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1947-1967

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LIST OF TABLES

APPENDIX

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ABSTRACT

INFLATION IN BRAZIL - 1947/1967

Luiz Zottmann

Essentially this work is an attempt to determine the nature of the Brazilian inflationary process in the priod 1947/67 by attempting to answer to the following set of questions:

Given the observed real growth in GNP, to what extent can it be said that:

1 - price increases can be attributed to shortages of food and foreign exchange supply?

2 - price increases were due to wage adjustments in excess of productivity gains and price increases generated by causes other than the wage rate adjustment itself?

3 - price increases over and above the proportion explained by the two former items were a result of excessive monetary expansion?

As these questions imply, independent variables - called imbalances in this study - are to be measured as the difference

between displacements of demand and supply in each of the markets considered in this study.

Accordingly the model, as framed, covers basically the same phenomena considered in other studies, but with two distinguishing features, namely:

a - its capability for testing the relative inflationary strength of the structural and monetary variables, under conditions which vary from "extremely favorable to the structural variables" to "extremely favorable to the monetary disturbances".

b - the built-in allowance for partial and temporary absorption of cost push inflationary effects by the evolution of GNP, thus making it possible to capture the full price reaction to wage changes over some unspecified time interval.

However, in view of limitations caused by insufficient data, there can be no claim that such an approach has led to the estimation of the real contribution to inflation of each of the variables considered in this study. Nevertheless, it does seem to provide valid evidence which can be summarized as follows:

For the period 1947/67, import, wage, and monetary imbalances were important explanatory variables, even though a year to

year examination shows that the role played by each varied considerably and that frequently price increases were accounted for by just one or two such disturbances.

Wage imbalances were consistently the main source of inflation from 1952 to about 1959, and an important but not dominant factor thereafter. Import imbalances never accounted for price increases higher than 5% a year. Monetary disturbances, in turn, fully accounted for inflation in the period 1947/51 and were the most important source of inflation from about 1960 on.

Finally, it was verified, that the observed behavior of employment and investment was quite consistent with our findings with respect to inflation.

ACKNOWLEDGEMENTS

This essay finds its origins in class and seminar discussions on the structuralist-monetarist controversy on inflation back in 1966. Since then, many have been the contributors to this study and it would be difficult to name all those persons to whom I am greatly indebted and thankful.

Professor Albert G. Hart for his expertise, patience and guidance has much to do with the beginnings, completion and whatever merits this work may have. Professor Philip Cagan and Ronald Findlay, members of the Defense Committee, also contributed to the improvement of this work. None of them are responsible for eventual shortcomings the essay may have.

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To my wife and Professor Eduardo Lopes Rodrigues goes my deepest gratitude for their ever present encouragement.

TABLE OF CONTENTS

CHARTS AND GRAPHS

GLOSSARY OF SYMBOLS

P_{wl}	Wholesale Price Index
P_{cl}	Cost of Living Index
P_f	Wholesale Food Price Index
P_m	Wholesale Imports Price Index
P_{ma}	Wholesale Manufactured Products Price Index
P_a	Price of Agricultural Goods other than food
$\Delta P^s/P^s$	Rate of price changes accounted for by the structural variables
$\Delta P^m/P^m$	Rate of price changes accounted for by the monetary variables
Wl	Legal Minimum Wage Rate
Wm	Market Wage Rate
Y	Real BNP
y	Real Per Capita Income
N	Population
S_f	Food Supply - Quantum Index
S_m	imports Supply - Quantum Index
D_f	Demanded Volume of Food
D_m	Demanded Volume of Imports
M or M_s	Money Supply
M *or M_d	Desired Money Balances
E	Employment Level
τ and ϕ	Income elasticity of demand for food and imports

α and θ	Direct price elasticity of demand for food and imports
β and λ	Price elasticity of demand for food and imports with respect to manufactured product prices
π	Price Sensitivity to excess money balances
X_{fu}	Food imbalance
X_{iu}	Import imbalance
X_{wu}	Wage imbalance - upper limit
X'_{wu}	Wage imbalance - lower limit
X_{mu}	Monetary imbalances - lower limit
X'_{mu}	Monetary imbalances - upper limit
I_{wuc}	Index of Wage Imbalance Correction

CHAPTER I

INTRODUCTION

As one goes over the economic literature on Brazilian problems it becomes quite evident that inflation and economic growth have been the most important and controversial issues during the last two decades.

This is understandable. After all, inflation does seem to have many faces, and the records in Brazil do not seem to prove the opposite. Indeed, all through the fifties, rising inflation rates from 15% to near 40% a year - coexisted with increasing rates of growth of real GNP. Next, for the first four years of the sixties the growth rate of real GNP gradually fell almost to zero while the inflation rate kept increasing steadily to amost 100% a year. Finally, from 1964 on, declining inflation rates have corresponded to increasing rates of growth of real GNP. As a matter of fact the average growth rate of income for the last three years of the decade - of about 9% a year - has no parallel in the past even though the inflation rate for the same period has been averaging about 22% a year.

It is also true, however, that to each of the three periods mentioned above corresponded a different stage of the controversy.

The first of these was actually the period in which the challenge of the previously widely accepted monetarist view of inflation gained its "momentum", in spite of the absense of valid evidence regarding the ability of the proposed alternative theories to explain the rates of inflation observed at the time. To that effect, as can be seen by consulting the collection of articles edited by Hirschman in 1961 and Baer and Kerstenetzky in 1964,[1] it seems to have been sufficient for the presentation of the records in Brazil at the time plus the apparent failure of price stabilization programs based on fiscal and monetary controls enforced in other countries in Latin America. This was, of course, a weak basis on which to defend the structural view of inflation. Therefore it is not at all surprising that its popularity declined considerably at the outset of the sixties, a period in which the growth rate of GNP slackened considerably while inflation got out of control. In effect, by 1964, the fiscal and monetary policies were again very much in line with a monetarist diagnosis of inflation, even though evidence invalidating in part or in full the structural explanation was

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1 Representative samples of these articles are: CAMPOS [1961], FELIX [1961] and GRUNWALD [1961] for the first and DELL [1964], FELIX [1964] and SEERS [1964] for the second collection.

non existent.[1] As a result, the difficulties encountered first in 1965 and then in 1967 were enough to revive the interest in the structural approach. Therefore, from 1965 on, the crucial problem has been the determination of the extent to which each of the alternative theories can in fact explain the inflationary process in Brazil.

Attempts in this direction have been made by DELFIM NETTO [1965] and COLAÇO [1967] with only relative success. In the first of these studies the problem was that the variables representing the structural disturbances - nominal wage changes and increase in costs of imports - were just added to those normally considered within the framework of a monetarist view of inflation, that is, expansion of money supply, changes in velocity and of real income. The impossibility of sorting out exogenous cost push disturbances from exogenous demand pull factors[2] and unstable regression coefficients were, consequently, likely. Both were actually present and the results were inconclusive. In the second study above the problem was that of omission of wages in the model. Indeed, given

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1 For more details see MINIPLAN [1964].

2 For a comprehensive treatment of these problems, see MACHLUP [1960].

that the study was based on a sectorial analysis of demand and supply, the omission of wages not only bypassed the question of secondary effects of structural disturbances - via the propagation mechanism - but also the possibility of testing for autonomous cost push disturbances. Therefore, the model has an implicit bias toward the monetarist view of inflation.

Because of the foregoing aspects of the question, the main objective of the present work is to investigate the nature of the Brazilian inflationary process by testing a model designed to provide explicit answers to the following questions:

1 - Have the observed increases in prices of food and imports resulted from the fact that the growth of supply of food and import was outpaced by the growth of demand due to income growth?

2 - Can the observed increases in prices of internally produced manufactured goods be explained by wage rate adjustments in excess of productivity gains, previous price increases accounted for by item "1" above and causes other than the wage rate adjustment itself?

3 - Are the price increases, over and above the proportion

explained by the two former items, the result of the monetary expansion in excess of the needs stemming from real GNP growth rates and price increases accounted for by items "1" and "2" above?

The model as outlined leads to three slightly different testable relationships, each having some special characteristic as to the underlining set of assumptions. In other words, each can be considered as the expression of an alternative way of looking into the interaction of the same set of inflationary factors. Hence, these equations can be considered as representing a "structuralist", a "monetarist-structuralist" and a "monetarist" model.

In spite of such characteristics, there still can be no claim that this study will produce good estimates of the real contribution to inflation of each of the variables considered, because questions related to data availability and adequacy precluded the inclusion of some elements necessary to a precise measurement of wage and monetary disturbances. Nevertheless, it appears to provide valid evidence about the nature of the Brazilian inflationary process in the period subject to examination.

As to the organization of this study, a step by step procedure was adopted to facilite the identification of the elements taken into account, the criteria used to purge the effects of inflation from the

explanatory variables and the empirical evidence related to the three alternative ways of looking at the problem. Hence we shall first deal with the structural model in isolation and then explore the consequences of introducing into the model elements of alternative views of inflation.

Chapters II, III and IV are therefore dedicated to the formulation and testing of the structuralist, monetarist-structuralist and monetarist model. Chapter V will be concerned with the question of choosing the best of the alternative price equations. Finally, in chapter VI we discuss the implications of the findings with respect to the implied behavior of variables wuch as urban employment, private investment and production in the secondary sector, and then compare such implied behavior with that actually observed.

CHAPTER II

A STRUCTURALIST MODEL

Traditionally the autonomous inflationary factors considered in the structural approach have been those stemming from bottlenecks in the agricultural and external sectors of the economy. Nonetheless, owing to the income redistribution policy recommended by the structuralists, wage rate increases might create an additional source of inflation. The present study will take into account such a possibility. Therefore after specification of the basic model, the wage element, which can be viewed as a departure from the basic structural model, was integrated as a second step.

Following the theoretical development of the model there will be a discussion of some aspects related to the empirical investigation. Finally, there will be a summary of the findings and conclusions to be drawn at this stage of the study.

A Pure Structuralist Model

According to the structuralists' point of view, as expressed in the works of FELIX [1961] and [1964], SEERS [1964] and URI [1968] among others, the basic problem is that peculiarities of the economic system prevent the supply of food and foreign exchange from keeping pace with demand increases accounted for by income growth, thus causing an autonomous increase in the price of such goods. These autonomous price increases are supposed to affect the whole system assuming a downward rigidity of real wages and other prices accompanied by a government policy of full employment.

Explanations as to how and why these events are supposed to come about in many Latin American countries, including Brazil, generally encompass the following.

With respect to bottlenecks in the food production sector, existing land distribution and dated agricultural technology are said to render the food supply very insensitive to market forces. Mainly the problem is that given the technological stagnation and consequently insignificant productivity gains, the possibilities of increasing the food supply depend on the extent to which idle cultivable land can be

put to work. However, since non-profit-responsive latifundiarios hold the most significant share of these lands, reclamation becomes mainly dependent on the speed of dissolution of latifundios, which is also assumed to be low. Under these conditions constancy of food prices becomes dependent on supplementary imported food supply even in those periods when demand for food shows a low or moderate increase.

However as bottlenecks are also assumed to be present in the external sector, all that can be expected from that sector is additional inflationary pressures. Indeed, given the low price and income elasticity of foreign demand for these countries' export products, supply of foreign exchange is assumed not to grow at a pace sufficient to meet the fast increasing demand for imports. Domestic currency depreciation is therefore an assumed common event, leading of course to price increases of both import and food items.

Assuming the foregoing to be the principal sources of inflation, the next step is to examine both the propagation mechanism and the inflationary role attributable to some other variables which, under different views, have been held as causes of inflation.

In order to keep track of the chain of events to be described and to sort out induced and autonomous changes in the relevant variables,

Chart II-1 may be used as a frame of reference and we may proceed as follows:

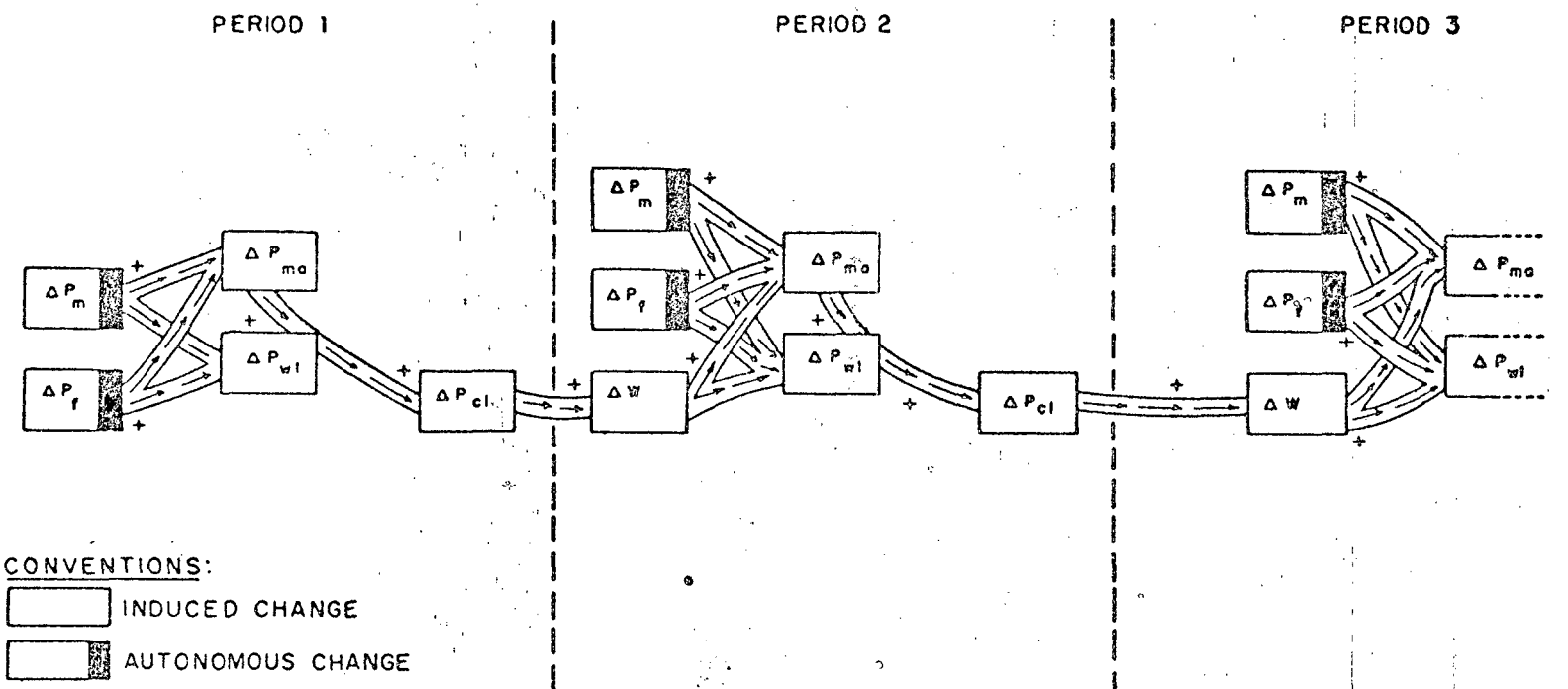
Starting from period one in which bottlenecks in the food and foreign exchange market - which from now on will be called food and import imbalances - cause an autonomous increase in prices of food (P_f) and imports (P_m), an upward change is induced in the wholesale price index (P_{w1}) as well as in the cost of living index (P_{c1}) in the same period. And this happens because, besides being items of the bundle of goods which compose those indices, import and food items are inputs for the manufacturing industry, thus affecting the price of its products (P_{ma}) via cost increases.

As to the indirect effects - via manufactured product prices - it is worth noticing that their intensity depends fundamentally on what happens to the demand for manufactured goods. As a simplification, however, structuralists assume full transfer of cost increases to the consumers, via an expansion of the public sector expenditures financed by an increase of the money supply. Budget deficit and permissive monetary policy under these assumptions should not be considered a source of inflation but rather a defense mechanism of government committed to a policy of fostering pro-

CHART II-1

A STRUCTURAL MODEL OF INFLATION

Causes of inflation and Propagation Mechanism



duction and employment.[1]

In short, in period one, food and import imbalances should cause a general increase in prices, budget deficit and monetary expansion, leaving the levels of production and employment relatively unaffected.

But once the cost of living has gone up, the labor force gets a powerful argument to support its demand for compensatory adjustments in wage rates (W). In period two, the government makes the adjustment via an increase in the minimum wage rate for unskilled workers. And on the basis of changes in the minimum wage rate, the whole wage rate scale moves upward.

With the wage adjustment in period two, costs go up once

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1 This is of course a strong assumption. Indeed, aside from the ignored possible effects of sectorial demand shifts, it seems difficult to admit a priori that the actual expansion of public expenditures and money supply should be no less or no more than the required one. Therefore the assumed passive role of monetary expansion can be questioned. Nevertheless, as this is the basic point of the models discussed in chapters III and IV we will defer the problem.

again,[1] thus forcing generation of additional demand in order to neutralize the negative effects of cost increases in the level of production and employment. Consequently price indices move up, thus calling forth in period three, a new wage rate correction, and so forth.

Admittedly, the number of times that the compensatory wage increase can feed the propagation mechanism out of a single observation of food and import is not large, for compensatory wage adjustments and their effects on prices converge to zero quite rapidly.[2] Consequently, the generation of a long-lasting inflationary process out of the above mentioned structural desequilibria requires continuous renewal of food and import imbalances.

In conclusion, according to the basic structuralist model

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1 In Brazil, as the legal minimum wage rate legislation is enforced only in the urban area, changes in this minimum rate tend to affect primarily the manufacturing industry and the tertiary sector.

2 As to the rate of convergence, it will be a function of at least three elements, namely: (1) the intensity of the original increase in prices of food and imports generated by the respective imbalances; (2) the relative share of food, imports and manufactured goods in the composition of the cost of living index; (3) the relative share of wages in costs of production and distribution.

"import" and "food imbalances" are the only two real causes of inflation. Accordingly, price changes in any particular year would be a function of current and past import and food imbalances.

In algebraic format the basic structural model, given the assumed neutrality of the monetary expansion with respect to inflation, can then be defined by the following set of equations:

$$(\Delta P_{w1}/P_{w1}) = a_1 (\Delta P_f/P_f) + a_2(\Delta P_m/P_m) + a_3(\Delta P_{ma}/P_{ma}) + a_4(\Delta P_a/P_a) \quad (1)$$

$$(\Delta P_f/P_f) = (1/-\alpha)\ (\Delta S_f/S_f - \tau\, \Delta y/y - \Delta N/N) + (\beta/\alpha)\ (\Delta P_{ma}/P_{ma}) \quad (2)$$

$$(\Delta P_m/P_m) = (1/-\theta)\ (\Delta S_m/S_m - \phi \Delta y/y - \Delta N/N) + (\lambda/\theta)\ (\Delta P_{ma}/P_{ma}) \quad (3)$$

$$(\Delta P_{ma}/P_{ma})_t = b_0 + b_1 \left[\Delta W/W_t - (\Delta \text{Prod}/\text{Prod})_{t-1}\right] + b_2 (\Delta P_f/P_f)_t + b_3 (\Delta P_m/P_m)_t \quad (4)$$

$$(\Delta W/W)_t = c_1 (\Delta \text{Prod}/\text{Prod})_{t-1} + c_2 (\Delta P_m/P_m)_{t-1} + c_3 (\Delta P_f/P_f)_{t-1} + c_4 (\Delta P_{ma}/P_{ma})_{t-1} \quad (5)$$

in which changes in food (S_f) and import (S_m) supply, per capita income (y), productivity (Prod) and population (N) are all exogenously

defined. From outside of the model come also estimates of the income elasticity of demand for food and imports (respectively "τ" and "ϕ").

In the above system of equations, expression (1) is an identity; expressions (2) and (3) result from subsystems composed of an equilibrium condition S=D with S exogenously defined and D determined by the function $D = k.P_f^{-\alpha}.P_{ma}^{\beta}.y^{\tau}.N$ in case of food and $D = k_m.P_m^{-\theta}.P_{ma}^{\lambda}.y^{\phi}.N$ in the case of imports; equation (4) expresses the rate of rise in prices of manufactured goods as a function of percentage increases in costs in terms of wages, the exchange rate, the internal price of food and two more exogenous elements (implicit in the constant "b_0"), namely: imported inflation and quality changes of the products. Finally, expression (5) takes wage changes as a function of productivity gains plus a compensation for cost of living increases in previous period.

As to the reduced form equation which results from the above system, substitution in equation (1) for each of the members of the right side of the equality of the appropriate expression - coming from equations (2), (3) and a combination of (4) and (5) - gives the wholesale price index as a function of current and past food and import imbalances plus a constant and an error term. The error

term " u " includes the unexplained change in prices of agricultural goods which are not food ($\Delta P_a/P_a$).

