Monetary Policy in 1968

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This paper examines three interrelated questions central to effective monetary policy in 1968: 1) the present state of excess liquidity in the economy; 2) the required rate of expansion of the money supply in 1968; 3) the implications of such expansion for the monetary budget.

1. The current liquidity position of the economy has been argued by many to be excessive. The principal basis for such a contention seems to be the substantial divergence between the December to December increase in the means of payments -- in excess of 42 per cent -- and a rate of increase of wholesale prices of almost half as much -- 21.7 per cent. This apparent violation of the quantity theory thus implies high undesired money balances which may be used to spark a new surge of inflationary pressure in 1968.

Such casual empiricism, however, is open to criticism. In the first instance it accepts as a "normal" level of liquidity that prevailing in December, 1966 and uses it as a standard against which to measure subsequent increments. There is little reason to believe that selection of a year in which the money supply increased less than 16 per cent, and prices by some 38 per cent, has any claim to legitimacy. The obvious fact is that there was a notable scarcity of liquidity in the economy at the end of 1966, by exactly the same quantity theory logic that is used to measure the performance in 1967. It is revealing that if one takes the two years together, the increase in wholesale prices of some 68 per cent is almost exactly equal to the 65 per cent increase in the money supply over the same period. On this basis one would assert that 1967 merely represented a compensation for an abnormal 1966. The point, then, is that any notion of excess or deficient liquidity must depend upon some standard of normality.

Subsequently, I will propose a non-arbitrary method of determining this base. This is necessary since the raw data over long periods of time do not yield a direct answer.

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...
Table 1 below presents June real money balances since 1948 in absolute and per capita terms. Note that the 1966 level of per capita balances is less than that in 1958, although per capita income has increased 15 per cent over the interval; and that 1967 shows an increase over 1966 in real terms of less than 10 per cent.

Table 1
Real Money Balances, June
Millions 1953 NCr

<table>
<thead>
<tr>
<th></th>
<th>Absolute</th>
<th>Per capita</th>
</tr>
</thead>
<tbody>
<tr>
<td>1948</td>
<td>85.3</td>
<td>1.72</td>
</tr>
<tr>
<td>1949</td>
<td>88.7</td>
<td>1.75</td>
</tr>
<tr>
<td>1950</td>
<td>95.8</td>
<td>1.84</td>
</tr>
<tr>
<td>1951</td>
<td>107.8</td>
<td>2.02</td>
</tr>
<tr>
<td>1952</td>
<td>109.6</td>
<td>1.99</td>
</tr>
<tr>
<td>1953</td>
<td>113.5</td>
<td>2.01</td>
</tr>
<tr>
<td>1954</td>
<td>110.6</td>
<td>1.90</td>
</tr>
<tr>
<td>1955</td>
<td>114.8</td>
<td>1.91</td>
</tr>
<tr>
<td>1956</td>
<td>111.8</td>
<td>1.81</td>
</tr>
<tr>
<td>1957</td>
<td>120.8</td>
<td>1.89</td>
</tr>
<tr>
<td>1958</td>
<td>141.2</td>
<td>2.14</td>
</tr>
<tr>
<td>1959</td>
<td>133.9</td>
<td>1.96</td>
</tr>
<tr>
<td>1960</td>
<td>149.7</td>
<td>2.11</td>
</tr>
<tr>
<td>1961</td>
<td>157.2</td>
<td>2.15</td>
</tr>
<tr>
<td>1962</td>
<td>161.4</td>
<td>2.14</td>
</tr>
<tr>
<td>1963</td>
<td>148.7</td>
<td>1.92</td>
</tr>
<tr>
<td>1964</td>
<td>149.5</td>
<td>1.87</td>
</tr>
<tr>
<td>1965</td>
<td>174.8</td>
<td>2.13</td>
</tr>
<tr>
<td>1966</td>
<td>180.7</td>
<td>2.13</td>
</tr>
<tr>
<td>1967</td>
<td>195.1</td>
<td>2.24</td>
</tr>
</tbody>
</table>

June balances have been selected since it is the most appropriate stock to compare with the income flow during the year, and to deflate with the average price index for the year. Better still would have been a weighted average money stock for the entire year, but June as a midpoint reflects this average reasonably well. It is possible to use other terminal points, such as December, but the appropriate deflator and income flow are not those of the calendar year. This is dealt with in the later discussion.
A second problem with current discussions of excess liquidity is that they implicitly accept a proportional relationship of prices and money supply. To the contrary, all monetary theorists have long recognized the influence of the cost of money, principally the negative interest rate earned on money balances during inflation, as an important determinant of the demand for money. Specifically in the Brazilian context, this means that deceleration of inflation such as occurred during 1967 will have positive effects upon the demand for money and will contribute to a desired accumulation of real money balances. The process by which this occurs exactly generates an observed difference between the expansion in the means of payments and the increase of prices.

