -1527.60 | -1512.50 | -1485.20 |
| 7504 | -1896.20 | -1931.00 | -1914.70 | -1888.20 |
| 7601 | -3345.90 | -3367.10 | -3353.80 | -3328.10 |
| 7602 | -1657.50 | -1692.30 | -1664.00 | -1640.90 |
| 7603 | -2135.50 | -2164.90 | -2138.80 | -2119.60 |
| 7604 | -1612.30 | -1626.20 | -1602.50 | -1581.80 |
| | 1 | 2 | 3 | 4 |

Fig.II46

Government savings



PART ONE

NOTES TO CHAPTER 1

1. This assumption is purely arbitrary. In the case in which $k_c < k_I$, simulations similar to the one we will present can be performed. Clearly, some different results in the policy decisions may be obtained. Thus, condition $\partial q_I / \partial k^T < 0$ follows. See Foley-Sidrausky, Chapter II, Page 18.

2. The IRI and ENI corporations represent one of the first attempts toward competitive government management. The U.K. and France now seem to be following such a behavioral line.

3. This hypothesis can be proven to be incorrect if a higher government wealth gives rise to higher flows of social services (pension schemes, public health programs, etc.) making people "optimistic" about future conditions and increasing their structural propensity to consume.

4. Indeed, in (I.24) we could have $\pi < 0$. Then, if the income effect were to be negative, i.e. $d < \pi_m g^m$, and greater than the wealth effect, then we would have a downward-sloping dd schedule. This would lead to an upward-sloping CC clearing relation.

5. The experiment performed here is similar to the previous point (3.1) Assets market conditions are also considered.

6. For the sake of simplicity, we consider $\pi_k = 0$.

7. As already given in (I.21). It will hold as long as the wealth effect on private demand for physical assets in small with respect

to the increase in the share of government capital.

# GLOSSARY OF SYMBOLS

List of symbols:

$a^T$ = total wealth

$a$ = private wealth

$b$ = bonds

$C$ = consumption goods

$d$ = per capita government deficit

$e$ = per capita government expenditure

$G$ = government debt

$g$ = $(G/N)$ = per capita government debt

$h$ = government propensity to save

$I$ = investments goods

$k_c$ = $(K_c/N_c)$ = capital intensity of the consumption goods sector

$k_I$ = $(K_I/N_I)$ = capital intensity of the investment goods sector

$k^T$ = $(K^T/N)$ = capital intensity of the economy

$K_c$ = input of capital in consumption goods production

$K_I$ = input of capital in investment goods' production

$K^T$ = stock of capital

$K^G$ = government capital stock

$k^G$ = $(K^G/N)$ = intensity of government capital

$K$ = private capital stock

$k$ = $(K/N)$ = private capital intensity

$m$ = money

$N_c$ = input of labor in consumption goods' production

$i$ = interest on government bonds

$N_I$ = input on labor in investment goods' production

$N$ = labor force = population

$n$ = rate of growth of population

$p_c$ = consumption goods' price

$p_k$ = price of capital

$p_m$ = price of money

$q$ = gross national product = $q_c + q_I p_k$

$q_I$ = production of investment goods

$q_c$ = production of consumption goods

$r$ = rental price of capital

$w$ = wage rate

$x$ = $(g/m)$ = debt/money ratio

$z$ = net government transfer

$\gamma$ = $gp_m$ = per capita government debt

$\pi_m$ = expected rate of deflation

$\pi_k$ = expectate of rate of change in the price of capital

$\theta$ = $\dot{g}/g$

Stars are for "exogenously given levels of variables"

Dots are for time derivatives.

# NOTES TO CHAPTER II

1. In this case, we should notice that we move out of condition II.12. indeed we have:

$$he < \beta p_k q_I(k^T, p_k)$$

and a smaller rate of increase in per capita government capital will result after such increase.

2. This result can be made clear by considering that new government investments need to be financed by money or bonds, and hence, the return on alternative asset $(r/p_k)$ must decrease.

3. The horizontal section of CC is derived from the conditions of the production possibilities frontier. For any $p_k < \bar{p}_k$, no effect can be derived from consumption goods production. Hence, only one firm d can clear the market.

4. Higher government capital can also lead to lower private propensity to consume. As shown in footnote 3, the result reached here will be completely reversed.

NOTES TO CHAPTER III

1. See:

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2. See Foley-Sidranski, Chapter 16.
3. See Foley-Sidranski, Chapter 16.
4. At least they enter the government budget through the grants they receive from the government itself.
5. A small difference needs, however, to be pointed out. In the closed economy case we considered government demand for investment goods to be always satisfied in the market. In the open economy we may still want the government to express a given demand for investment which is always satisfied in the world market. And this case can be dealt with similarly to the previous one. However, we may also have the government goal given in terms of the "share" of domestic capital to be pursued.
6. This has already been showed in Foley-Sidranski, Chapter 16.
7. See S. Fischer-J.A. Frenkel, "Investment, the Two Sector Model and Trade in Debt and Capital Goods," J of I.E., No. 3, 1972, pp. 212-213.
8. See Foley-Sidranski, pp. 279-281.
9. They may obviously differ for private and government propensity. For the

sake of simplicity, we assume them to be equal.