By calling the right hand side of expressions (2) and (3) X_{fu} and X_{iu}, which stand respectively for food and import imbalances, the price equation becomes:

$$(\Delta P_{w1}/P_{w1})_t = A_0 + A_1 (X_{fu})_t + A_2 (X_{iu})_t + A_3 (X_{fu})_{t-1} + A_4 (X_{iu})_{t-1} + \ldots A_m (X_{fu})_{f-n} + A_{m+1} (X_{iu})_{t-n} + u \qquad (6)$$

Modifying the Structural Model

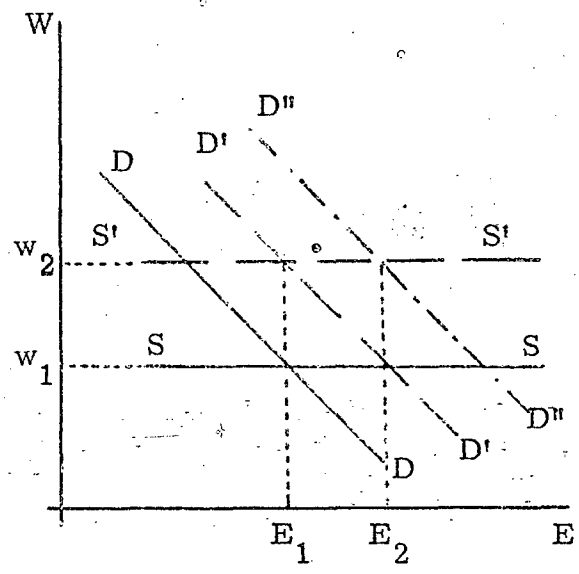
The model, as specified so far, clearly supposes that the actual wage rate changes correspond exactly to the previous productivity gains plus previous increases in the cost of living accounted for by structural imbalances. In addition, it was assumed that, under these conditions, nominal wage rate adjustments should not be considered as a source of inflation.

There are, however, at least two grounds on which the assumed passive role of wage adjustments can be disputed. The first is that wage rate adjustments might not in fact be governed by the above assumed rule or formula. For example, in the case of an

income redistribution policy, wage rate adjustments could exceed those based on productivity gains plus compensation for previous increases in cost of living, accounted for by structural imbalances. Second, even in those cases whire the assumed formula operates, there is no guarantee that wage increases will not aggravate the inflationary process, as will now be shown.

Assuming, as indicated in figure II-1, a downward sloping demand for labor curve; a horizontal labor supply curve[1] and an initial equilibrium position of employment (E_1) and nominal wage rate level (W_1), let us follow the effects stemming from structural imbalances, productivity gains and government wage and employment policies.

Figure II-1



Considering that the price increases initially generated

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1 The assumed slope of the labor supply curve is a matter of indifference, provided that the price elasticity is greater than zero in the relevant range. As in the case of the food and import imbalances concept, what matters here is the supply and demand displacements.

by the structural imbalances are due to demand pressures, one should ordinarily expect the demand for labor to shift to the right. The identical effect should also result from productivity gains. In the graph both effects are represented by the demand shift to D'D'. Now, assuming that the government - as far as the wage rate adjustment is concerned - reacts to these changes with some lag, the initial effects of productivity gains and structural imbalances on the labor market should be those of expanding the level of employment (to E_2 in the graph) leaving the nominal wage rate unchanged (W_1). The nominal wage rate would then rise when government enacts legislation adjusting the nominal minimum wage rate level. Assuming now that the wage increase sponsored by the government matches the productivity gains plus the price increases due to the structural imbalances, the nominal wage rate level will rise to (W_2) and employment will fall back to the level (E_1). However, in view of an assumed ever present severe problem of unemployment and income redistribution in underdeveloped countries, even when the economy is running at full capacity, any reduction of the observed levels of employment is said to put the government under an unbearable political pressure. Expenditures are therefore assumed to be expanded to the extent needed to produce a price increase identical to the nominal wage rate increase, thus allowing the demand for labor to be such that the new nominal wage

rate (W_2) becomes compatible with the employment level (E_2).[1]

Given, then, that the price response to the wage increase is greater than that initially caused by the structural imbalances, the conclusion to be drawn from the analysis is that the attempt to increase the real wage rate - by an amount equal to the value of previous productivity gains - aggravates the inflationary process.

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1 In accordance with this hypothesis, the labor supply is assumed not to be a limiting factor. Therefore the overfull employment hypothesis - often valid in the case of developed nations - is in this case ruled as irrelevant in determining the acceptability of any particular employment level at given time. Under these circumstances, no matter how high an observed employment level - say E_1 - might be at a given moment, the necessary condition for acceptability is that it must be higher than any level previously recorded. That is why an increase in employment to E_2 makes E_1 no longer satisfactory, even in the case of an eventual reduction back to E_1 generated by an increase in the legal minimum wage rate.

This hypothesis implies that the influence of the labor market on inflation is more a result of an inconsistency between the wage rate and employment policy than a direct consequence of food and import imbalances. Given then the peculiarity of such an hypothesis and the fact that an overfull employment situation is a theoretically valid alternative, its acceptability must be put to a test. In this respect, the compared behavior of prices, wages rate and employment - as shown in chapter VI - indicates a pattern of behavior quite compatible with the hypothesis in question, that is: the lower the wage rate imbalance, the lower the rate of inflation and the higher the rate of growth of employment.

Therefore wage rate adjustments in this case cannot be said to play just a passive role.

Crucial to such a conclusion are, however, the assumptions that the effects of productivity gains and structural imbalances are those of expanding the employment level and that the government will next act in the direction of maintaining the expanded level of employment at a higher nominal wage rate. Therefore, the validity of the assumptions has to be carefully examined.

Essentially, the question is that of determining, under conditions of market imperfections, whether or not firms will increase production as a reaction to demand increases (the case of the structural imbalances effects) and to cost of production savings (productivity gains).

From a single entrepeneur point-of-view it seems more likely that production will be increased as a response to the first of such forces. Indeed, in the case of demand increases more can be sold by each firm at the previous price level, while in the case of cost savings additional sales can be achieved only via a price reduction. The risk of competitors counterveiling action - especially in terms of price competition - is considerably greater in the second hypothesis.

Therefore, production and employment will most likely increase as a response to the structural imbalances. Productivity gains, on the other hand, can be admitted to be appropriated by the producers via a price mark up, thus leaving product prices, production and employment unaffected.

Consequently, the proportion of the wage rate increase corresponding to productivity gains could be assumed to be absorbed by the firms, in which case the price response to the wage rate change should just match the initial effects of food and import imbalances on prices of agricultural goods and imports. Hence one could admit, as the structuralists do, that wage rate increases generated by previous productivity gains and the structural imbalances do no more than just propagate inflation. Therefore, they should not be taken as an independent variable in an inflation model.

Considering however that the minimum wage rate legislation in Brazil has been enforced only in the urban sector, the above conclusion might not hold if the price index one uses to measure the initial inflationary effects of food and import imbalances is not chosen with some care.

Indeed, the minimum wage rate is enforced only in the urban

sector, and thus the preceding analysis of the role of wage rate increases cannot be applied to the primary sector. Consequently, the price index used to measure the impact of the structural imbalances on the labor market excludes agricultural products domestically produced. In addition, since we use the wholesale price index as our measure of inflation, a further restriction has to be taken into account. Services are not directly represented in the wholesale price index, thus leaving only the secondary sector as our main concern. Hence the relevant price index, used to measure wage rate increases which only propagate inflation, should be that of manufactured goods.

In conclusion non-inflationary wage adjustments would be those which match productivity gains plus the price increases of manufactured goods accounted for by structural imbalances. Therefore the amount by which the actual nominal minimum wage rate level exceeds the non-inflationary level - a difference which from now on will be called wage imbalance - is in fact an autonomous inflationary factor and should be included in the price equation.

It is true that in many cases government sponsored wage increases are regulated by previous increases in the cost of living, and the difference between the actual and non-inflationary wage levels should more properly be called "induced inflationary factors".

It is also true, however, that wage rate legislation has been used largely as a device to redistribute national income, a policy highly recommended by the structuralists. Wage increases, under these circumstances, would tend to exceed the amount corresponding to previous cost of living increases and productivity gains. In this case, actual nominal minimum wage rates will be considered an exogenous variable, and the wage imbalances will be taken as an "autonomous" rather than "induced inflationary factor".

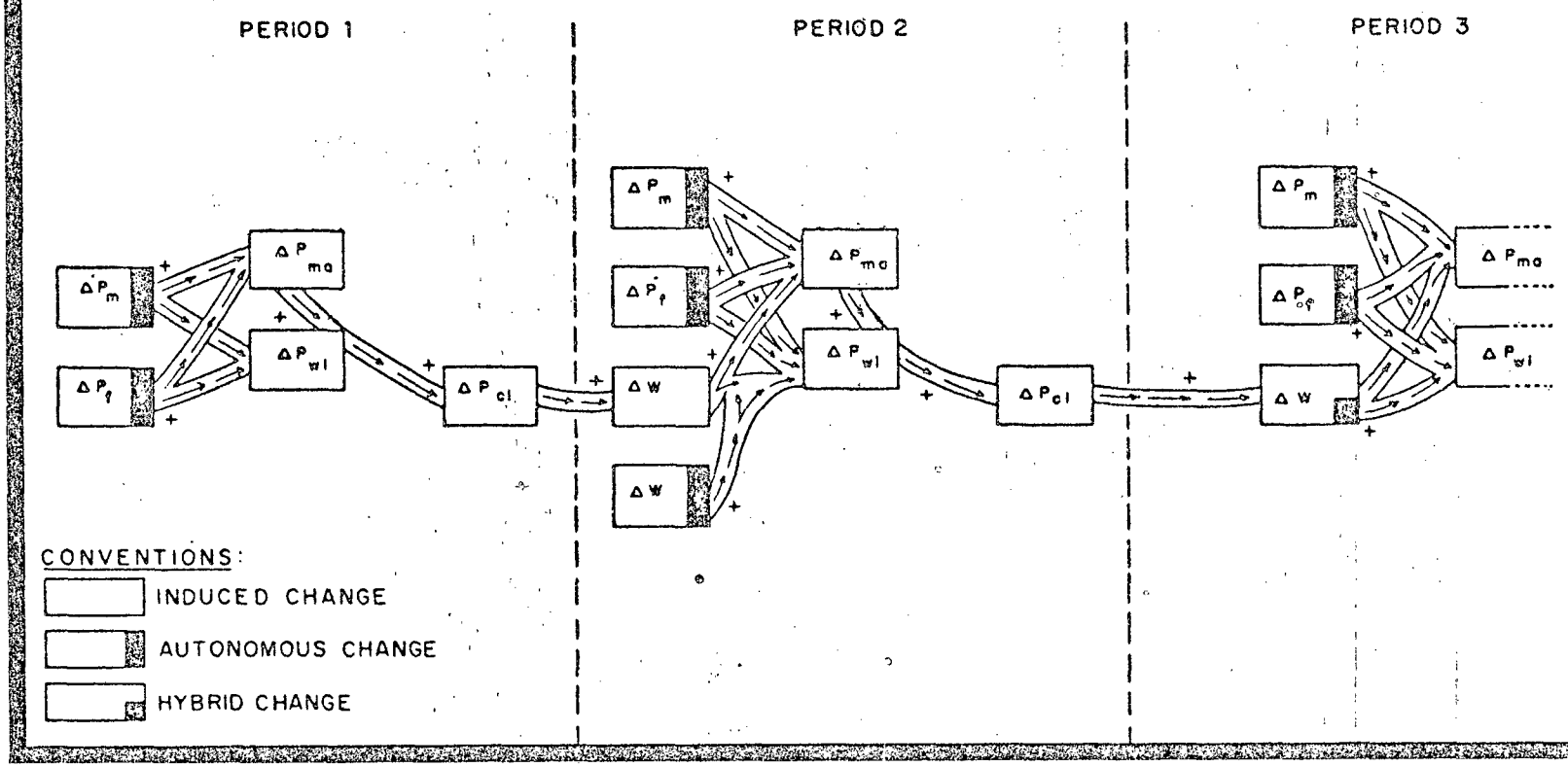
Much more difficult than admitting the possibility of having such wage imbalances is however the task of measuring them. Particularly, as it will be shown in the following lines, the problem is that, since the wage imbalance is in itself an inflationary factor, it becomes quite difficult to measure the non-inflationary wage rate level.

To simplify the explanation, let it first be assumed that, in period one the cost of living index has risen in the same proportion as manufactured products, and that the price increase is fully explained by the import and food imbalances. Next, let it be assumed that the wage correction in period two exceeded the adjustment justified by the price increase and productivity gains of period one. Finally, let us introduce in the flow chart of the pure structural model

CHART II-2

A STRUCTURAL MODEL OF INFLATION

Causes of inflation and Propagation Mechanism



this autonomous change in wage rates at period two, thus generating the flow Chart II-2.

Now, since the total wage change in period two involves both the compensatory and the autonomous element, prices should increase more than otherwise. Consequently if, from period there on, wage rate levels are adjusted on the basis of cost of living increases - assumed to be proportional to manufactured product price index - and productivity gains of the previous period, the resulting wage rate figures will be an overestimation of the non-inflationary levels. In such a case, the chances of determining what should be the non-inflationary wage rate become dependent on the possibilities of finding a period in which actual wage rate levels could be assumed to be the equilibrium levels and of estimating the extent to which variables other than wages account for price increases.

Of the two, the second condition is more difficult to fulfill. Indeed, in the midst of an inflationary process, one of the probable events is, for instance, a disequilibrium in the money market. Since this disequilibrium should stem from excess of money supply, its measurement depends on the determination of the demand for money, which in turn is normally supposed to be

influenced by price evolution. As prices are also assumed to be influenced by the wage imbalances, the conclusion is that the estimation of the non-inflationary wage rate - which is basic to the computation of wage imbalances - cannot be made independently of the determination of the effects of wage imbalances on prices.

In view of this problem, the choice was in favor of working with two alternative measurements of the non-inflationary wage rate levels, namely its upper and lower bounds. As to the upper bound, it was to be obtained by first taking the wage rate which prevailed in a period in which prices were relatively stable and GNP growing at a normal rate and then correcting this figure by increases in the price of manufactured goods and productivity gains through time. For the lower bound, the procedure was the same, except that no correction for price changes of manufactured goods was introduced.

Whith such a procedure, there are two alternative measurements of "wage imbalances". Consequently, two price equations should be estimated.

As to the changes imposed by this new element in the equation system previously defined, expressions (4) and (5) should now be replaced as follows:

$$(\Delta P_{ma}/P_{ma})_t = b_0 + b_1 \left|(W1-Wm)/W_m\right|_t + b_2(\Delta P_f/P_f)_t + + b_3(\Delta P_m/P_m)_t \quad (7)$$

$$Wm_t = W1_{t=o}(Prod_{t-1}/Prod_{t=-1}) \quad (8)$$

$$W'm_t = W1_{t=o}(Prod_{t-1}/Prod_{t=-1})\,(Pma_{t-1}/Pma_{t=-1}) \quad (9)$$

in which the new variables are:

W1 = actual minimum wage rate

Wm = lower limit of non-inflationary wage rate

W'm = upper limit of non-inflationary wage rate

Given the two alternative measurements of non-inflationary wage rates, one should work alternatively with expressions (7) and (8) or (7) and (9).

The reader should note, however, that in the case of combining (7) and (9), which corresponds to utilizing the lower limit of wage imbalances, the compensatory wage increases - motivated by previous increases in prices - are being omitted from the price equations.

That being the case one should, in this particular formulation, include two more variables in expression (7), namely, the

changes in the price of food and imports generated by the respective imbalances in the previous period. Price of manufactured goods would then be defined as:

$$(\Delta P_{ma}/P_{ma})_t = b_0 + b_1 \left[(W1 - Wm')/Wm\right]_t + b_2(\Delta P_f/P_f)_t + \\ + b_3 (\Delta P_m/P_m)_t + b_4 (\Delta P_f/P_f)_{t-1} + \\ + b_5 (\Delta P_m/P_m)_{t-1} \qquad (10)$$

With these changes in the equation system, the two alternative reduced-form equations for wholesale prices are:

a) with the wage imbalance set at its upper limit - combination of expressions (1), (2), (3), (7) and (8)

$$(\Delta P_{w1}/P_{w1})_t = A_0 + A_1 (X_{wu})_t + A_2 (X_{fu})_t + A_3 (X_{iu})_t + u \qquad (11)$$

b) with the wage imbalance set at its lower limit - combination of expressions (1), (2), (9) and (10)

$$(\Delta P'_{w1}/P'_{w1})_t = A'_0 + A'_1 (X'_{wu})_t + A'_2 (X_{fu})_t + A'_3 (X_{iu})_t + \\ + A'_4 (X'_{wu})_{t-1} + A'_6 (X_{iu})_{t-1} + u \qquad (12)$$

in which (X_{wu}) and (X'_{wu}) stand respectively for the upper and lower limits of wage imbalances, and the others, as already defined, for food and import imbalances.

Problems of Estimation

Even though the price equations specified sum up the theoretical construct in a consistent way there are a number of questions to be considered before attempting to estimate them. These questions are mainly those of data requirements and length of time span. The latter being important for the reason that it gives rise to problems like the need of capturing through dummy variables occasional but important disturbance factors, and the extent to which it is realistic to assume that the parameters of the price equations to be tested are in fact constant through time.

The Data Problem

There are problems of data availability and its reliability.

With respect to availability, the main problem was that of periodicity. While data on price indices, legal minimum wage rates, means of payment and imports are available on a monthly basis, data for GNP, industrial and food production are provided only on a yearly basis. Consequently, the alternative was to work with yearly data - more precisely, average annual figures.

The only case in which data were not available even on a

yearly basis was that of productivity gains. The choice was then in favor of taking the evolution of national per-capita income as a proxy, as is the practice of government authorities when calculating wage rate adjustments.

As to the income elasticity for food and import items, we have used respectively 0.7 and unity. The first of these values is an estimate produced by EDEL [1965]. The second corresponds to an assumed reasonable value.

To minimize possible problems of data reliability, the strategy was to rely as much as possibile on data processed by the same institution on the assumption that, whatever the criteria used in the process, the resulting data set should be consistent even if biased in one direction or another. Figures for GNP, production, import and price indexes are then those produced by Fundação Getulio Vargas. Monetary variables, in their turn, are based on figures by the Central Bank.

One particular and important source of difficulty not solved in accordance whith such strategy was that of the figures for the wage imbalances. Here the problems and solution were the following:

On one hand, there was the problem that the available figures

for actual wage rate are not compatible over time. As a consequence legal minimum wage rate figures had to be used. However, as the minimum wage rate level differs by region and since it was almost impossible to achieve a reasonable weighting system, the choice was in favor of taking the figures for São Paulo as a proxy, for this state alone accounts for something like 50% of Brazilian industrial production.

On the other hand, there was the question of finding the year in which the actual wage rate was identical to the non-inflationary level, since this is fundamental to the generation of the series in accordance whith expressions (8) and (9).

Given that inflation has been constantly present in the Brazilian economic history the strategy was that of selecting as a starting point an intermediate year of a period in which the legal minimum wage rate was kept constant for some years and GNP growth rates were high. As the only suitable period - 1944/51 - was quite a long one and given that the average annual rate of manufactured product price increases was of about 15%, there was the risk of seriously underestimating the non-inflationary wage rate if the mid-period or any subsequent year were chosen as the starting point. To avoid such an underestimation, 1944 (the first year of the

period) was then selected as that in which the prevailing legal minimum wage rate was in fact equal to the non-inflationary level.

On the Constancy of the Regression Coefficients

Once decided that the testing of the model would rest upon yearly data, it became evident that given the number of independent variables, the time span to be considered in the regression analysis should be as large as possibile. Actually it was a period of twenty years. But twenty years for a developing country, especially when pushing for import substitution, means considerable changes in the structure of the economy. And this was indeed the case of Brazil, where, as a result of rapid import substitution, the share of domestically produced manufactured goods in GNP has increased substantially, the reverse being the case for imports (see Table A-3).

Such being the case, it becomes difficult to imagine that the parameters of expressions (1) to (5) should have remained constant through time. Consequently, coefficients of the reduced form price equations should also be affected, and correction terms should be considered.

As to the coefficients related to wage imbalances in the

price equations (11) and (12), the device was to suppose that they could be decomposed into a constant multiplied by an expansion factor. And since these price equations are linear, one possibility would be to multiply the figures of wage imbalances by that expansion factor, in which case the parameter to be estimated would in fact be constant.

The index of the industry share in GNP, which is quite sensitive to the effects of the import substitution process, was chosen to represent such an expansion factor or index of wage imbalance correction (I_{wuc}). Practically, the same device could be used to correct in the reduced form price equations the coefficient related to import imbalances. However, in this case, one should take the share of imports in GNP as the index of import imbalances correction. But it so happens that one of the effects of import substitution has been that of increasing the income and/or investment elasticity of imports, a fact which was not considered in the demand equation defined in this model. Consequently, on the assumption that these two opposite effects are approximately of the same strength, no correction was actually introduced in the coefficients linked to import imbalances.

A similar situation also can be admitted with respect to

ssible adjustments of the coefficients linked to food imbalances. The decline of agriculture relative to GNP should imply a downward adjustment of the importance of food in the price indices. On the other hand, the phenomenon of rapid growth of urban population goes paripassu with the process of industrialization, a fact which should be reflected in the coefficients of the demand for food. Again the two effects work in opposite directions, and the assumption was that they were of comparable strength. Therefore, no correction was introduced in the coefficients linked to food imbalances.

The Question of Disturbance Factors

One of the problem which often goes together with that of inflation is of course social and political unrest. Therefore, in the course of testing an inflationary model for a period as long as the one considered in this study, the likelyhood of disturbance factors still not embodied in the model is considerable.

In fact, they seem to have been important twice; first in the period 1957-1959, and second in the years 1963-64. As to the first of these cases, it was the question of more stringent measures of price control both in 1957 and 1958, followed by liberalization in 1959. Hence the price index both for 1957 and 1958 under-estimated

the intensity of the inflationary forces, the reverse being the case in 1959. Consequently, a dummy variable was introduced and its values were: minus one in 1957 and 1958; one in 1959 and zero for the other years.

As to the second case, it was the question of disturbances generated by political problems which became acute in 1963 and 1964. Again a dummy variable was introduced. It was set at one for 1963 and 1964 and at zero for all the other years.

On the efficiency of regression coefficient estimates

As mentioned at page 24, the equation system underlining the reduced form equations (11) and (12) does not specify behavior variables that account for the price increases of agricultural goods other than food ($\Delta Pa/Pa$). Hence, the price increases of such goods are embodied in the residuals of equations (11) and (12) - a fact which might lead to autocorrelation of the residuals and inefficient estimates of the regression coefficients. Probably overestimation would result, for the chances are that price increases of all goods should be positively correlated.

That being the case, one additional independent variable was introduced so as to account for the price increases of agricultural

products other than food. The variable elected to perform this job was the wholesale price increases lagged one year, for three reasons:

a) Since cocoa, coffee, sugar, cotton and lumber are the main products in the category of agricultural goods other than food, and since they are also important items of Brazilian exports, their prices tend to be more directly influenced by the current state of domestic and international demand and less by the structural imbalances.

b) Since these products are important export crops, the government usually intervenes by setting minimum price levels to guide the market. However, since the setting and the announcement of such minimum prices for a given year have to be made in time to influence the decisions of the producers - which is approximately six to nine months before the harvest time - such prices have a built-in allowance for the expected price increases, both in the domestic and international markets. Most likely in these cases, producers will press for and the government will grant minimum price increases which at least match the price increases most recently observed

in a period of six to nine months. Consequently, annual growth rates in price lagged by one year seem a good first approximation to current minimum price adjustments of these products.

c) Whenever actual price increases of these goods extend beyond such minimum price adjustments, the excess should be accounted for by actual demand increases, a fact which would reflect a permissive monetary policy. Even in this case the lagged price variable would work just as well. However, if this were actually the case, they would play the role of proxies for monetary disturbances.

On the basis of the above considerations, the regression analysis performed on equations (11) and (12) would be no longer a test of the structural view in isolation. Nevertheless, it emphasizes the structural variables.

Empirical Findings

Tables II-1 and II-2 sum up the results of the best estimates of equation (11) and (12). Since we have used a step-wise procedure, the report includes some steps and results which, in

STRUCTURALIST MODEL

Equation 11

- Parameters and Statistics[1] -

Dependent Variable: Wholesale Price Index Growth Rates

REGRESSION n9	INTERCEPT	IMPORT IMBALANCE	FOOD IMBALANCE	WAGE IMBALANCE UPPER LIMIT		DUMMY 1	DUMMY 2	WHOLESALE PRICE INDEX 1 YEAR LAG GROWTH RATE	R^2	R^2 ADJUSTED FOR D.F.	VON NEUMANN P=0.05 MIN.1.3680 MAX.2.845
				No lag	3 Months Lag						
4165	12.79775					11.80384 (5.31288)	39.00278 (7.83942)	0.48525 (0.10194)	0.865	.840	1.85250
	12.42359			-0.00028 (0.00054) (*)		11.97737 (5.4475)	37.85800 (8.31484)	0.53280 (0.13824)	0.867		
	11.90001	0.06812 (0.11818) (*)		-0.00037 (0.00057) (*)		12.10600 (5.57746)	37.60761 (8.51742)	0.681239 (0.11818)	0.870		
	10.94350	0.05782 (0.12362) (*)	-0.39581 (0.84758) (*)	-0.00045 (0.00061) (*)		11.87935 (5.76054)	37.06944 (8.84154)	0.6001 (0.17495)	0.872		
4173	12.79775					11.80384 (5.31288)	39.00278 (7.83942)	0.48525 (0.10194)	0.865	.840	1.85250
	12.46152				-0.00028 (0.00056) (*)	11.97737 (5.4475)	37.86448 (8.33710)	0.52956 (0.13623)	0.866		
	11.94765	0.06778 (0.11835) (*)			-0.00038 (0.00060) (*)	12.08394 (5.58006)	37.60150 (8.54273)	0.55771 (0.14780)	0.870		
	11.003576	0.05762 (0.12378) (*)	-0.39322 (0.84881) (*)		-0.00046 (0.00064) (*)	11.85567 (5.76459)	37.05510 (8.87168)	0.59559 (0.17272)	0.871		

(*) Not significant at $t_{.05}$

1 Figures in parenthesis are standard errors of estimate

spite of being not statistically significant are of some interest.

Case 1 - Equation (11) - wage imbalances set at their upper limits

As shown in Table II-1, in this particular case, none of the behavior variables comes out well in the test regardless of the time lag considered with respect to wage imbalances. Actually, the only regression coefficient which presents the proper sign is that of "food" imbalances, even though it does not differ significantly from zero.

As a consequence, neither one of the regressions can be considered as valid explanation. The structuralist model treated in this way fails to explain the observed price increases.

Case 2 - Equation (12) - wage imbalances set at lower limit

In this case, regressions 4 146 and 4 149 (Table II-2) in which instantaneous reaction of prices to wage imbalances is assumed, show that:

a) with the exception of the non-significant regression coefficient for unlagged "import imbalances", all coefficients present the proper sign.

b) the regression coefficient of "food" imbalances and the one referred to in item "2" above, are those which do not pass the significant test at a 5% level.

c) even though the control variables - the two dummies as shown in regression nº 4 157-a and the lagged price increases - do account for about 86% of the variance, the influence of "wage" and "import imbalances" cannot be neglected.

This being the case, regression numbered 4 149-e could be considered as good enough as far as equation (12) is concerned.

Notwithstanding, in the set numbered 4 154 and 4 451, which tests the possibility that prices react both to current and lagged wage imbalances, it can be noted that:

a) Lagged and simultaneous wage variables cannot effectively be used jointly since there is an overlapping of nine months between the two twelve periods used to calculate them, a fact which is well shown by the high degree of multicolinearity between them (R^2 = .97) and by the absence of gains with respect to the explained variance.

Equation 12

- Parameters and Statistics - [1]

Dependent Variable: Wholesale Price Level Growth Rates

Regression Number	Intercept	Import Imbalance		Food Imbalance		Wage Imbalance - Lower Limit -		Dummy 1	Dummy 2	Wholesale Price Growth Rates Lagged One Year	R^2	R^2 Adjusted For D.F.	Von Neuman P.05% Min. 1.3680 Max. 2.8425
		No Lag	Lagged One Year	No Lag	Lagged One Year	No Lag	Lagged One Year						
4146	7.36372					0.07588 (0.03396)		11.05747 (4.7647)	35.91093 (7.14828)	0.42271 (0.09539)	0.898	0.871	2.28519
4149 - a	24.26667								58.30333 (10.66540)		0.624 0.624		
- b	11.93596								39.34175 (8.69813)	0.493491 (0.11305)	0.823		
- c	12.79775							11.80384 (5.31288)	39.00278 (7.83943)	0.48525 (0.10194)	0.865		
- d	14.44244		-0.20529 (0.09096)					11.06689 (4.75219)	39.47909 (6.99871)	0.43561 (0.09359)	0.893		
- e	9.78240		-0.16454 (0.08704)			0.06051 (0.03241)		10.61793 (4.40300)	36.91854 (6.62559)	0.39559 (0.03929)	0.919	0.890	2.16755
- f	9.00340		-0.18378 (0.09118)	-0.51846 (0.63461) (*)		0.05687 (0.03311)		10.23823 (4.48545)	36.85354 (6.70619)	0.42945 (0.09942)	0.923		
- g	8.00261		-0.23193 (0.12486)	-0.87761 (0.89683) (*)	-0.56127 (0.96336) (*)	0.04793 (0.03728) (*)		8.03650 (5.90212) (*)	37.46280 (6.96233)	0.47677 (0.13042)	0.925		
- h	7.27120	0.04242 (0.12228) (*)	-0.22092 (0.13353) (*)	-0.82396 (0.94438) (*)	-0.64998 (1.03290) (*)	0.05246 (0.04037) (*)		7.87480 (6.16146) (*)	37.39701 (7.23496)	0.48483 (0.13745)	0.926		
4154	7.45256						0.08381 (0.03463)	12.29188 (4.65752)	36.47371 (6.94502)	0.30926 (0.09609)	0.903	0.877	2.40090
4451	7.72153					-0.03753 (0.14182) (*)	0.12173 (0.14769) (*)	12.88188 (5.30057)	36.85854 (7.31680)	0.39128 (0.10369)	0.903		
4157 - a	9.72419		-0.16274 -(0.03469)				0.06864 (0.03284)	11.61930 (4.30277)	37.30922 (6.40954)	0.37547 (0.08934)	0.923	0.896	2.23443
- b	8.85081		-018193 (0.09826)	-053342 (0.61536) (*)			0.06547 (0.03334)	11.17530 (4.37160)	37.18307 (6.46886)	0.41061 (0.09883)	0.927		
- c	8.04078		-0.22036 (0.12217)	-0.81757 (0.87540) (*)	-0.44844 (0.95163) (*)		0.05771 (0.38129) (*)	9.34295 (5.95377) (*)	37.6144 (6.73405)	0.45031 (0.13224)	0.928		
- d	7.04868	0.05830 (0.12055) (*)	-0.20409 (0.13067) (*)	-0.73819 (0.91958) (*)	0.55840 (1.00949) (*)		0.06496 (0.01217) (*)	9.20219 (6.16033) (*)	37.5523 (6.96107)	0.45840 (0.13770)	0.930		

(*) Not significant at $t_{.05}$

1- Figures in parenthesis are standard errors of estimate.

b) By comparing the explained variance of regression 4 149-e and regression 4 157-a, it can be seen that the hypothesis of lagged reaction of prices to wage imbalances is somewhat stronger than that of instantaneous reaction. Therefore it should be the preferred one.

Contrary to the findings with respect to estimation of equation (11), equation (12) estimates do indicate that the structural variables, namely "wage" and "import" imbalances, did have something to do with inflation in the period 1947/1967.

Nevertheless, since the monetary disturbances were not properly represented in these price equations, a firm conclusion cannot be drawn at this stage. We must first check how well these variables fare in the next two models. In one case, monetary and structural variables are included together without discrimination, and in the other, a framework unfavorable to the structural variables is provided.

CHAPTER III

A MONETARIST-STRUCTURALIST MODEL

The structuralist model as specified and tested in the previous chapter assumes, as already noted, that the monetary expansion was no more or less than that required to neutralize the negative effects of food, import and wage imbalances on production and employment. For that reason monetary disturbances were not to be taken as a cause of inflation.

There are, however, at least two grounds on which the assumed passive role of the monetary disturbances could be disputed. The first is that in reality the monetary expansion could have exceeded the required amount as above defined, a situation in which the excess monetary expansion should be considered at least as an additional source of inflation. The second is that inflation might have been initiated by an excessive monetary expansion and propagated or even aggravated by an unrealistic wage and exchange rate policy - a case in which monetary, wage and exchange rate disturbances should all be taken as explanatory variables.

As both of these alternative hypotheses are theoretically feasible and as the poor showing of the structural variables in the

previous test is compatible with their implied behavior in either one of these alternative hypotheses, both of them will be tested in this study.

This chapter will however be concentrated on the first of these cases. That is, we will first try to verify whether or not monetary expansion has been just enough to meet the demand for cash balances generated by the observed GNP growth rates and price increases due to the structural variables and, if not, what proportion of price increases can be accounted for by an excessive expansion of the money supply.

As in the previous chapter, we will first deal with the algebra of the model, discuss next its implications, and then proceed with the empirical evidence and conclusion which may to be drawn.

The algebraic format of the model

The possibilities of measuring whiat should be the compensatory expansion of money supply, which is fundamental in this case, involves an implicit or explicit use of a demand-for-money function. This must incorporate also the effects of price expectations on velocity of circulation and will therefore carry implications as to how the price expectations are formed in the first place.

Accepting as valid for this study the estimates of FISHLOW [1969] we chose to use the following demand-for-money function

$$M^*/P^s = 57.1 + .2031\ Y - 33.7\ P^s_t/P^s_{t-1} \qquad (14)$$

in which

M^* - desired level of nominal cash balances

Y - Real Gross National Product

P^s_t/P^s_{t-1} - price increase accounted for by the structural variables as estimated in the previous chapter.

The compensatory monetary expansion would then be $\Delta M^*/M^*$.

Once it is decided how the compensatory monetary expansion is to be measured, one can bring into the model the other relationships which are needed to show how this model considers the inflationary role of excessive expansion of the actual money supply.

These relationships are:

$$(\Delta P_{w1}/P_{w1})_t = (\Delta P^m/P^m)_t + (\Delta P^s/P^s)_t \qquad (15)$$

$$(\Delta P^m/P^m)_t = \pi\left[(\Delta Ms/Ms)_t - (\Delta M^*/M^*)_t\right] \qquad (16)$$

$$(\Delta P^s/P^s)_t = A'_o + A'_1 (X_{wu})_t + \ldots + A'_n (X_{iu})_{t-m} \qquad (17)$$

in which

P_{wl} - observed wholesale price index level

$\Delta P^s/P^s$ - rate of price changes accounted for by the structural variables

$\Delta P^m/P^m$ - rate of price changes accounted for by the monetary variables

Ms - nominal money supply

M* - nominal desired cash balances (as they would be if only the structural factors counted)

Y - real GNP

X'_{wu} X'_{fu} X_{iu} - respectively, wage, food and import imbalances

Expression (15) merely states that the observed rates of inflation can be thought of as being the sum of price increases explained by the structural and monetary variables. Equation (16) states that the monetary expansion in excess over that of desired nominal cash balances is the only monetary disturbance considered. Finally, equation (17) states that the share of price increases accounted for by the structural variables are a direct result of the structural imbalances.

As to the reduced form resulting from the above system, the combination of equations (15) to (17) yields:

$$(\Delta P_{w1}/P_{w1})_t = \pi \left[(\Delta Ms/Ms)_t - (\Delta M^*/M^*)_t\right] + A'_o$$
$$+A'_1 (X_{wu})_t + \ldots + A'_n (X_{iu})_{t-m} \qquad (18)$$

in which all the independent variables are predetermined.

The implications of the model

The system as presented in a reduced form equation (18) gives rise to two peculiarities which seem to be worthy of discussion. The first has to do with the particular form of price-expectation formation used in this study and the extent to which monetary disturbances are assumed to affect prices. The seconds has to do with the procedure adopted with respect to the estimation of the reduced form equation (18).

As to the first of these aspects, the key point is that price expectations in this model are assumed to be nothing more than that part of current price evolution which is explained by the latest "food", "import" and "wage imbalances", whereas the more usual procedure, following the lines of CAGAN [1956], is that of basing them on price evolution history. Though different, these two ways of looking into the problem are not incompatible. Either one could be used depending on the institutional characteristics of the economy under examination. For economies like that of Brazil there are at least three factors

which tend to be taken in general as the essential causes of inflation, and should therefore be considered as important elements for the price expectation formation. These factors are: currency devaluation, weather conditions and legal minimum wage rate. As to the first of these factors, the question is that the combination of balance-of-payment problems with a system of fixed exchange rates has led to currency devaluations which could also include government's expectations regarding the future rate of inflation. The price of agricultural goods in turn - in the absence of buffer stocks and limited possibilities of supplementation of domestic supply by importation - are very sensitive to the current weather conditions. Finally, there is the fact that the government's income redistribution policy used to be largely executed through a legal-minimum-wage-rate policy.

On the other hand, for countries whose currency plays a role of hard money; whose agriculture policy includes buffer stocks and in which labor unions are strong enough as far as bargaining power is concerned, price expectations should be based on other elements. In such cases the whole price evolution history seems in fact to be a more adequate basis on which to base expectations, particularly so because inflation rates in these countries tend to be lower than the nominal interest rate and not much greater than productivity gains,

thus minimizing the eventual damages arising from erroneous guesses about price movements.

To the extent that monetary disturbances are assumed to explain price movements in this model, the rationale is the same as that which calls for the differences noted with respect to price - expectation formation. Since in this model, price expectations are supposed to be based on inflationary pressures coming from structural variables, monetary disturbances should be held responsible for price increases over and above those accounted for by such structural variables. On the other hand, whenever price expectations are formed on the basis of price history, it is quite natural that monetary disturbances should be held fully responsible for current price changes. After all, price history can hardly be thought of as a cause of inflation.

With respect to the procedure adopted to test the model, the reader should note that estimation of the reduced form equation (18) implies a reestimation of the inflationary strength of the structural variables, in spite of the fact that the initial estimates - those pertaining to the test of the structural model - were taken as valid as far as the computation of $\Delta M^*/M^*$ is concerned.

The point is that equation (18) gives the chance to test the inflationary strength of the structural variables in a framework in which monetary disturbances are competing with them. By so doing, it should provide more efficient estimates when compared to those stemming from the tests of the structural model.

That being the case, estimates of the inflationary impact of the structural variables as given by fitting equation (18) should then replace those formerly used to measure the desired cash balances. But since, by doing so, a different measurement of $\Delta M^*/M^*$ is obtained, reestimation of equation (18) should then be attempted. In short, one would be led to a process of successive approximations, in the hope that estimates would converge to a unique figure.

One alternative to this process would be of course to abandon altogether the estimates pertaining to the test of the structural model. In this case, however, expression (14) should be a part of the system of equations, and a new reduced form equation should then be obtained. This possibility is not explored in this chapter. Rather, it is taken as a central point in the following one.

TABLE III-1

MONETARIST-STRUCTURALIST MODEL

Equation 18

Second Stage Estimates

- Parameters and Statistics - [1]

Dependent Variable: Wholesale Price Index Rates of Change

Regression Number	Intercept	Import Imbalance	Wage Imbalance - Lower Limit -		Monetary Imbalance				Dummy	Dummy	Wholesale Price Index Rates of Change	R^2	R^2 Adjusted	Von Neuman P. 05% Min. 1.3680 Max. 2.8425
		Lagged One year	No Lag	Lagged 3 Months	111	112	121	122	1	2	Lagged One Year		For D.F.	
4453 - a	16.76013				0.88856 (0.16095)							0.629		
- b	17.95819				0.56449 (0.15252)					36.66115 (10.04443)		0.792		
- c	17.97260				0.65440 (0.11747)				18.34622 (4.91831)	32.19464 (7.66607)		0.889		
- d	10.23132		0.09049 (0.02542)		0.59735 (0.09075)				16.82455 (3.76393)	27.86432 (5.95437)		0.940	0.929	2.20156
- e	10.17768		0.09018 (0.02748)		0.59034 (0.10089)				16.76071 (4.22331)	27.90736 (6.26034)	0.00605 (0.15463) (*)	0.940		
4457 - a	24.26667									58.30333 (10.66540)		0.624		
- b	18.43448					0.55483 (0.16357)				55.48297 (0.16357)		0.776		
- c	18.51375					0.64165 (0.13208)			17.84746 (5.35083)	33.20277 (8.38539)		0.868		
- d	10.58921		0.09236 (0.02909)			0.58207 (0.10715)			16.31888 (4.30063)	28.78775 (6.84015)		0.920		
- e	12.93403	-0.18120 (0.07032)	0.07352 (0.02586)			0.55693 (0.09186)			15.59943 (3.67697)	29.84836 (5.84577)		0.946	0.932	2.21430
4461 - a	18.27329						0.66296 (0.12318)		18.48642 (5.03806)	33.27563 (7.86477)		0.883		
- b	10.46163			0.09719 (0.02627)			0.57495 (0.09503)		18.09825 (3.76426)	28.88304 (5.94517)		0.939	0.928	2.38192
4464 - a	10.49383			0.09983 (0.02956)				0.54631 (0.10774)	17.51564 (4.22557)	30.00047 (6.68094)		0.923		
- b	12.73035	-0.17919 (0.06929)		0.08098 (0.02621)				0.52657 (0.09206)	16.55798 (3.61717)	30.81263 (5.70528)		0.948	0.934	2.30405

(*) - Not significant at t. 05

1- Figures in parenthesis are standard errors

Empirical Findings

Table III-1 sums up the results of the best alternative estimates of equation (18). They are not to be taken however as the result of successive approximations. These were not attempted because, since the measurement of wage imbalances could not be changed, costs were far in excess of possibile benefits.