10. This result is very similar to the one about high interest policy found by T.D. Willet-F. Forte, "Interest Rate Policy and External Balance," Quarterly Journal of Economics, Vol. 83, 1969.

## NOTES TO CHAPTER IV

1. See:

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2. Public and private consumption are here considered as perfect substitutes.

3. See Arrow-Kurz, op. cit.

4. The inclusion of government propensity to invest may be very important if monetary policy is ruled out. For instance, in the work done by Arrow and Kurz (pp. 128-131), with a one good production technology with government using only an income tax, it is proven that a first best solution is not met since their condition (8) is fulfilled only by chance. If we introduce government propensity to save, then their variable "s" becomes the level of the "total" propensity to save, which now depends both on private and public propensities. Hence, the correct value of s can be managed by the government and a first best solution becomes possible.

   In our analysis, we would find that:

   $$\dot{k} + \dot{g} = s[q + dp_w - e]$$

   or that the private propensity to save must be equalized according to the following condition:

   $$s = \frac{q_I p_k - (he/p_k) - nk + d - ng}{q_c + q_I p_k + dp_m - e}$$

   so that by managing d and h, it can always be fulfilled.

5. See F. Modigliani, "International Capital Movements, Fixed Parities and Monetary and Fiscal Policy," in Bagwhati, ed., Development and Planning MIT Press, Cambridge, MA, 1973.

6. See S. Fischer-J.A. Frenkel, op. cit., p. 218.

## NOTES TO APPENDIX OF CHAPTER IV

1. See: Dorfman, Samuelson, Solow, Linear Programming and Economic Analysis; Debreu, Theory of Value
2. See: G. Palmerio, L'Impresa Pubblica, F. Angeli, Milano, 1974.
3. The experience of the Italian economy, although remarkable, can indeed be considered a very peculiar one. It is not only due to the particular conditions of the recent growth of this economy, but also to a historical tradition (or accident) of heavy government intervention in the competitive system. The I.R.I. and AGIP were indeed founded long before the second World War, even though their main growth started only in the fifties.
4. Historical experience shows how decisions such as providing better female worker protection or generally healthier working conditions, or supplying better wage schedules, taken first by government corporations, will sooner or later have to be borne by private corporations as well.
5. The case of the Italian economy is here very appropriate. Indeed, government corporation investment programs may compete with wage subsidy programs like the "Cassa Integrazione" when receiving government financial support.

NOTES TO CHAPTER V

1. See: M.S. Feldstein, "Financing in the Evaluation of Public Expenditure," in W. Smith, Essays in Public Finance and Stabilization Policy, 1974.

2. See:

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3. Note that they do not necessarily have to be equal to the share $B_1$ and $B_2$ used to cover interest payments.

# PART TWO

## Notes to Chapter I

1. The major econometric models of the Italian economy are:
   - Banca d'Italia, Modello Econometrica MlBI, Rome 1969-70
   - Universita di Ancona, AA.VV. Il Modellaccio, F. Angeli, Milan, 1976
   - Paol Sylos Labini, "Prezzi, distribuzione e investimenti in Italia," Monete e Credito, 1967
   - Universita di Bologna, AA.VV., Il modello econometrico dell' Universita di Bologna, Il Mulino, Bologna, 1976
     and by P. Bosi and F. Cavazzuti, Glistrumenti fiscali nell' economia italiana, Il Mulino, Bologna, 1974

2. S.E.C. is the new integrated system of national accounts introduced in Europe in 1974. See V. Siesto, Contabilita Nazionale, Il Mulino, Bologna, 1977.

# NOTES TO CHAPTER II

1. The three different hypotheses we made to obtain quarterly data for gover-ment corporation investment are given by a moving-average profile, a pro-cycle case and an anti-cycle case.

In the first hypothesis we have divided the annual data by four and then a moving average of these data was computed. Further, the proportions obtained for the four quarterly data of each year were applied to the historical summed data in order to obtain a quarterly series homogeneous with actual annual data.

In the second case the historical proportions of each quarter over the annual levels of total Italian investments were applied to data for government corporation investments. This quarterly series follows the profile of actual data. Therefore we called it the pro-cycle hypothesis.

In the third case, we considered that government corporations investments were performed in each quarter according to an anti-cycle target, i.e. in the quarters where historical data reached their peak level we considered government corporation investments to reach their minimum and vice versa.

2. Unfortunately data on profits are very poor and unreliable in Italy. Therefore the model always refers to cash-flows as the sum of profits plus depreciation and it has to bear the effects that during fast growing phases are connected with higher levels of depreciation.