A step-wise estimation procedure was also used in this case. Therefore results are reported for some steps which are of interest even though in some cases the regression coefficents were statistically not significantly different from zero.

Before analyzing any result, it is worth noting that:

a) the two dummy variables are included as before.

b) given that the inclusion of monetary imbalances could render statistically insignificant either one of the structural variables formerly held significant, and since the conclusions regarding the speed of price reaction to wage disturbances could also be reversed at this stage, we have elected to work with four alternative measurements of the monetary imbalances (corresponding

to four $\Delta P^S/P^S$ estimates in accordance with equations 4 146, 4 149-e, 4 154 and 4 157-a of table II-2)

As to the findings, the first two sets of regressions in Table III-1 - namely regressions 4453 and 4457 - in which instantaneous reaction of prices to wage imbalances is assumed - show that:

1 - the regression coefficients of monetary, wage and import imbalances are all statistically significant and have the proper sign.

2 - the attempt to introduce in this model - as was done in the structural one - the lagged price increase as one of the independent variables is to no avail, for in a free-run step-wise regression analysis, it is the last variable to enter, and its regression coefficient is the only one that does not pass the significancy test. The reasons are: first, that it is highly correlated with monetary imbalances (R^2 = .92) and second, its explanatory power is inferior to that of the monetary imbalances.

Statistics for regression sets 4 461 and 4 464 confirm the conclusions above outlined. They show as before that a stronger

relation can be established if a lagged rather than instantaneous price reaction to wage imbalance is assumed. Indeed, regressions 4 461-b and 4 464-b explain a larger proportion of price movements than their counterparts, namely, regressions 4 453-d and 4 457-e.

Comparison between regressions 4 461-b and 4 464-b suggests that the second is to be the preferred. Nevertheless, for reasons which will become obvious at a later stage of this work we will retain both as alternatives deserving consideration.

While in principle the procedure could be carried out for three or four steps, these two last equations seem so strong that it is unprofitable to go beyond these two steps.

In any case, either one must be read as saying that inflation in Brazil during the period 1947/67 was of a hybrid nature. Hence, the monetarist-structuralist controversy becomes a matter of degree rather than nature; and the problem becomes one of determining the relative inflationary strength of the structural and monetary variables on a year-to-year basis.

Of course, these cannot be taken as final conclusions. Indeed, the monetarist model is yet to be tested. Besides, by simply challenging the assumption that the full actual monetary ex-

pansion was to be taken as compensatory, it was possible to demonstrate that inflation in Brazil was only partially explained by the structural variables. Consequently, it should not be surprising if the test of a monetarist model should lead to different conclusions.

CHAPTER IV

A MONETARIST MODEL

The rejection of the supposition that the monetary changes are compensatory for the sutrctural variables effects on prices can lead, as already noted, to a model in which monetary, wage and exchange rate disturbances can be all taken as independent variables. With this in mind, it sufficed to assume that inflation was in fact initiated by an excessive monetary expansion and propagated or even aggravated by an unrealistic wage and fixed exchange rate policy.

Interestingly enough, given that the definitions of the wage imbalance, lower limit and import imbalance used in the two previous models in this study are compatible with such hypothesis, this last model can lead to a testable reduced form equation quite similar to equation (18). In fact the two basic differences should be those of the measurement of the monetary imbalances and of the size of the coefficients of the structural variables, as will now be shown.

To simplify the exposition and implications of this question, let us replace for the moment the demand-for-money function (14) by a general form

$$M^*/P^S = g\,(Y,\ P^S/P^S_{t-1})$$

which could yield the following expression for desired changes in cash balances.

$$(\Delta M^*/M^*)_t = Z_1\,(\Delta Y/Y)_t + Z_2\,(\Delta P^S/P^S)_t - Z_3\left[(\Delta P^S/P^S)_t - (\Delta P^S/P^S)_{t-1}\right] \qquad (19)$$

As before the demand for nominal cash balances (M^*) is a function of real GNP (Y) and price increases accounted for by the food, wage and import imbalances ($\Delta P^S/P^S$).

Given that wage and import imbalances might also, in this case, be a source of inflation and considering in addition that the price expectation should still be formed as previously described, there are two possible alternative ways of measuring the desired or non-inflationary cash balances evolution.

In one case, as the inflationary impact of wages, food and import imbalances are still exogenous, the non-inflationary cash balances would be computed as before. As a consequence this model would no differ from the "monetarist-structuralist" previously specified and tested.

However, it could be argued that the materialization of the

inflationary pressures stemming from the wage, food and import imbalances are not independent of the monetary expansion. Had, for instance, the monetary expansion equaled the expansion of demand for cash balances accounted for by real GNP growth, there should not have been room for the price expectations to be realized. Also wage increases should in this case be absorbed by the firms. Under these circumstances, the inflationary impact of these elements should be tested in an environment in which the monetary disturbances were to be measured as the difference between the money supply expansion and the increase in desired nominal cash balances accounted for by real GNP growth. In other words, the previously estimated effects of the structural imbalances could not be considered as valid estimates.

The testable relationship pertaining to the last case should then result from a system defined by equations (15), (16), (12) and (19) for, in this case, $\Delta P^s/P^s$ cannot be taken as predetermined.

The new reduced form equation should then be

$$(\Delta P_{w1}/P_{w1}) = \pi \left[(\Delta Ms/Ms)_t - Z_1 (\Delta Y/Y)_t \right] + B'_o + B'_1 (X_{wu})_t + \\ + \ldots + B'_n (X_{iu})_{t-m} \qquad (20)$$

As the reader should have noted, the monetary imbalances as measured in equation (20) are the full extent by which the money supply increase exceeds that of GNP, a fact which gives to such an equation an important characteristic. The question is that, as stated, equation (20) can also be thought of as being the expression of single equation inflation models based on a crude form of the quantitative theory of money to which are added some disturbances in the real variables. This peculiarity is particularly interesting because, among other things, it provides a link between this study and previous works in the field which, as it will be shown throughout this chapter, were based on those single equation inflation models.

Of course this dual nature of equation (20) poses some problems with respect to its statistical treatment and the possible interpretation of the regression results. As a single equation model equation (20), is not capable of distinguishing the autonomous increases in the money supply from those needed to sustain the price increase generated by structural imbalances since structural imbalances and monetary disturbances are included together as independent variables. Moreover, the monetary imbalances, measured in equation (20), imply that a full expansion of the money supply which exceeds the real GNP growth is autonomous and therefore a cause of inflation. Consequently,

art of the price increase may be simultaneously explained by the structural and monetary imbalances, which therefore would represent in part the same thing. Multicolinearity in this situation is very likely and, if not sufficiently pronounced to make either one of the independent variables insignificant, would leave us with the problem of double counting of the same effect. Given that double counting stems from the measurement of the monetary imbalances, the bias of the model will work in favor of the monetary variables, therefore overestimating their influence on prices.

Of course the problem of double counting could be eliminated if one could assume that the monetary expansion induced by the effects of the structural imbalances took place with some lag. However given that in our case the unit of time under consideration is the year and that equation (20) includes current as well as past structural imbalances as independent variables, the assumed lag should be greater than two years which is anything but reasonable.

An alternative procedure capable of solving the problem of double counting would be that of considering equation (20) as the reduced form of the system of equations which characterize our monetarist model. In this case the set of structural relationships (16), (17) and (19), rather than equation (20), could be used to

estimate first the price increase due to structural imbalances, second the money supply expansion needed to support the price increase generated by these imbalances, third the extent to which the actual money supply expansion exceeded that amount and, finally, the price increase which can be attributed to the excess monetary expansion. In fact, from the estimates of the regression coefficients of equation (20) one could easily obtain the parameters of the structural relationships. From there $\Delta P^S/P^S$ would be obtained in accordance with equation (17) which, in turn, would allow the estimation of the monetary expansion needed to support such price increases and income growth (equation 19). At that point, one would already have distinguished the autonomous from the induced money supply expansion and, consequently, could immediately obtain the contribution of the autonomous increase in the money supply to price increases by using equation (12).

Of course, in this case, one is assuming that part of the monetary expansion is for the purpose of sustaining the increases in prices due to structural imbalances. Therefore, as the reader might have noted, the model becomes equivalent to the "monetarist-structuralist" one, and, except for significant differences in the estimated parameters, the results should not differ.

As to these differences in estimated parameters, the monetarist model, summed up in equation (20), represents a poorer alternative than the structuralist - monetarist model, whose reduced form expression is given by equation (18). Indeed, the estimation of equation (20) involves greater risk in the sense of providing for structural imbalances regression coefficients which are statistically insignificant. The question is that, aside from the problem of multicolinearity already discussed, the coefficients of the structural variables in equation (20) are a small fraction of those in equation (18). In fact the relationship between them is

$$B'_n = A'_n \left[1 - \pi (Z_2 - Z_3) \right]$$

Given that "Z_2" and "Z_3" are the coefficients of the demand for money equation and that the first (normally equal to unity) is greater than the second, the coefficients of the structural variables in equation (20) are therefore smaller than those of equation (18). Consequently, unless the unexplained variance resulting from testing equation (20) is substantially smaller than that pertaining equation (18), there would be an increased risk that structural imbalances might fail to be significant.

In view of all these limitations it seems that, with respect to the monetarist model, the more reasonable alternative is that

giving to equation (20) the statistical treatment which corresponds a single equation model. This, as we already have seen, involves some deficiences. Nevertheless, it can be of some use in the sense providing a basis of comparison between this study and previous nes existing in the field.

Relation to other Studies

As expressed by equation (20) the model to be tested in this chapter comes close to those tested by DELFIM NETTO [1965] and COLAÇO [1967].

What these models have in common with the present one is first that they cover basically the same set of problems, and secondly that the measurement of the monetary imbalances are based on almost identical criteria. Where they differ is in the way in which wage, external-sector disturbances and expectations are defined.

For wage disturbances these studies have taken the full percentage change in the legal minimum wage rate; for external-sector disturbances, the percentage change of import prices expressed in the national currency; and for expectations, the difference between the prices in year t-1 and t-2.

Unlike our model, the wage and external sector disturbances as defined in these other studies are not free from the effects of inflation. Consequently, we would expect to have better results and lesser problems of multicolinearity.

Empirical Findings

As in the previous tests the dummy variables were taken into account. A step-wise procedure was again used and the report will again include some steps which, in spite of the fact that they did not lead to gains, are of some interest.

The most important observations which come out of the results in Table IV-1 are:

1 - of the structural variables wage and import imbalances are the only ones to yield significant coefficients in the price equation.

2 - wage and import imbalances cannot effectively be used jointly, as can be seen by comparing regressions 4 465-d, 4 467-a and "b".

3 - the hypothesis of a lagged reaction of price to wage imbalances is again better than that of an instantaneous

Dependent Variable: Wholesale Price Index Growth Rates

Regression Number	Intercept	Import Imbalance		Food Imbalance		Wage Imbalance - Lower Limit -		Dummy 1	Dummy 2	Wholesale Prices Index Rates of Change Lagged One Year	Monetary Imbalance	R^2	R^2 Adjusted For D.F.	Von Neuman P.05% Min. 1.3680 Max. 2.8425
		No Lag	Lagged One Year	No Lag	Lagged One Year	No Lag	Lagged 3 Months							
4465 - a	3.90965										0.38017 (0.11233)	0.773		
- b	8.21459								30.21511 (7.74572)		0.63393 (0.10505)	0.880		
- c	8.81954							13.25815 (3.73086)	29.24757 (5.97502)		0.63914 (0.08096)	0.933		
- d	5.92179					0.04787 (0.02587)		12.66222 (3.49179)	28.45381 (5.58479)		0.57893 (0.03216)	0.946	0.936	2.25282
4467 - a	10.40451		-0.13182 (0.06856)					12.68059 (3.46433)	30.66443 (5.57626)		0.53656 (0.07973)	0.946		
- b	7.74721		-0.11132 (0.06650) (*)			0.03983 (0.02491) (*)		12.27452 (3.30734)	29.78370 (5.33629)		0.51167 (0.03029)	0.954		
- c	6.86089		-0.12965 (0.06673) (*)	-0.57169 (0.45253) (*)		0.03188 (0.02472) (*)		11.98346 (3.24730)	29.39672 (5.23517)		0.58600 (0.08517)	0.960		
- d	6.43963		-0.15044 (0.03533) (*)	-0.72363 (0.59471) (*)	-0.26249 (0.63465) (*)	0.03052 (0.02763) (*)		11.05436 (4.03848)	29.58894 (5.43044)		0.60700 (0.10161)	0.960		
- e	6.35147		-0.15602 (0.98103) (*)	-0.76247 (0.68358) (*)	-0.30654 (0.73777) (*)	0.03018 (0.02894) (*)		10.81256 (4.57652)	29.78235 (5.84403)	0.02385 (0.17597) (*)	0.58595 (0.18799)	0.960		
- f	6.11675	0.01410 (0.09435) (*)	-0.15275 (0.10503) (*)	-0.74522 (0.72539) (*)	-0.33736 (0.79992) (*)	0.03178 (0.03216) (*)		10.72810 (4.82772)	29.80030 (6.12336)	0.02886 (0.18739) (*)	0.58294 (0.19799)	0.960		
4470	6.07730						0.05260 (0.02700)	13.39708 (3.44307)	29.04469 (5.51392)		0.56129 (0.03472)	0.947	0.937	2.36156
4469 - a	7.82416		-0.11225 (0.06528) (*)				0.04993 (0.02578) (*)	12.88514 (3.25201)	30.28063 (5.23565)		0.52778 (0.08203)	0.956		
- b	6.84110		-0.13016 (0.06512)	-0.57978 (0.44236) (*)			0.04061 (0.02537) (*)	12.51881 (3.18400)	29.81439 (5.11875)		0.57013 (0.08628)	0.961		
- c	6.49120		-0.14660 (0.03349) (*)	-0.69993 (0.58240) (*)	-0.21008 (0.62838) (*)		0.03683 (0.02861) (*)	11.72336 (4.06722)	29.92465 (5.31337)		0.58118 (0.10433)	0.961		
- d	6.15855	0.02211 (0.03856) (*)	-0.13938 (0.09165) (*)	-0.65850 (0.62886) (*)	-0.23993 (0.66530) (*)		0.03993 (0.03227)	11.72559 (4.23609)	29.91806 (5.5340)		0.58863 (0.10870)	0.962		
- e	6.02708	0.02441 (0.09418) (*)	-0.14482 (0.10335) (*)	-0.69724 (0.71292) (*)	-0.29220 (0.78790) (*)		0.03979 (0.03383) (*)	11.45153 (4.83830)	30.12576 (5.97922)	0.02619 (0.18406) (*)	0.56607 (0.19638)	0.962		

(*) Not significant at t.05

1- Figures in parenthesis are standard errors

reaction, as can be seen by comparing regression 4 465-d to regression 4 470.

In view of these observations, regressions 4 467-a and 4 470 can be considered as being equally good as far as the explanatory power is concerned. But they have different implications as to which of the structural variables are to be retained. Elements other than the regression results have then to be considered before any decision can be reached as to which may more closely represent the facts.

In any event the implications of such findings are that, even in an analytical framework unfavorable to them, the import and wage imbalances are found still to be partially responsible for inflation in Brazil.

Compared Conclusions

Even though differences in formulation and periods subject to test of the monetarist models considered in this chapter preclude any valid comparison of the results, there is still some room for comments regarding some of the conclusions each one allows to be drawn.

The Delfim Netto Model - Tested for the period 1945-1964

Results from a regression equation, where the wholesale price index appears as the dependent variable, are:

A - For annual data

$$P/P_{t-1} = .201 + .622M/M_{t-1} + .148C/C_{t-1} + .968A_t \qquad R^2 = .91$$

B - For bi-monthly data

$$P/P_{t-1} = .449 + .291M/M_{t-1} + .172C_{t-1}/C_{t-2} + .116W/W_{t-1} + .114A_t \qquad R^2 = .75$$

in which

P/P_{t-1} - rate of change in wholesale price index

M/M_{t-1} - rate of change in money supply

C/C_{t-1} - rate of change in cost of imports in national currency

W/W_{t-1} - rate of change in legal minimum wage rate for São Paulo

A_t - difference between the rate of inflation in the previous two years.

Given that the reported results include only the statistically significant variables, it can initially be said that wage rate changes, increases in the cost of imports and price expectations satisfactorily

explain inflation in Brazil in the period 1945-1964. More precision is achieved however in the case of annual data, in which wages fail to significantly enter the price equation because of problems of multicolinearity.

Two additional and interesting conclusions to be drawn with respect to wages in the bi-monthly test of the model are that:

a) wage increases will cause prices to rise even if such wage adjustment covered nothing more than previous productivity gains.

b) the inflationary effects of wages are instantaneously exhausted, no matter what happens to the monetary expansion.

Finally, given the definition of the variables and the observations just made, it can be said that while satisfactorily explaining the observed rates of inflation, the Delfim Netto model can say very little about the real causes of inflation. In fact, the cost increases of wage and import items considered can hardly be admitted to be unaffected by current or past price changes.

Under these circumstances, the following are the advantages

of the monetarist model proposed in this study:

1 - the causal relationship prevails only in the direction of the explanatory variable to the dependent variable.

2 - multicolinearity does not prevent wages from significantly entering the price equation when tested for annual data.

3 - the model provides room for instantaneous and lagged price reactions to wage disturbances over some unspecified time interval, which in turn depends on what happens to the money supply.

4 - all these advantages are achieved without any loss with respect to the over-all explanatory power of the independent variables.

The Harberger Model - as tested for Brazil (period 1947-65) in COLAÇO [1967].

The reported results in the case of wholesale price index are:

For annual data

TABLE IV-2

Variable P_{t-1}	Constant	Coefficients and Standard Errors						
		Y_t	M_t	M_{t-1}	M_{t-2}	A_t	W_t	R^2
	-.0547	.4868 (1.1411)	.5410 (.1919)	.4363 (.2682)	.3800 (.2374)			.81
	-.0465	.5327 (.7374)	.3163 (.1382)	.4415 (.1733)	.2053 (.1600)	.4913 (.1334)		.93
	-.0434	.4354 (.9433)	.3321 (.1699)	.4641 (.2209)	.1655 (.2729)	.4786 (.1577)	.0077 (.0412)	.93

Source: COLAÇO [1967]

Basically, the variables and their measurements are the same as those in the Delfim Netto model. The difference is that in this case income changes (Y) and the lagged monetary expansion (M_{t-1} and M_{t-2}) are brought into the analysis while the increase in import costs is excluded.

Tested only for annual data, this model proved to have an explanatory power comparable to the previous one. Monetary expansion with one year lag did compensate the exclusion of the increase in import costs, a fact which is not at all surprising.

Given in addition that wages and income changes fail to

significantly enter the price equation, inflation becomes a problem of current and past monetary expansion, a conclusion which differs substantially from those derived from the Delfim Netto model and from our own monetarist one.

In any event, the conclusions derived from the use of the Harberger model seem less reliable than those previously achieved for two reasons. First, lack of tests on quarterly or even bi-monthly data precluded the possibility of dodging the problem of multicolinearity between monetary expansion and wages. Second, owing to the results of the Delfim Netto Model based on bi-monthly data, wage rate changes cannot be said to have been given a fair chance. In addition, as the variable measurements are basically those of the Delfim Netto Model, the conclusions become vulnerable to the same inconveniences already noted. For that reason, they should be less reliable than those derived from the test of our monetarist model.

CHAPTER V

CHOOSING AMONG ALTERNATIVES

As concluded in the two previous chapters, the Brazilian inflationary process during the period 1947/67 can be satisfactorily explained either by the price equations resultant from the monetarist structuralist model or from the monetarist one. And what is more important, in each case two equations could be selected on the basis of their explanatory power and their implications regarding the nature of the structural disturbances.

These equations are:

a) Monetarist-Structuralist Model - Equation (18)

A-1 [Table III-1 - regression 4 461-b]

$$\Delta P_{w1}/P_{w1} = 10.46 + .10X_{wu-3/4} + .57X_{mu} + 18.10X_{d'} + 28.88X_{d''}$$

(.02627) (.09503) (3.76426) (5.94517)

adjusted R^2 = .924

D = 2.38192

A-2 [Table III-1 - regression 4 464-b]

$$\Delta P_{w1}/P_{w1} = 12.73 + 0.08\,X_{wu-3/4} + .53\,X_{mu} + 16.56\,X_{d'} + 30.81\,X_{d''} - .18\,X_{iu-1}$$

(.02621) (.09206) (3.61717) (5.70528) (.06929)

adjusted R^2 = .930

D = 2.30406

b) Monetarist Model - (Equation 20)

B-1 [Table IV-1 - regression 4 470]

$$\Delta P_{w1}/P_{w1} = 6.08 + 0.05\,X_{wu_{-3/4}} + .56\,X_{mu} + 13.40\,X_{d'} + 29.04\,X_{d''}$$

(.02700) (.08472) (3.44307) (5.51392)

adjusted R^2 = .933

D = 2.36156

B-2 [Table IV-1 - regression 4 467-a]

$$\Delta P_{w1}/P_{w1} = 10.40 - .13\,X_{iu_{-1}} + .59\,X_{mu} + 12.68\,X_{d'} + 30.66\,X_{d''}$$

(.06856) (.07973) (3.46438) (5.57626)

adjusted R^2 = .932

D = 2.15781

Under these conditions any possibility of narrowing the choice down to just one of these alternative price equations would be most helpful. To achieve this, however, some additional considerations and information have to be brought into analysis. Therefore, attention will be focussed on the following points:

(a) The performance of each equation with respect to the reproduction of the swings of inflation rates in the period of adjustment, as well as in 1968 and 1969 which were not included in the data set; (b) the theoretical strength behind each alternative equation; (c) a check of consistency resting upon the implied behavior for other variables such as employment, income growth rates and others.

To simplify matters, however, we shall first attempt to select just one equation for each model. As a second step we shall choose between the structuralist-monetarist and monetarist model.

The Monetarist-Structuralist Model

The performance of the two alternative price equations of the structural approach with respect to the reproduction of changes in rates of inflation in the period 1948-67 is depicted in graph V-1.

As can be easily seen, both of them do rather well throughout the period. However, insight can be gained by breaking down the time span into two distinct periods, namely: from 1948 to 1957 and from 1958 to 1957.

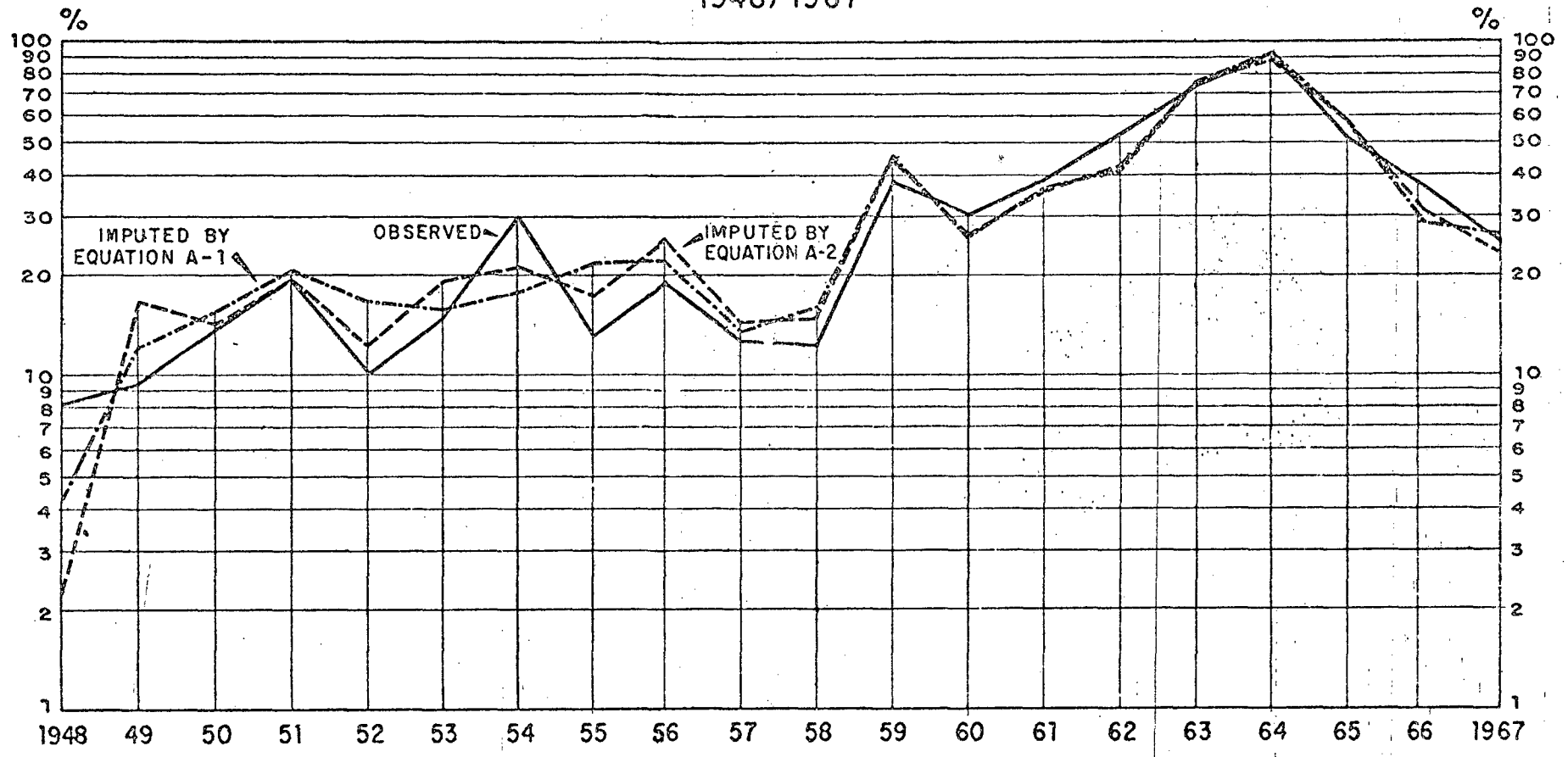
Indeed, from 1948 to 1957 the swings of the observed price

GRAPH V-1

WHOLESALE PRICE INDEX

RATES OF CHANGE

1948/1967



changes are much more closely reproduced by equation "A-2". In fact, it explains the observed price movements, whereas this is not so in the case of equation "A-1", for the years 1953 and 1955. On the other hand, by considerably overestimating the price growth rate in 1949, equation "A-2" produces a fall in the intensity of price increases in 1950, whereas there was actually an increase. However, it should be noted that even equation "A-1" produces for 1949 a price growth rate which is substantially greater than that estimated for 1948. Consequently, the problem seems to be linked to a variable which is common to both equations. Such being the case, equation "A-2" still seems to be that one which provides better results for the period 1948/57.

With respect to the second period, that is, from 1958 to 1967, both equations produce almost identical price growth rates, with the exception of 1967, thus, reproducing equally well variations in the growth rates of prices during the period. Consequently, the choice of equation "A-2" still seems appropriate.

Still with respect to the comparison above, there is one additional observation to be made. As the independent variables of equation "A-2" are those of equation "A-1" plus the "import imbalances", one can infer that the difference in growth rates of

prices estimated by these equations can be attributed to the "Import imbalances".

In other words, "import imbalances" played a significant role in the period 1948/57, but were insignificant from 1958 up to 1966 and acted as an anti-inflationary factor in 1967.

As for the years of 1968 and 1969, the performance of both equations with respect to estimates of the rate of inflation is provided by Table V-1.

TABLE V-1

Wholesale Price Index

Observed - Imputed

1968/1969

Rates of Change

Period	Observed	Imputed		Absolute Deviation	
		Eq. A-1	Eq. A-2	Eq. A-1	Eq. A-2
1968	24.06%	27.89%	28.00%	3.83	3.94
1969	19.47%	19.80%	17.78%	0.33	- 1.69

Again, both equations provide satisfactory results. Nevertheless, the growth rates in the wholesale price index as imputed by means of equations "A-1" do get closer to the observed ones in both years. For this reason, it should then be considered the one which gives a better explanation of inflation from 1968 on.

Such being the case, neither of the two equations could be considered absolutely superior to the other. However, there is the possibility of defending equation "A-2" as the one which best explains inflation in the period 1948/67 whereas equation "A-1" is to be preferred for more recent years. This possibility stems from the changes introduced in the official exchange rate policy by August 1968. Indeed, up to that month, devaluation of the cruzeiro used to be made once a year - the decisive element being the state of foreign reserves. However, starting in August 1968, devaluation began to take place more often as the Government decided that the real exchange rate should be kept constant so as not to discourage exports.

Such being the case, any inflationary pressure coming from the external sector would no longer stem from the import side, but rather from the exports, at least as far as this new policy succeeded in equilibrating the Balance of Payments. Actually, there has been

a "surplus". And, given that the "import imbalances" deal with the first of these pressures, that is to say, pressures coming from the side of "imports", they are no longer suitable to explain the pressures on prices due to the external sector of the Brazilian economy. Equation "A-2" therefore may be chosen for the period 1948/67 and equation "A-1" from then on.

The Monetarist Model

With respect to the two alternative equations of the monetary model, the case does not differ very much from the previous one. Indeed, as one can see by inspecting Graph V-2, the equation "B-2", which includes "import imbalances" among the independent variables, reproduces all but one of the variations in price changes in the period 1948/57, whereas equation "B-1" misses twice. For the period 1958/67 the two of them do equally well. Again, then, odds are in favor of the equation which includes the "import imbalances". Nevertheless, equation "B-2", for the period 1968/69, leads to results not so satisfactory with respect to price growth rate estimates, as can be seen in Table V-2.

GRAPH V-2

WHOLESALE PRICE INDEX

RATES OF CHANGE

1948 / 1967

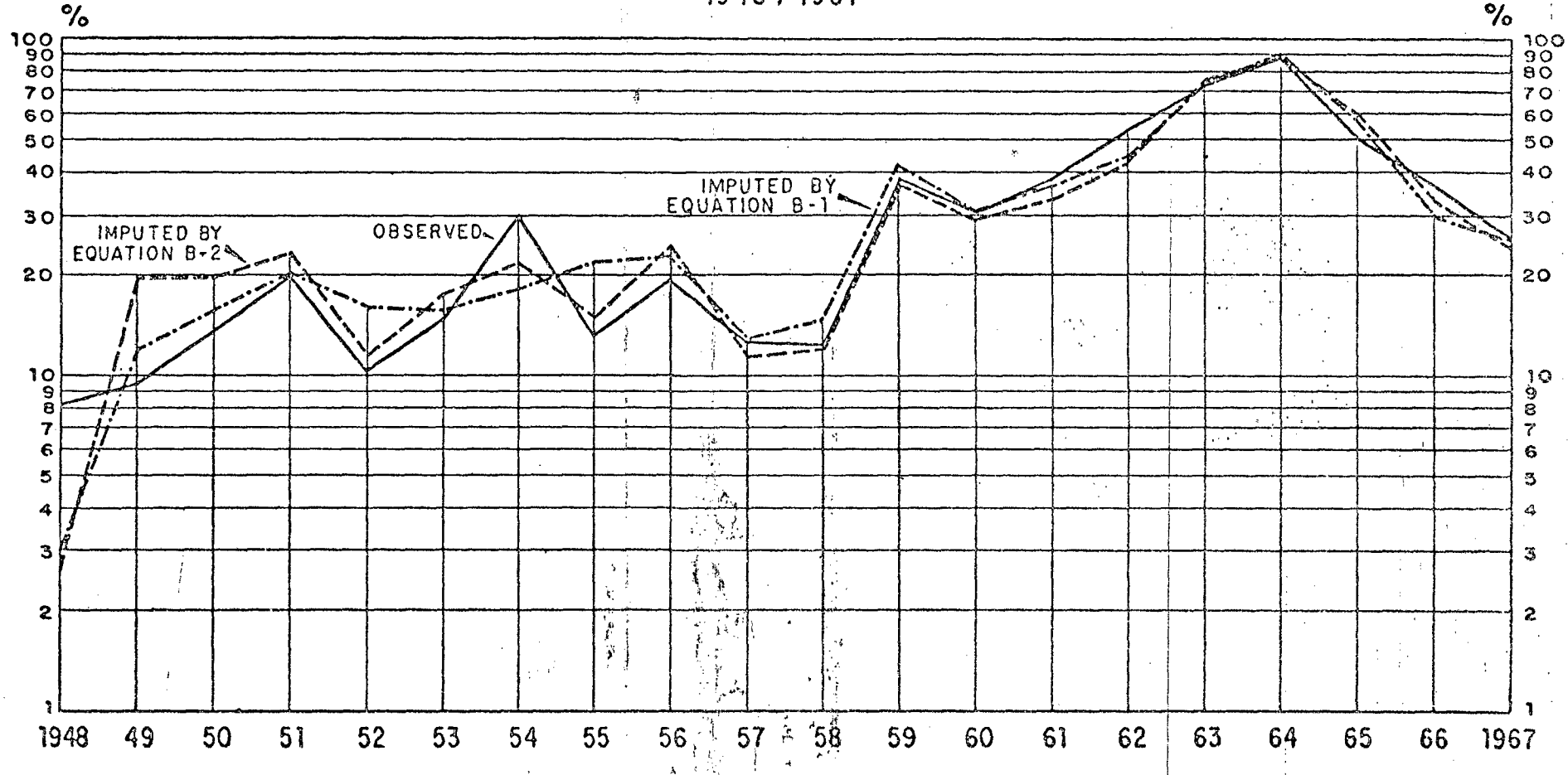


TABLE V-2

Wholesale Price Index

Observed - Imputed

1968/1969

Rates of Change

Period	Observed	Imputed		Absolute Deviation	
		Eq. B-1	Eq. B-2	Eq. B-1	Eq. B-2
1968	24.06%	28.07%	30.29%	4.01	6.13
1969	29.47%	20.13%	22.28%	0.66	2.81

In fact, the equation which includes "import imbalances" tends to produce poorer estimates, thus repeating what also observed with respect to the alternative equations of the "structuralist approach".

Again, neither of the equations should be considered as absolutely superior. But given that the main difference between equations "B-2" and "B-1" refers to the inclusion or not of import imbalances, we can proceed as in the case of the structural approach. Hence, equation "B-2", which includes the import imbalances is regarded as most appropriate in accounting for inflation

in the period 1948/67, whereas equation "B-1", provides a better explanation for more recent years.

Choosing between Models

One of the interesting points which arises from the previous comparisons is that, at least for the years of 1968/69, the two price equations of the structuralist-monetarist model are obviously more powerful than those of the monetarist model with respect to estimating the real evolution of growth rates of prices. Indeed, equation "A-1" price growth rate estimates are much closer to the observed one than those stemming from its counterpart in the monetarist model (equation "B-1"). The same is also true with respect to equation "A-2" and its counterpart, that is, equation "B-2". For earlier periods, no significant differences can be noted.

This being the case, one could, of course, just take the set of equations "A-1" and "A-2", that is to say, to choose the structuralist-monetarist model as that one which yields better results, thus ignoring any problems relating to assumptions regarding either the very initial cause of inflation or the nature of the inflationary process.

CHAPTER VI

IMPLICATIONS AND FURTHER TESTS

The acceptance of the monetarist-structuralist model as the best way to test the different hypothes regarding the real contribution to inflation stemming from structural and monetary disturbances led us to conclude that inflation in Brazil was of a dual nature. It should be noted besides that the monetarist model yields parameters for the structural variables not very different from those yielded by the better formulated model. In these circumstances the controversy is reduced to a question of determining the degree to which each of them accounts for the observed price increase rates on a year to year basis.

One additional question which can be posed on the basis of a year to year analysis is that of the evolution of the factor price ratios and their effects on the evolution of employment, production, income growth, etc. Indeed, since the cost push variable is the wage imbalance, its relative strength in comparison with demand-pull variables can be taken as a good proxy for the relation between the rewards of labor and capital.

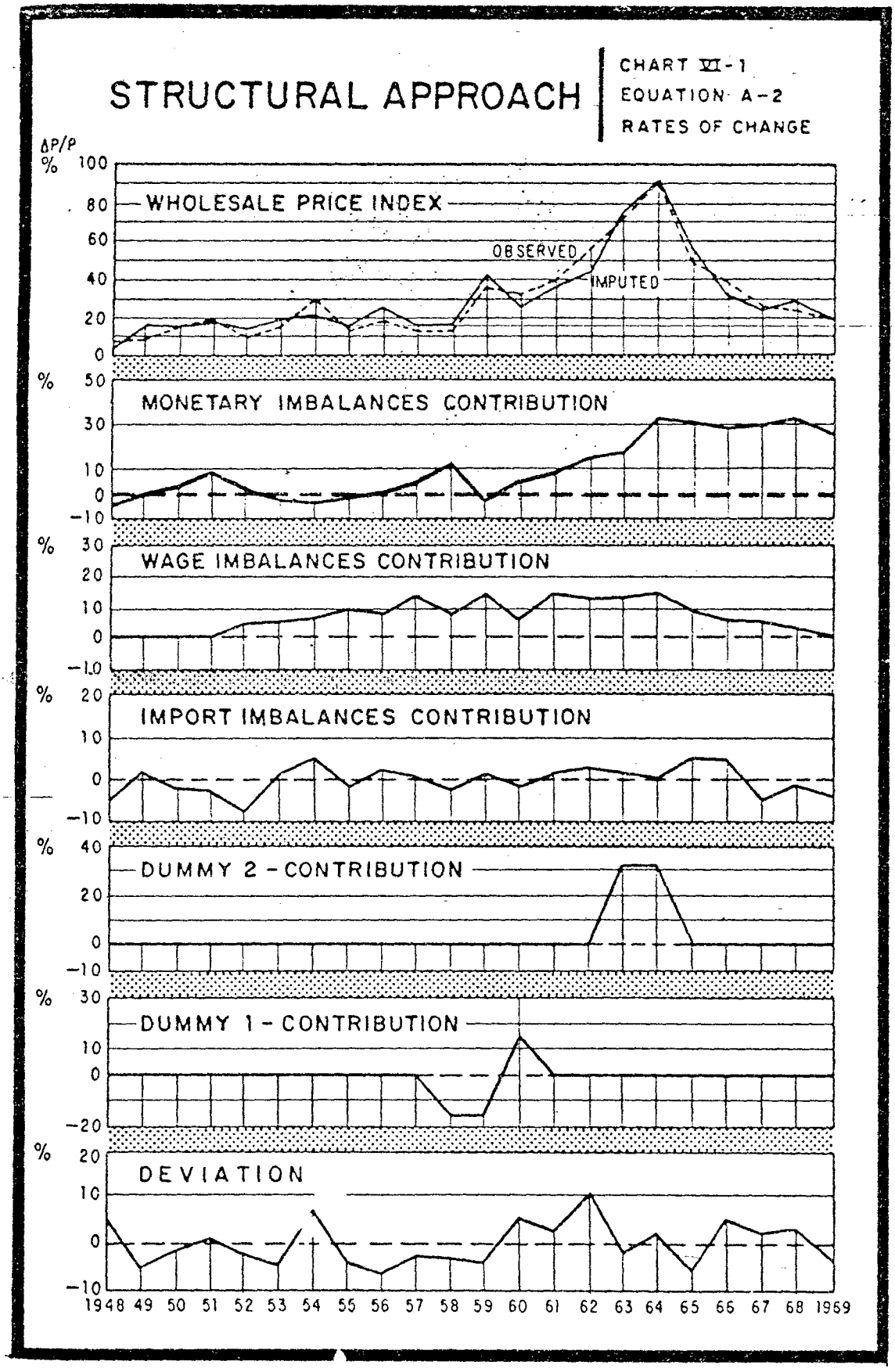
However, before any attempt is actually made in this direction, two questions have to be raised. The questions are:

First: Can this dual nature of the inflation be identified, year after year throughout the period? Or, can one speak of alternating periods of demand pull or cost push inflation?

Second: In case of periods where both elements are present, which one worked with higher intensity? Did the cost push effects overwhelm the demand pull ones? Was it the opposite?

The year by year evolution is presented in a Tinbergen Chart for equation "A-2". Notwithstanding the choice of this particular price equation, Tinbergen Charts are also offered for the other three in the Appendix.

Tackling first the problem of structuralism as against monetarism, a quick look at Chart VI-1 suffices to note that "import imbalances", the most traditional structural disturbance factor in the model, did not play an important role as an inflationary source. In fact, the price growth rates which they could account for was never beyond 5% a year. Moreover, when import imbalances were an inflationary factor in one year they almost always were an anti-inflationary force in the ensuing years. Hence the general role of this variable was to make price changes fluctuate around the determined trend rather than to cause any


STRUCTURAL APPROACH
CHART XI-1
EQUATION A-2
RATES OF CHANGE
ΔP/P
%
WHOLESALE PRICE INDEX
OBSERVED
IMPUTED
MONETARY IMBALANCES CONTRIBUTION
WAGE IMBALANCES CONTRIBUTION
IMPORT IMBALANCES CONTRIBUTION
DUMMY 2 - CONTRIBUTION
DUMMY 1 - CONTRIBUTION
DEVIATION
1948 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 1969

market change in the intensity of the inflationary process under study.

This being the case, the origin of "wage imbalances" cannot be traced back to the effects of the import imbalances on prices As a matter of fact, it was only in 1952 that the problem with wages first arose. At that time, as well as in the two previous years, import imbalances worked as an anti-inflationary variable. Hence, it is far more likely that the "wage imbalance" was motivated by increase in wages as a response to inflation originated in the money market and/or to a desire to increase real wages as a policy of income redistribution. As from 1948 to 1951 the "monetary imbalances" were the main source of inflation, it follows that the wage price spiral can be thought of as a phenomenom fully attributable to mismanagement in the money and labor market, with the import imbalances playing a role only occasionally.

Another possible interpretation for the wage imbalance could be, of course, that it was the instrument by which the government undertook a policy of income redistribution. But again, the phenomenon could not be attributed to structural rigidities or insensitivity to price changes by the primary and external sector of the economy.

In short, the result of the inflation test even stemming from a formulation according to a structural approach to inflation shows that in the case of Brazil it had nothing to do with structural rigidities. At best it could be attributed to a policy of income redistribution.

As to the problem of cost-push factors as against demand-pull ones, the previous discussion narrows down the problem of inflation to just the wage and monetary imbalances. Under these circumstances, the question of wage evolution as against profits can be more appropriately explored.

With respect to this point, however, Chart VI-1 does not make it easy to follow up the relative strength of the two variables. Therefore, the discussion is based on Table VI-1.

By confining attention first to the figures of column 5 of the table, in which we have a ratio of the contribution to inflation of wage and monetary imbalances - defined just for positive values - one can spot two distinct periods.

The first of these, which goes from 1948 up to 1951, is clearly a time in which inflation was essentially of a demand-pull nature. From 1952 onward it assumes an hybrid nature.

TABLE VI-1

ESTIMATED PRICE INDEX EVOLUTION

Wage and Monetary Imbalances Contribution

1948/1969

Period	Prices Imbalances: Wage Imbalances (1)	Monetary Imbalances (2)	Growth Rates Percentage Over equilibrium levels Contribution to Inflation Wage Imb. (3)	Mon. Imbal. (4)	(3/(4)
1948	0.00	-8.29	0.00	-4.37	
1949	0.00	1.00	0.00	0.53	0.00
1950	0.00	6.42	0.00	3.38	0.00
1951	0.00	17.86	0.00	9.40	0.00
1952	51.23	5.80	4.70	3.05	1.54
1953	61.58	-2.26	5.95	-1.19	
1954	74.30	-6.92	7.23	-3.64	
1955	105.55	-0.22	10.64	-0.12	
1956	85.97	1.45	9.11	0.76	11.98
1957	123.46	7.77	12.90	4.09	3.15
1958	83.44	22.26	9.53	11.72	0.81
1959	118.48	-4.30	14.24	-2.26	
1960	68.23	11.41	8.45	6.01	1.40
1961	104.23	16.78	13.34	8.84	1.50
1962	98.50	27.23	12.87	14.34	0.90
1963	93.28	33.62	12.08	17.70	0.68
1964	103.51	62.30	13.67	32.81	0.42
1965	84.41	59.59	10.21	31.48	0.32
1966	46.61	16.61	6.11	8.75	0.70
1967	43.06	18.29	5.53	9.63	0.56
1968	28.59	23.57	3.89	12.41	0.31
1969	11.88	11.35	1.63	6.02	0.27

Sources: Tables A-7 and A-12

for instance, that the capital labor ratio in the industrial sector moved in the same direction as the figures of column 5 in Table VI-1. As a corollary, changes might be anticipated in the rates of growth of industrial employment, either in absolute or relative terms. In addition, drastic changes could also be expected with respect to the evolution of private investment and GNP.

Of course, these are not necessary results. After all, factors of production could be complementary; the marginal propensity to save of laborers could be higher than that of entrepreneurs and the capital market could have been efficient enough to properly channel these additional sayings. However, none of these qualifications seems to be particularly relevant. At least studies already developed show that the Brazilian capital market was extremely imperfect in the period and that the capital/labor ratio has shown considerable changes.[1]

Nevertheless, there wil be no attempt to prove that the evolution of these variables was actually explained by the change in factor price ratios. In this respect, all that is undertaken is to

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1 Ministry of Planning, [1967]

check in general terms the consistency of the findings of the inflation model under the assumption of substitutability of factors of production. The evolution of these variables in a way which seems compatible with the implied behavior stemming from the inflationary model, will be, therefore, taken as confirmation of the plausibility of the inflation model. On the other hand, incompatible evolution will be just considered an inconclusive test, tending to diminish somewhat its plausibility.

Industrial Employment

With respect to the evolution of industrial employment in the period 1948/69, figures are only partially available. Nevertheless, there is the chance to work with annual average growth rates for three periods which correspond to three different situations regarding relative factor prices. And in this respect the figures of Table VI-2 are quite enlightening.

TABLE VI-2

MANUFACTURING INDUSTRY

Production-Employment

Period	Annual Growth Rates		
	Employment (1)	Production (2)	(1) ÷ (2)
1940-50[a]	5.0%	8.2%	0.69
1949-59[b]	2.6%	10.2%	0.25
1964-69[b]	4.6%	7.0%	0.66

Sources: Ministry of Planning (IPEA), FGV, IBGE.

Notes: (a) - Workers employed on September 1st, 1940 and January 1st, 1950, and monthly average production index.

(b) - Monthly Average of workers employed and production index.

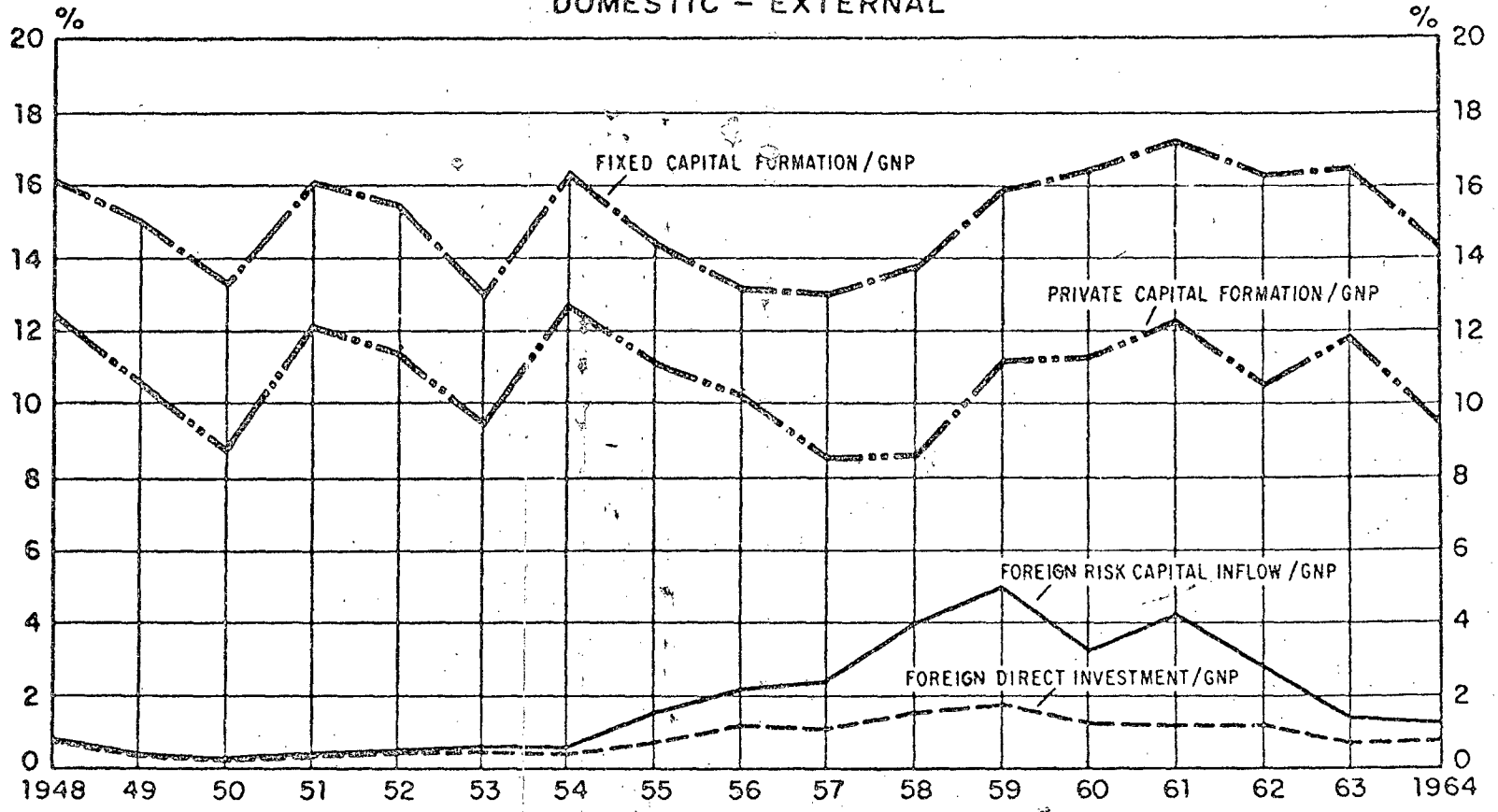
In fact, the decade 1949/59 shows that employment growing at a much slower pace than in the two other periods, either in absolute or relative terms. And, no doubt, it was in the 1949/59 decade that the price of labor rose considerably relative to that of capital, the reverse being true for the period 1944 to 1950 and from 1962 to 1969, as shown by the evolution of wage imbalances.

At least, with respect to employment, the observed behavior is very much in line with the conclusions drawn regarding the causes of inflation.

GRAPH VI - 2

BRASIL

INVESTMENTS – PRIVATE SECTOR
DOMESTIC – EXTERNAL



Private Investment

One probable additional result which could have originated from the inflationary mechanism in Brazil could be a fall in private investment. But here the possibility depends fundamentally on whether or not business enterprises were limited to financing their investments with their own resources. Hence, there is the need to examine the evolution of investment and its financing.

In general, however, investors in Brazil - in addition to their own resources - did have two alternatives, namely: national official financing institutions and foreign private and official sources of financing. Accordingly, we may examine the evolution of private investment and foreign financing.

In fact, by examining Graph VI-2, one can note that from 1948 up to 1954 the ratio of investment in fixed capital to GNP varied considerably around an average of about 15%. From 1954 to 1958 there was a downward trend, the opposite being true for the more recent years.

Now, considering that it was in the period 1952/58 that the inflation was predominantly of a cost-push nature, the downward trend observed in the private investment/GNP ratio can, in part, be

attributed to an insufficiency of resources.

In this respect, the evolution of foreign capital tends to confirm the hypothesis. In fact, by disaggregating the inflow of foreign capital into direct investment and "suppliers credit", it is easy to note that starting in 1952 the suppliers' credit began to be an increasingly important source of financing up to 1959. From then on it began to decrease steadily. That is to say, suppliers' credit seemed to have functioned as a substitute for internally generated investment funds of business enterprises.

Investment changes and the inflow of foreign capital also tend to confirm, as much as the evolution employment, the validity of the findings of the inflation model used in this study. Hence, it can be held as good enough as far as the understanding of inflation in Brazil is concerned.

CLOSING REMARKS

Essentially, what the foregoing chapters have shown can be summed up in the following set of observations:

The first is that, as framed, the model called for independent variable measurements such that:

- the relative inflationary strength of the structural and monetary variables could be tested in ways that vary from "extremely favorable to the structural factors" to "extremely favorable to the monetary disturbances."
- the model has a built-in allowance for partial and temporary absorption of cost-push inflationary effects by growth pattern of GNP. Hence it can capture the full price reaction to wage adjustments over some unspecified time interval.

Secondly, under these circumstances the findings were that:

- no matter which way the hypothesis was tested, the structural as well as the monetary variables did significantly enter the price equations.
- the role played by the import, wage and monetary imbalances varied considerably over time and in several years price increases were fully accounted for by just one or two of such disturbances.

A third set of observations were those related to tests of compatibility between the implied and observed behavior of variables which could be affected by inflation. The conclusions were that:

- in fact the growth rate of employment relative to production during the ninety fifties was significantly lower than in the forties and sixties, the two decades in which wage pressures did not exist or were being drastically reduced.
- private investment in the nineteen fifties - especially from 1955 up to 1959 - slackened as a proportion of GNP, in spite of the increasing use of foreign suppliers' credit as a source of investment financing.

Finally, some comment needs to be made concerning the this study. In effect, although the model led to plausible findings, there can be no claim that, in fact, it provided estimates for the real contribution of structural as well as monetary variables to inflation, since data availability precluded the possibility of:

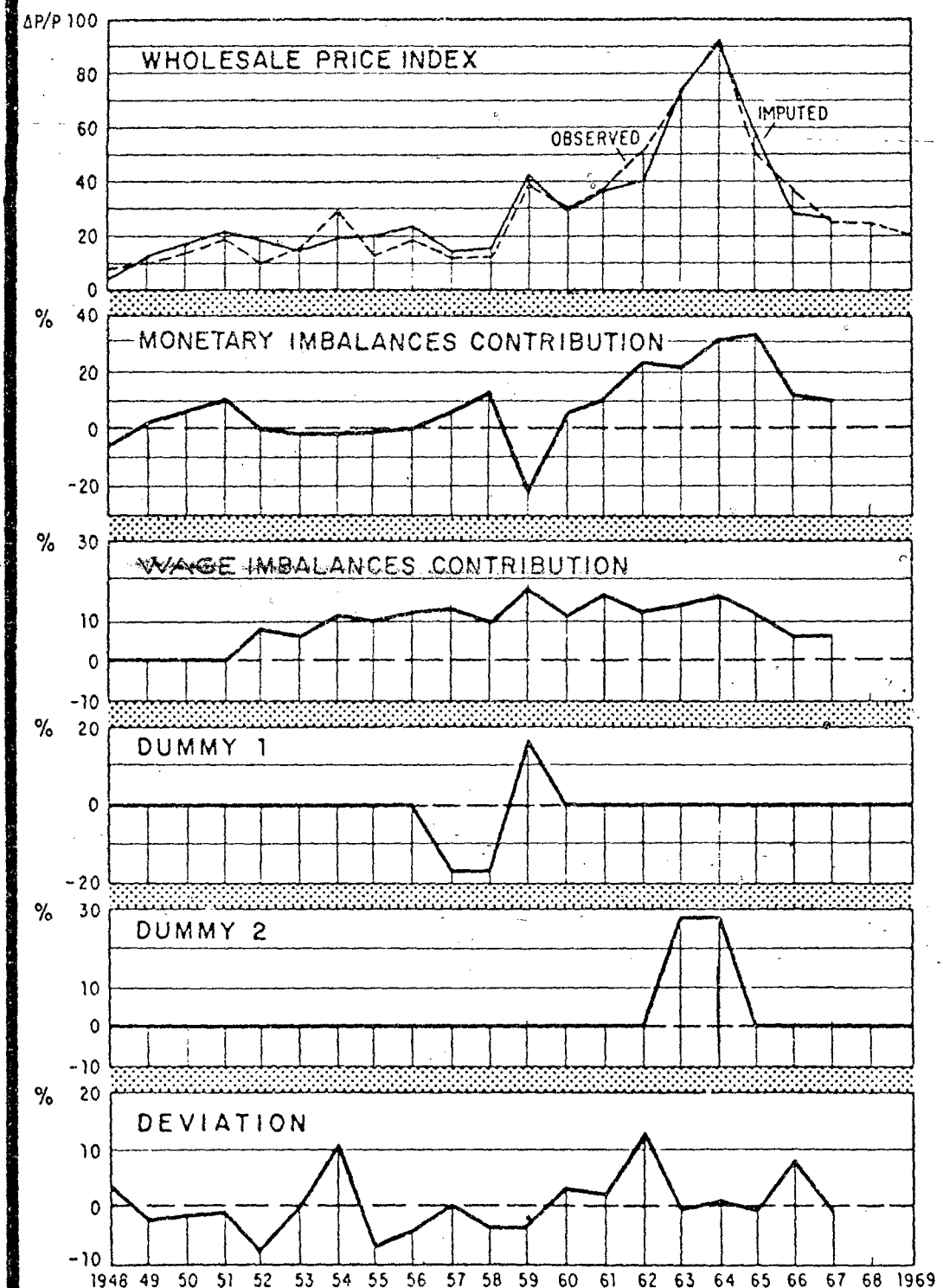
- taking into account inflationary factors such as increases in excise tax rates, international price increases of Brazil's main export products, etc.
- breaking down the price increases of manufatured goods in such a way that the wage imbalances could be more precisely measured.

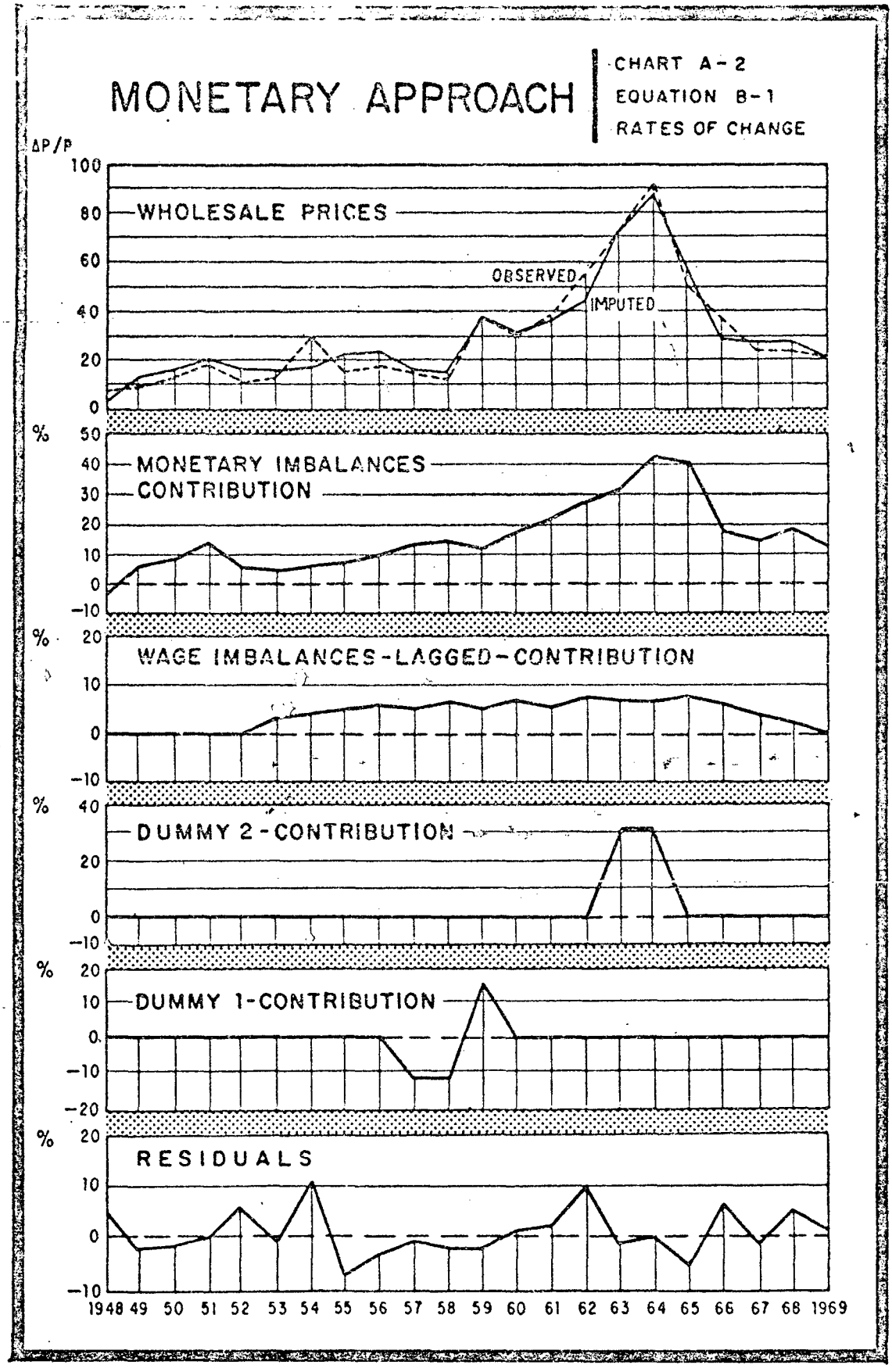
In any event, the model as tested seems to provide valid evidence regarding the nature of the Brazilian inflationary process.

APPENDIX

STRUCTURAL APPROACH

CHART A-1
EQUATION A-1
RATES OF CHANGE




MONETARY APPROACH
CHART A-2
EQUATION B-1
RATES OF CHANGE
ΔP/P
WHOLESALE PRICES
OBSERVED
IMPUTED
%
MONETARY IMBALANCES
CONTRIBUTION
WAGE IMBALANCES-LAGGED-CONTRIBUTION
DUMMY 2-CONTRIBUTION
DUMMY 1-CONTRIBUTION
RESIDUALS
1948 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 1969

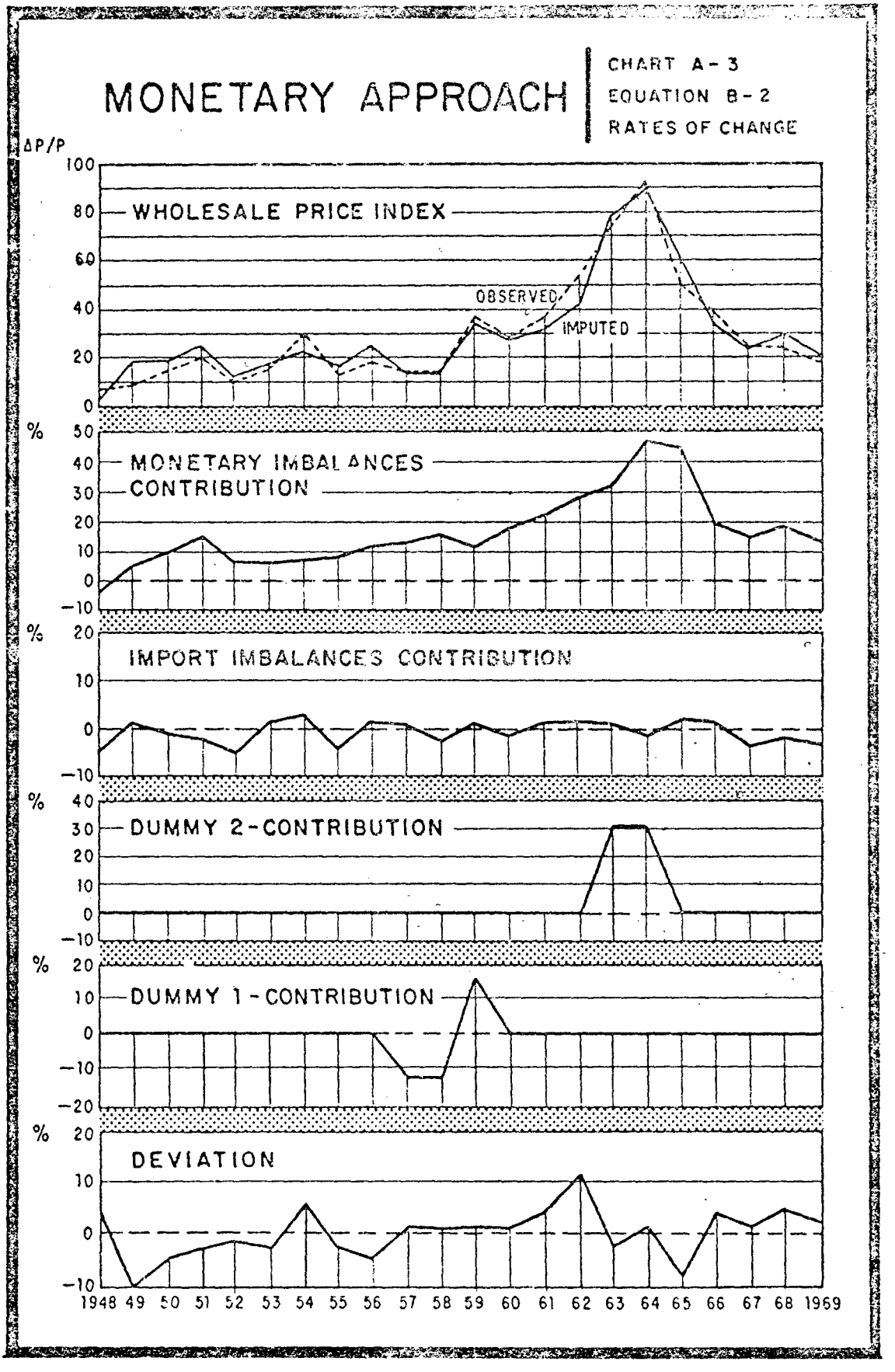

MONETARY APPROACH
CHART A-3
EQUATION B-2
RATES OF CHANGE
ΔP/P
WHOLESALE PRICE INDEX
OBSERVED
IMPUTED
%
MONETARY IMBALANCES CONTRIBUTION
IMPORT IMBALANCES CONTRIBUTION
DUMMY 2-CONTRIBUTION
DUMMY 1-CONTRIBUTION
DEVIATION
1948 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 1969

TABLE A-1

LEGAL MINIMUM MONTHLY WAGE RATE - SÃO PAULO NCr$ 1,00*

	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
1943						0,27	0,27	0,27	0,27	0,27	0,27	0,36
1944/51	0,36	0,36	0,36	0,36	0,36	0,36	0,36	0,36	0,36	0,36	0,36	0,36
1952	1,19	1,19	1,19	1,19	1,19	1,19	1,19	1,19	1,19	1,19	1,19	1,19
1953	1,19	1,19	1,19	1,19	1,19	1,19	1,19	1,19	1,19	1,19	1,19	1,19
1954	1,19	1,19	1,19	1,19	1,19	1,19	2,30	2,30	2,30	2,30	2,30	2,30
1955	2,30	2,30	2,30	2,30	2,30	2,30	2,30	2,30	2,30	2,30	2,30	2,30
1956	2,30	2,30	2,30	2,30	2,30	2,30	2,30	3,70	3,70	3,70	3,70	3,70
1957	3,70	3,70	3,70	3,70	3,70	3,70	3,70	3,70	3,70	3,70	3,70	3,70
1958	3,70	3,70	3,70	3,70	3,70	3,70	3,70	3,70	3,70	3,70	3,70	3,70
1959	5,90	5,90	5,90	5,90	5,90	5,90	5,90	5,90	5,90	5,90	5,90	5,90
1960	5,90	5,90	5,90	5,90	5,90	5,90	5,90	5,90	5,90	7,67	9,44	9,44
1961	9,44	9,44	9,44	9,44	9,44	9,44	9,44	9,44	9,44	11,12	13,22	13,22
1962	13,22	13,22	13,22	13,22	13,22	13,22	13,22	13,22	13,22	13,22	13,22	13,22
1963	21,00	21,00	21,00	21,00	21,00	21,00	21,00	21,00	21,00	21,00	21,00	21,00
1964	21,00	24,62	42,00	42,00	42,00	42,00	42,00	42,00	42,00	42,00	42,00	42,00
1965	42,00	42,00	66,00	66,00	66,00	66,00	66,00	66,00	66,00	66,00	66,00	66,00
1966	66,00	84,00	84,00	84,00	84,00	84,00	84,00	84,00	84,00	84,00	84,00	84,00
1967	84,00	84,00	105,00	105,00	105,00	105,00	105,00	105,00	105,00	105,00	105,00	105,00
1968	105,00	105,00	129,60	129,60	129,60	129,60	129,60	129,60	129,60	129,60	129,60	129,60
1969	129,60	129,60	129,60	129,60	156,00	156,00	156,00	156,00	156,00	156,00	156,00	156,00

* NCr$ 1.00 = Cr$ 1.000,00

Source: Anuário Estatístico do IBGE

TABLE A-2

GROSS NATIONAL PRODUCT AND MONEY SUPPLY

1947/1969

NCr$ 1.000.000,00

	MONEY SUPPLY		G N P		G N P (1)	
	Levels*	% Increase	Levels NCr$ 1949	% Increase	Levels NCr$ 1949	% Increase
1947	46,3		186,5		200,7	-
1948	46,9	1,30	204,2	9,5	215,6	7,4
1949	53,7	14,50	215,6	5,6	229,9	6,6
1950	67,0	24,76	226,4	5,0	244,8	6,5
1951	86,6	29,25	238,0	5,1	259,3	6,0
1952	100,2	15,70	251,4	5,6	281,9	8,7
1953	112,6	12,38	259,4	3,2	289,0	2,5
1954	136,9	21,58	279,4	7,7	318,2	10,1
1955	162,9	18,99	298,4	6,8	340,0	6,9
1956	196,5	20,63	304,0	1,9	350,8	3,2
1957	243,2	27,77	324,9	6,9	379,1	8,1
1958	323,8	33,14	346,5	6,6	408,3	7,7
1959	411,6	27,12	371,9	7,3	431,1	5,6
1960	570,4	38,58	396,7	6,7	472,9	9,7
1961	823,7	44,41	425,6	7,3	521,6	10,3
1962	1.270,8	54,23	448,4	5,4	549,0	5,3
1963	2.006,7	57,91	455,6	1,6	557,5	1,5
1964	3.741,4	86,45	469,8	3,1	573,8	2,9
1965	6.853,2	83,17	487,9	3,9	589,5	2,7
1966	9.454,1	37,95	504,5	3,4	619,6	5,1
1967	12.688,1	34,21	529,2	4,9	649,2	4,8
1968	18.061,6	42,40	573,7	8,4	703,7	8,4
1969	23.722,2	31,30	625,3**	9,0	767,0**	9,0

Source: Banco Central, Sumoc e FGV

* Monthly Average, Stock

** Estimates

(1) - Revised figures

TABLE A-3

NATIONAL ACCOUNTS STATISTICS

1949/ = 100

	GNP	INDUSTRY		INDUSTRY SHARE	
		Non Adjusted	Adjusted(1)	%	Index
1947	86,5	81,4	18,77	21,7	100,00
1948	94,7	90,6	20,89	22,6	101,84
1949	100,0	100,0	23,06	23,1	106,45
1950	105,0	111,4	25,68	24,5	112,90
1951	110,4	118,5	27,32	24,7	113,82
1952	116,6	124,4	28,68	24,6	113,36
1953	120,3	135,2	31,17	25,9	119,35
1954	129,6	146,7	33,83	26,1	120,27
1955	138,4	162,3	37,43	27,0	124,42
1956	141,0	173,5	40,00	28,4	130,88
1957	150,7	183,2	42,25	28,0	129,03
1958	160,7	213,2	49,16	30,6	141,01
1959	172,5	240,7	55,51	32,2	148,39
1960	184,0	264,8	61,06	33,2	153,00
1961	197,4	293,4	67,66	34,3	158,06
1962	208,0	316,0	72,87	35,0	161,30
1963	211,3	318,2	73,37	34,7	159,91
1964	217,9	334,1	77,04	35,4	163,13
1965	226,3	318,3	73,40	32,4	149,31
1966	234,0	355,9	82,07	35,1	161,75
1967	245,5	366,0	84,40	34,4	158,53
1968	266,1	420,9	97,06	36,5	168,20
1969	290,0	463,0	106,77	36,8	169,59

(1) Adjustment made taking the industry share of GNP in 1947/48

TABLE A-4

FOREIGN CAPITAL INFLOW

YEAR	US$ 1 000 000.0			Effective Exchange Rates (1)	Cr$ 1 000 000,00		
	Direct Investment	Loans to Private Sec	Total		Direct Investment	Loans to Private Sec	Total
1947	55	-	55	18,73	1 030,15	-	1 030,15
1948	67	-	67	18,72	1 254,24	-	1 254,24
1949	44	-	44	18,72	823,68	-	823,68
1950	39	-	39	18,72	730,08	-	730,08
1951	63	-	63	18,72	1 179,36	-	1 179,36
1952	94	-	94	18,72	1 759,68	-	1 759,68
1953	60	21	81	32,34	1 940,40	679,14	2 619,54
1954	51	32	83	41,78	2 130,78	1 336,96	3 467,74
1955	79	83	162	63,80	5 040,20	5 295,40	10 335,60
1956	139	131	270	73,76	10 252,64	9 662,56	19 915,20
1957	178	211	389	66,14	11 772,92	13 955,54	25 728,46
1958	128	223	351	149,35	19 116,80	33 305,05	52 421,85
1959	158	291	449	201,75	31 876,50	58 709,25	90 585,75
1960	138	217	355	222,79	30 745,02	48 345,43	79 090,45
1961	147	346	493	296,84	43 635,48	102 706,64	146 342,12
1962	132	178	310	495,50	65 406,00	88 199,00	153 605,00
1963	87	93	180	767,77	66 795,99	71 402,61	138 198,60
1964	86	54	140	1 688,05	145 172,30	91 154,70	236 327,00
1965							

SOURCE: IPEA - Ministry of Planning.

(1) - Average for the year.

TABLE A-5

INVESTMENT - GNP

NCr$ 1 000 000,00

YEAR	Fixed Capital Investments			Foreign Capital Inflow			GNP	(3) : (7)	(2) : (7)	(4) : (7)	(6) : (7)
	GOV (1)	Private (2)	Total (3)	Direct. Invest. (4)	Loans to Private Sec. (5)	Total (6)	(7)				
1947	4,5	23,9	28,4	1,03	-	1,03	164,3	17,3	14,6	0,6	0,6
1948	7,0	23,0	30,0	1,25	-	1,25	186,8	16,1	12,3	0,7	0,7
1949	9,5	22,8	32,3	0,82	-	0,82	215,6	15,0	10,6	0,4	0,4
1950	11,7	21,9	33,6	0,73	-	0,73	253,3	13,3	8,7	0,3	0,3
1951	12,1	37,1	49,2	1,18	-	1,18	306,1	16,1	12,1	0,4	0,4
1952	14,3	40,1	54,4	1,76	-	1,76	352,1	15,5	11,4	0,5	0,5
1953	15,1	40,7	55,8	1,94	0,68	2,62	430,7	13,0	9,5	0,5	0,6
1954	20,8	70,6	91,4	2,13	1,34	3,47	558,2	16,4	12,7	0,4	0,6
1955	22,3	76,9	99,2	5,04	5,30	10,34	695,1	14,3	11,1	0,7	1,5
1956	26,8	90,2	117,0	10,25	9,66	19,92	887,2	13,2	10,2	1,2	2,3
1957	47,4	90,5	137,9	11,77	13,96	25,73	1 059,8	13,0	8,5	1,1	2,4
1958	68,5	112,5	181,0	19,12	33,31	52,42	1 313,6	13,8	8,6	1,5	3,4
1959	85,5	202,5	288,0	31,88	58,71	90,59	1 806,0	16,0	11,2	1,8	5,0
1960	126,5	273,2	399,7	30,75	48,35	79,09	2 418,8	16,5	11,3	1,3	3,3
1961	170,6	429,6	600,2	43,64	102,71	146,34	3 498,6	17,2	12,3	1,3	4,2
1962	313,6	580,1	893,7	65,41	88,20	153,61	5 498,0	16,3	10,6	1,2	2,8
1963	440,3	1 139,6	1 579,9	66,80	71,40	138,20	9 591,2	16,5	11,9	0,7	1,4
1964	903,6	1 792,9	2 696,5	145,17	91,15	236,33	18 867,3	14,3	9,5	0,8	1,3
1965	1 601,4	1 697,4	3 298,8				30 796,5	10,7	5,5		
1966	2 237,6	3 431,0	5 668,6				44 396,4	12,8	7,7		

SOURCE: F.G.V. and TABLE A-4.

WAGE IMBALANCE

DEFINITION I (lower limit)

W_n' CORRECTED BY INCREASE IN P_{MA}

NO LAG

PERIOD	(1) W_L (**) Cr$ 1,00	(2) P_{MA} (*) 1944 = 100	(3) y 1944 = 100	(4) W_n' (**) Cr$ 1,00	(5) $(W_L - W_n)/W_n'$ %	(6) $I_{w.c}$ (*) 1947 = 100	(5) (6)
1944	4 320.00	100.00	100.00	4 320.00	0.0		
1945	4 320.00	107.69	103.00	4 320.00	0.0		
1946	4 320.00	121.15	106.09	4 791.78	0.0		
1947	4 320.00	119.23	109.28	5 552.41	0.0	100.0	0.0
1948	4 320.00	121.15	114.69	5 628.73	0.0	101.84	0.0
1949	4 320.00	126.92	117.63	6 002.50	0.0	106.45	0.0
1950	4 320.00	130.77	119.86	6 449.58	0.0	112.90	0.0
1951	4 320.00	153.84	122.45	6 771.20	0.0	113.82	0.0
1952	14 280.00	167.30	125.51	8 137.89	75.48	113.36	85.56
1953	14 280.00	192.31	125.75	9 071.06	57.42	119.35	68.53
1954	20 940.00	253.84	131.51	10 447.04	100.44	120.27	120.79
1955	27 600.00	288.46	136.33	14 421.24	91.38	124.42	113.70
1956	34 600.00	357.69	134.80	16 988.72	103.66	130.88	135.67
1957	44 400.00	419.23	139.86	20 829.58	113.16	129.03	146.01
1958	44 400.00	490.39	144.80	25 329.68	75.29	141.01	106.17
1959	70 800.00	703.85	150.92	30 675.66	130.80	148.39	194.09
1960	81 420.00	869.24	156.21	45 889.22	77.43	153.00	118.47
1961	124 608.00	1 238.47	162.56	58 658.68	112.43	158.06	177.71
1962	158 592.00	1 794.25	166.09	86 972.69	82.35	161.30	132.83
1963	252 000.00	3 290.42	163.39	128 739.02	95.74	159.91	153.10
1964	483 000.00	6 032.76	163.39	232 252.58	107.96	163.13	176.12
1965	768 000.00	9 740.50	164.68	425 819.22	80.36	149.31	119.99
1966	972 000.00	12 886.69	165.27	692 956.31	40.27	161.75	65.14
1967	1 298 000.00	16 215.57	168.21	920 066.37	41.08	158.53	65.12
1968		21 145.10	177.13	1 178 332.28			
1969		25 352.97	187.58	1 618 026.43			

SOURCE: Anuário Estatístico do IBGE e Fundaçao Getulio Vargas.

(*) - Average for the year.

(**) - Annual wage rate.

TABLE A-7

WAGE IMBALANCE

DEFINITION 2 (Upper Limit)

NO LAG

PERIOD	(1) W_L (**) Cr$	(2) P_{MA} (*) 1944 = 100	(3) Y 1944 = 100	(4) W_m (**) Cr$ 1,00	(5) $(W_L - W_m)/W_m$ %	(6) $I_{w.c}$ (*) 1947 = 100	(5) (6)
1944	4 320. -	100.00	100.00	4 320. -	0.0		0.0
1945	4 320. -	107.69	103.00	4 320. -	0.0		0.0
1946	4 320. -	121.15	106.09	4 791.78	0.0		0.0
1947	4 320. -	119.23	109.28	5 552.41	0.0	100. -	0.0
1948	4 320. -	121.15	114.69	5 628.73	0.0	101.84	0.0
1949	4 320. -	126.92	117.63	6 002.50	0.0	106.45	0.0
1950	4 320. -	130.77	119.86	6 449.58	0.0	112.90	0.0
1951	4 320. -	153.84	122.45	6 771.20	0.0	113.82	0.0
1952	14 280. -	167.30	125.51	8 137.89	75.48	113.36	85.56
1953	14 280. -	192.31	125.75	8 341.24	71.20	119.35	84.98
1954	20 940. -	253.84	131.51	8 357.19	150.56	120.27	181.08
1955	27 600. -	288.46	136.33	8 740.00	215.79	124.42	268.49
1956	34 600. -	357.69	134.80	9 060.33	281.88	130.88	368.92
1957	44 400. -	419.23	139.86	8 958.65	395.61	129.03	510.46
1958	44 400. -	490.39	144.80	9 294.93	377.68	141.01	532.57
1959	70 800. -	703.85	150.92	9 623.23	635.72	148.39	943.34
1960	81 420. -	869.24	156.92	10 029.96	711.77	153.00	1 089.01
1961	124 608. -	1 238.47	162.56	10 428.71	1 094.86	158.06	1 730.54
1962	158 592. -	1 794.25	166.09	10 803.54	1 367.96	161.30	2 206.52
1963	252 000. -	3 290.42	163.39	11 038.14	2 182.99	159.91	3 490.82
1964	483 000. -	6 032.76	163.39	10 858.70	4 348.05	163.13	7 092.97
1965	768 000. -	9 740.50	164.68	10 858.70	6 972.67	149.31	10 410.89
1966	972 000. -	12 886.69	165.27	10 944.44	8 781.22	161.75	14 203.62
1967	1 298.000. -	16 215.57	168.21	10 983.64	11 717.58	158.53	18 575.88

SOURCE: Anuário Estatístico IBGE e Fundação Getúlio Vargas.

(*) Average for the year

(**) Annual wage rate

WAGE IMBALANCE

DEFINITION 1 - (Lower Limit)

W'_m - CORRECTED BY INCREASE IN P_{ma} AND Y

THREE MONTHS LAG

PERIOD	(1) W_L (**) Cr$ 1,00	(2) W'_m (**) Cr$ 1,00	(3) $(W_1 - W'_m)/W'_m$	(4) $I_{W.c}$ (*) 1947 = 100	(3) / (4)
Oct. 1943 - Sept. 1944	4 320.-	4 320.-	0.0		0.0
" 1944 " 1945	4 320.-	4 320.-	0.0		0.0
" 1945 " 1946	4 320.-	4 673.84	0.0		0.0
" 1946 " 1947	4 320.-	5 362.26	0.0	100.-	0.0
" 1947 " 1948	4 320.-	5 609.65	0.0	101.84	0.0
" 1948 " 1949	4 320.-	5 909.06	0.0	106.45	0.0
" 1949 " 1950	4 320.-	6 337.82	0.0	112.90	0.0
" 1950 " 1951	4 320.-	6 690.80	0.0	113.82	0.0
" 1951 " 1952	11 790.-	7 796.22	51.23	113.36	58.07
" 1952 " 1953	14 280.-	8 837.77	61.58	119.35	73.50
" 1953 " 1954	17 610.-	10 103.05	74.30	120.27	89.36
" 1954 " 1955	27 600.-	13 427.69	105.55	124.42	131.33
" 1955 " 1956	30 400.-	16 346.85	85.97	130.88	112.52
" 1956 " 1957	44 400.-	19 869.37	123.46	129.03	159.30
" 1957 " 1958	44 400.-	24 204.66	83.44	141.01	117.66
" 1958 " 1959	64 100.-	29 339.17	118.48	148.39	175.81
" 1959 " 1960	70 800.-	42 035.84	68.23	153.00	104.39
" 1960 " 1961	113 280.-	55 466.32	104.23	158.06	164.75
" 1961 " 1962	158 592.-	79 894.19	98.50	161.30	158.88
" 1962 " 1963	228 648.-	118 297.44	93.28	159.91	149.16
" 1963 " 1964	420 000.-	206 374.20	103.51	163.13	168.86
" 1964 " 1965	696 000.-	377 427.57	84.41	149.31	126.03
" 1965 " 1966	918 000.-	626 172.04	46.61	161.75	75.39
" 1966 " 1967	1 235 000.-	863 288.86	43.06	158.53	68.26
" 1967 " 1968	1 432 200.-	1 113 765.80	28.59	168.20	48.09
" 1968 " 1969	1 687 200.-	1 508 102.89	11.88	169.59	20.15

SOURCE: Anuário Estatístico do IBGE e Fundação Getúlio Vargas

(*) Average fo the year

(**) Annual wage rate.

TABLE A-9

WAGE IMBALANCE

DEFINITION 2 (Upper Limit)

THREE MONTHS LAG

PERIOD	(1) W_L (**) Cr$ 1,00	(2) W_m (**) Cr$ 1,00	(3) $(W_L - W_m)/W_m$ %	(4) $I_{w.c}$ (*) 1947 = 100	(3) (4)
Oct. 1943 - Sept. 1944	4 320. -	4 320. -	0.0		0.0
" 1944 " 1945	4 320. -	4 320. -	0.0		0.0
" 1945 " 1946	4 320. -	4 673.84	0.0		0.0
" 1946 " 1947	4 320. -	5 362.26	0.0	100. -	0.0
" 1947 " 1948	4 320. -	5 609.06	0.0	101.84	0.0
" 1948 " 1949	4 320. -	5 909.06	0.0	106.45	0.0
" 1949 " 1950	4 320. -	6 337.82	0.0	112.90	0.0
" 1950 " 1951	4 320. -	6 690.80	0.0	113.82	0.0
" 1951 " 1952	11 790. -	7 796.22	51.23	113.36	58.07
" 1952 " 1953	14 280. -	8 290.40	72.25	119.35	86.23
" 1953 " 1954	17 610. -	8 353.20	110.82	120.27	133.28
" 1954 " 1955	27 600. -	8 644.30	219.29	124.42	272.84
" 1955 " 1956	30 400. -	8 980.25	238.52	130.88	312.88
" 1956 " 1957	44 400. -	8 984.07	394.21	129.03	508.65
" 1957 " 1958	44 400. -	9 210.86	382.04	141.01	538.71
" 1958 " 1959	64 100. -	9 541.23	571.82	148.39	848.52
" 1959 " 1960	70 800. -	9 928.28	613.11	153.00	938.06
" 1960 " 1961	113 280. -	10 329.02	996.72	158.06	1 575.42
" 1961 " 1962	158 592. -	10 709.84	1 380.81	161.30	2 227.25
" 1962 " 1963	228 648. -	10 788.15	2 019.44	159.91	3 229.29
" 1963 " 1964	420 000. -	10 903.57	3 751.95	163.13	6 120.56
" 1964 " 1965	696 000. -	10 858.70	6 309.61	149.31	9 420.88
" 1965 " 1966	918 000. -	10 923.01	8 304.28	161.75	13 432.17
" 1966 " 1967	1 235 000. -	10 973.84	11 154.04	158.53	17 682.50

SOURCES: Anuário Estatístico do IBGE e Fundação Getúlio Vargas

(*) Average for the year

(**) Annual wage rate

TABLE A-10

FOOD IMBALANCES

PERIOD	FOOD PRODUCTION[1]		Per Capita Income % Increase	Population % Increase	Food Demand % Increase	A - B
	1948 = 100	% Inc. A				
1948	100 -	5.3	6.5	3.0	7.55	- 2.25
1949	105.00	5.0	2.5	3.0	4.75	+ 0.25
1950	110.98	5.7	1.9	3.1	4.43	+ 1.27
1951	112.98	1.8	2.1	3.0	4.47	- 2.67
1952	114.34	1.2	2.5	3.1	4.85	- 3.65
1953	120.97	5.8	0.2	3.0	3.14	+ 2.66
1954	127.62	5.5	4.6	3.1	6.32	- 0.82
1955	134.64	5.5	3.6	3.2	5.72	- 0.22
1956	137.60	2.2	- 1.1	3.0	2.23	- 0.03
1957	149.60	8.7	3.8	3.1	5.76	+ 2.94
1958	149.45	- 0.1	3.5	3.1	5.55	- 5.65
1959	152.89	2.3	4.2	3.1	6.04	- 3.74
1960	162.37	6.2	3.5	3.1	5.55	+ 0.65
1961	168.70	3.9	4.1	3.2	6.07	- 2.17
1962	178.99	6.1	2.2	3.0	4.54	+ 1.56
1963	185.08	3.4	- 1.6	3.0	2.02	+ 1.38
1964	193.96	4.8	0.0	3.1	3.10	+ 1.70
1965	216.65	11.7	0.8	3.1	3.66	+ 8.04
1966	210.58	- 2.8	0.3	3.1	3.31	+ 6.11
1967	219.63	4.3	1.8	3.1	4.36	+ 0.06

SOURCE: Conjuntura Econômica - FGV - 1968, 1964

(1) - Index of food production for final consumption

TABLE A-11

IMPORT IMBALANCES

PERIOD	(1) IMPORT QUANTUM INDEX	(2)	(3) Per Capita Income % Increase	(4) Population % Increase	(5) Demand For Imports % Increase	(2) - (5)
	Level	% Increase				
1947	70.0	40.0				34.00
1948	63.0	- 10.0	6.5	3.0	9.5	- 19.50
1949	73.0	15.87	2.5	3.0	5.6	10.27
1950	89.0	21.92	1.9	3.1	5.0	16.92
1951	135.0	51.69	2.1	3.0	5.1	46.59
1952	131.0	- 2.96	2.5	3.1	5.6	- 8.56
1953	100.0	-23.70	0.2	3.0	3.2	-26.90
1954	142.0	42.00	4.6	3.1	7.7	34.30
1955	126.0	-11.27	3.6	3.2	6.8	-18.70
1956	119.0	- 5.56	- 1.1	3.0	1.9	- 7.46
1957	145.0	21.85	3.8	3.1	6.9	14.95
1958	145.0	0.00	3.5	3.1	6.6	- 6.60
1959	160.0	10.34	4.2	3.1	7.3	3.04
1960	161.0	0.63	3.2	3.1	6.7	- 6.07
1961	151.0	- 6.21	4.5	3.2	7.3	-13.51
1962	140.0	- 7.28	2.4	3.0	5.4	-12.68
1963	146.0	4.28	- 1.4	3.0	1.6	2.68
1964	122.0	-16.44	0.0	3.1	3.1	-19.54
1965	101.0	-17.21	0.8	3.1	3.9	-21.11
1966	131.0	29.70	0.3	3.1	3.4	26.30
1967	145.0	10.69	1.8	3.1	4.9	5.79
1968	178.0	22.76	5.4	3.0	8.4	14.36
1969	196.0	10.00	6.0	3.0	9.0	1.00

SOURCE: FGV - Fundação Getúlio Vargas - Conjuntura Econômica.

TABLE A-12

MONETARY IMBALANCES

STRUCTURAL APPROACH

WAGE IMBALANCES LOWER LIMIT

YEAR	$\hat{P}/Pt-1$	Y NCr$1953	Contribution to M*/P*		M*/P*	P*	M*	M^*_t/M^*_{t-1}	$M_t/M_{t-1} - M^*_t/M^*_{t-1}$
			Y	$\hat{P}/\hat{P}t-1$					
1947	1 0000	297.8	60.48	- 33.70	83.88	100.00	83.88	-	-
1948	1 0419	326.1	66.23	- 35.11	88.22	104.19	91.92	9.59	- 8.29
1949	1 1299	343.3	69.08	- 38.08	88.75	117.72	104.47	13.65	0.85
1950	1 0809	377.9	76.75	- 36.43	97.42	127.24	123.96	18.66	6.10
1951	1 0700	397.3	80.69	- 36.06	101.73	136.15	138.51	11.73	17.52
1952	1 0729	415.8	84.45	- 36.16	105.39	146.08	153.95	11.15	4.55
1953	1 1534	427.1	86.74	- 38.87	104.97	168.49	176.86	14.88	- 2.50
1954	1 2152	470.7	95.60	- 40.95	111.75	204.75	228.81	29.37	- 7.79
1955	1 1102	491.7	99.86	- 37.41	119.55	227.31	271.75	18.77	0.22
1956	1 2097	500.0	101.55	- 40.77	117.88	274.98	324.15	19.28	1.35
1957	1 0923	537.0	109.06	- 36.81	129.35	300.36	388.52	19.86	7.91
1958	1 0313	572.0	116.17	- 34.75	138.52	309.76	429.08	10.59	22.55
1959	1 3323	608.9	123.67	- 44.90	135.87	412.69	560.72	30.68	- 3.56
1960	1 1645	645.4	131.08	- 39.24	148.94	480.58	715.78	27.65	10.93
1961	1 2154	693.4	140.83	- 40.96	156.97	584.10	916.86	28.09	16.32
1962	1 1985	727.1	147.67	- 40.39	164.38	700.04	1150.73	25.51	28.77
1963	1 2113	744.4	151.19	- 40.82	167.47	847.96	1420.08	24.12	33.79
1964	1 2000	770.5	156.49	- 40.44	173.15	1017.55	1761.89	24.07	62.38
1965	1 2026	798.2	162.11	- 40.53	178.68	1223.71	2186.53	24.10	59.07
1966	1 1720	826.1	167.78	- 39.50	185.38	1434.19	2658.70	21.59	16.36
1967	1 0940	866.7	176.03	- 36.87	196.26	1569.00	3079.32	15.82	18.85

SOURCE: IPEA and regression 4149-C.

TABLE A-13

MONETARY IMBALANCES

STRUCTURAL APPROACH

IMPORT IMBALANCES EXCLUDED

WAGE IMBALANCES LOWER LIMIT - LAGGED

YEAR	$\hat{P}/\hat{P}_{t-1}$	Y NCr$ 1953	Contribution to M*/P*		M*/P*	P*	M*	M^*_t/M^*_{t-1}	M/M - M*/M*
			Y	$\hat{P}/\hat{P}_{t-1}$					
1947	1 0000	297.8	60.48	- 33.70	83.88	100.00	83.88	-	-
1948	1 0745	326.1	66.23	- 36.10	87.23	107.45	93.73	11.74	- 10.44
1949	1 0745	343.3	69.73	- 36.10	90.73	115.46	104.76	11.76	2.74
1950	1 0745	377.9	76.75	- 36.10	97.75	124.06	121.27	15.76	9.00
1951	1 0745	397.3	80.69	- 36.10	101.69	133.30	135.55	11.78	17.47
1952	1 1232	415.8	84.45	- 37.85	103.70	149.72	155.26	14.54	1.16
1953	1 1361	427.1	86.74	- 38.29	105.55	170.10	179.54	15.64	- 3.26
1954	1 1494	470.7	95.50	- 38.73	113.97	195.51	222.82	24.11	- 2.53
1955	1 1845	491.7	99.86	- 40.25	116.71	231.58	270.28	21.30	- 2.31
1956	1 1688	500.0	101.55	- 39.39	119.26	270.67	322.80	19.43	1.20
1957	1 0851	537.0	109.06	- 36.58	129.58	293.70	380.58	17.90	9.87
1958	1 0521	572.0	116.17	- 35.46	137.81	309.00	425.83	11.89	21.25
1959	1 3448	608.9	123.67	- 45.32	135.45	415.54	562.85	32.18	- 5.06
1960	1 1620	645.4	131.08	- 37.74	150.44	482.86	726.41	29.06	9.52
1961	1 2126	693.4	140.83	- 40.86	157.07	585.52	919.68	26.61	17.80
1962	1 2077	727.1	147.67	- 40.70	164.07	707.13	1 160.19	26.15	28.13
1963	1 1995	744.4	151.19	- 40.42	167.87	848.20	1 423.87	22.73	35.18
1964	1 2160	770.5	156.49	- 40.98	172.61	1 031.41	1 780.32	25.03	61.42
1965	1 1802	798.2	162.11	- 39.77	179.44	1 217.27	2 184.26	22.69	60.48
1966	1 1377	826.1	167.78	- 38.34	186.54	1 384.89	2 583.37	18.27	19.68
1967	1 1317	866.7	176.03	- 38.14	194.99	1 567.28	3 056.04	18.30	15.91
1968	1 1148	939.5	190.81	- 37.57	210.34	1 747.20	3 675.06	20.26	22.14
1969	1 0914	1 024.1	207.99	- 36.78	228.31	1 906.89	4 353.62	18.46	12.84

SOURCE: IPEA and regression nº 4154

TABLE A-14

MONETARY IMBALANCES

STRUCTURAL APPROACH

WAGE IMBALANCES LOWER LIMIT - LAGGED

YEAR	$\hat{P}/\hat{P}_{t-1}$	Y NCr$1953	Contribution to M^*/P^*		M^*/P^*	P^*	M^*	M^*_t/M^*_{t-1}	$M_t/M_{t-1} - M^*_t/M^*_{t-1}$
			Y	$\hat{P}/\hat{P}_{t-1}$					
1947	1 0000	297.8	60.48	- 33.70	83.88	100.00	83.88	-	-
1948	1 0419	326.1	66.23	- 35.11	88.22	104.19	91.92	9.59	- 8.29
1949	1 1270	343.3	69.73	- 37.98	88.85	117.42	104.33	13.50	1.00
1950	1 0783	377.9	76.75	- 36.34	97.51	126.61	123.46	18.34	6.42
1951	1 0664	397.3	80.69	- 35.94	101.85	135.02	137.52	11.39	17.86
1952	1 0566	415.8	84.45	- 35.61	105.94	142.66	151.13	9.90	5.80
1953	1 1592	427.1	86.74	- 39.07	104.77	165.37	173.26	14.64	- 2.26
1954	1 1988	470.7	95.50	- 40.40	112.30	198.26	222.65	28.50	- 6.92
1955	1 1244	491.7	99.86	- 37.89	119.07	222.91	265.42	19.21	- 0.22
1956	1 2008	500.0	101.55	- 40.47	118.18	267.67	316.33	19.18	1.45
1957	1 0980	537.0	109.06	- 37.00	129.16	293.90	379.60	20.00	7.77
1958	1 0348	572.0	116.17	- 34.87	138.40	304.13	420.92	10.88	22.26
1959	1 3419	608.9	123.67	- 45.22	135.55	408.11	553.19	31.42	- 4.30
1960	1 1549	645.4	131.08	- 38.92	149.26	471.33	703.50	27.17	11.41
1961	1 2129	693.4	140.83	- 40.87	157.06	571.67	897.86	27.63	16.78
1962	1 2192	727.1	147.67	- 41.09	163.68	696.98	1140.81	27.06	27.23
1963	1 2159	744.4	151.19	- 40.98	167.31	847.46	1417.89	24.29	33.62
1964	1 1996	770.5	156.49	- 40.43	173.16	1016.61	1760.36	24.15	62.30
1965	1 1937	798.2	162.11	- 40.23	178.98	1213.53	2171.98	23.38	59.79
1966	1 1714	826.1	167.78	- 39.48	185.40	1421.53	2635.52	21.34	16.61
1967	1 0953	866.7	176.03	- 36.91	196.22	1557.00	3055.16	15.92	18.29
1968	1 1072	939.5	190.81	- 37.31	210.60	1723.91	3630.55	18.83	23.57
1969	1 1094	1024.1	207.99	- 37.39	227.70	1912.51	4354.79	19.95	11.35

SOURCE: IPEA and regression nº 4157-A

TABLE A-15

MONETARY IMBALANCES

MONETARY APPROACH

YEAR	$\hat{P}/\hat{P}t-1$	Y Cr$ 1953	Contribution to M*/P — Y	M /P*	M*/M t-1	$\Delta_{M/M}$ - $\Delta M^*/M^*$
1947	0,0	297,8	60,43	83,88	-	-
1948	0,0	326,1	66,23	89,63	6,86	- 5,56
1949	0,0	343,3	69,73	93,13	3,90	10,60
1950	0,0	377,9	76,75	100,15	7,54	17,22
1951	0,0	397,3	80,69	104,09	3,93	25,32
1952	0,0	415,8	84,45	107,85	3,61	12,09
1953	0,0	427,1	86,74	110,14	2,12	10,26
1954	0,0	470,7	95,60	119,00	8,04	13,54
1955	0,0	491,7	99,86	123,26	3,58	15,41
1956	0,0	500,0	101,55	124,95	1,37	19,26
1957	0,0	537,0	109,06	132,46	6,01	21,76
1958	0,0	572,0	116,17	139,57	5,37	27,77
1959	0,0	608,9	123,67	147,07	5,37	21,75
1960	0,0	645,4	131,08	154,48	5,04	33,54
1961	0,0	693,4	140,83	164,23	6,31	38,10
1962	0,0	727,1	147,67	171,07	4,16	50,12
1963	0,0	744,4	151,19	174,59	2,06	55,85
1964	0,0	770,5	156,49	179,89	3,04	83,41
1965	0,0	798,2	162,11	185,51	3,34	79,83
1966	0,0	826,1	167,78	191,18	3,06	34,89
1967	0,0	866,7	176,03	199,43	4,32	29,89
1968	0,0	939,5	190,81	214,21	7,41	34,99
1969	0,0	1 024,1	207,99	231,39	8,02	23,28

SOURCE: IPEA

TABLE A-16

MONETARY IMBALANCES

STRUCTURAL APPROACH

EXCLUSIVE IMPORT IMBALANCES

WAGE IMBALANCES LOWER LIMIT

YEAR	$\hat{P}/Pt-1$	Y NCr$1953	Contribution to M*/P*		M^*/P^*	P*	M*	M^*_t/M^*_{t-1}	$M_t/M_{t-1} - M^*_t/M^*_{t-1}$
			Y	$\hat{P}/\hat{P}_{t-1}$					
1947	1 0000	297.8	60.48	- 33.70	83.88	100.00	83.88	-	-
1948	1 0736	326.1	66.23	- 36.18	87.15	107.36	93.56	11.55	- 10.25
1949	1 0736	343.3	69.73	- 36.18	90.64	115.26	104.47	11.66	2.84
1950	1 0736	377.9	76.75	- 36.18	97.67	123.74	120.86	15.69	9.07
1951	1 0736	397.3	80.69	- 36.18	101.61	132.85	134.99	11.69	17.56
1952	1 1386	415.8	84.45	- 38.37	103.18	151.26	156.07	15.62	0.08
1953	1 1256	427.1	86.74	- 37.93	105.91	170.26	180.32	15.54	- 3.16
1954	1 1653	470.7	95.50	- 39.27	113.43	198.40	225.06	24.81	- 3.23
1955	1 1599	491.7	99.86	- 39.09	117.87	230.12	271.24	20.52	- 1.53
1956	1 1766	500.0	101.55	- 39.65	119.00	270.76	322.20	18.78	1.85
1957	1 0739	537.0	109.06	- 36.19	129.97	290.77	377.91	17.29	10.48
1958	1 0436	572.0	116.17	- 35.17	138.10	303.45	419.60	10.89	22.25
1959	1 3315	608.9	123.67	- 44.87	135.90	404.04	549.01	30.86	- 3.74
1960	1 1635	645.4	131.08	- 39.21	148.97	470.10	700.30	27.55	11.03
1961	1 2085	693.4	140.83	- 40.73	157.20	568.12	893.08	27.53	16.88
1962	1 1744	727.1	147.67	- 39.58	165.19	667.20	1 102.15	23.41	30.87
1963	1 1898	744.4	151.19	- 40.10	168.19	793.83	1 335.14	21.14	36.77
1964	1 2073	770.5	156.49	- 40.69	172.90	958.45	1 657.16	24.19	62.26
1965	1 1647	798.2	162.11	- 39.25	179.96	1 116.31	2 008.91	21.23	61.94
1966	1 1231	826.1	167.78	- 37.85	187.03	1 253.72	2 344.83	16.72	21.23
1967	1 1231	866.7	176.03	- 37.85	195.28	1.408.	2 748.65	17.22	16.99

SOURCE: IPEA and regression nº 4146.

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