The only acceptable way to resolve this important question of excess liquidity is by reference to a demand function for real money balances. On the one hand, it is capable of including other factors such as the cost of money which are currently ignored; on the other, it establishes a desired level of holdings with which supply can be compared, and yields a quantitative measure of excess or deficiency. This avoids the base problem referred to above, especially since one can also test the hypothesis of an adjustment process to divergences between desired and actual money balances.

The empirical results obtained by fitting a demand function to the data of Table 1 are quite good. Various specifications of the functions all yield comparable conclusions, and the use of the implicit PIB deflator or the wholesale price index makes little difference. Here, I therefore will deal only with the implicit deflator and will present the results of three different demand functions: arithmetic, logarithmic, and a derivative form in which the rate of price change appears as the dependent variable. All of these share the same theoretical foundations which may be briefly elaborated.

The demand for money depends upon its transaction utility, and hence in magnitude upon the total level of economic activity, subject to the cost of holding money as an asset. One can economize upon the level of money balances when money is expensive, that is, when other assets yield returns substantially
higher than those of money balances. Typically, since the return to money balances is zero, this alternative cost is equal to the interest rate on other liquid assets. In an inflationary context, of course, the cost of holding money is negative since the real value is eroded by continuous increases in the price level. Then the relevant cost is approximately the real interest rate on those other assets plus the rate of change of prices, since the money interest rate in the market reflects inflation. Ideally we would like to use that market rate of interest in our analysis, but since such data are not readily available we may substitute the rate of change of prices as an approximation. This is possible since, with \( \frac{1}{\Delta} \), the real interest rate not substantially variable and a responsive market, \( \frac{\Delta(P/P-1)}{\Delta(i + P/P-1)} \).

Accordingly, we may write in arithmetic and logarithmic form respectively,

1) \( \frac{dM}{dP} = a + bY + \xi(P/P-1) \)

2) \( \frac{dM}{dP} = rY^s(P/P-1)^x \)

where \( \frac{dM}{dP} \) is the desired level of real money balance, \( Y \) is real domestic product, and \( P/P-1 \) is the rate of change of price. We may also reformulate 2) to read as follows:

\[
\log M - \log P = \log r + s \log Y + t \log \frac{P}{P-1}.
\]

\[
\frac{d \log P}{dt} = -s \frac{d \log Y}{dt} - t \frac{d \log \frac{P}{P-1}}{dt} + \frac{d \log M}{dt}
\]

and substituting the discrete stochastic approximation:

3) \( \frac{P}{P_{-1}} = r' + \frac{M}{M_{-1}} - s \frac{Y}{Y_{-1}} - t \left( \frac{P}{P-1} - \frac{P_{-1}}{P_{-2}} \right) \)

Finally, we may test the extent to which the observed money balances are desired or equilibrium ones. We may rewrite 1) and 2) respectively as

1) \( \frac{M}{P} = (\frac{M}{P})_{-1} = \lambda \left[ \frac{(M/P)^X - (M/P)_{-1}}{(M/P)_{-1}} \right] \)

2) \( \frac{M}{P/(M/P)} = (\frac{M}{P})_{-1} \left( \frac{(M/P)^X}{(M/P)_{-1}} \right) \)
which indicate that only some fraction of the difference between desired current money balances and last period's actual, can be made up. \( \lambda \) is the coefficient of adjustment. Substituting 1) and 2) for the desired values of money balances then yields the final forms for statistical estimation:

4. \[
\frac{M}{P} = \lambda a + \lambda b \frac{Y}{P} + \lambda c \frac{P}{P_{-1}} + (1 - \lambda) \left( \frac{M}{P} \right)_{-1}
\]

5. \[
\log \frac{M}{P} = \lambda \log \frac{Y}{P} + \lambda d \log \frac{P}{P_{-1}} + \sum (1 - \lambda) \log \left( \frac{M}{P} \right)_{-1}
\]

The fitted equations corresponding to these five alternative specifications are as follows:

1) \[
\frac{M}{P} = 57.1 + .2031 Y - 33.7 \frac{P}{P_{-1}} \quad R^2 = .97
\]

2) \[
\log \frac{M}{P} = - .522 + .862 \log Y - .295 \log \frac{P}{P_{-1}}
\]

3) \[
\frac{P}{P_{-1}} = 1.63 + .864 \frac{M}{P_{-1}} - 1.44 \frac{Y}{P_{-1}} + .388 \left( \frac{P}{P_{-1}} \cdot \frac{P_{-1}}{P_{-2}} \right)
\]

4) \[
\frac{M}{P} = 57.1 + .2030 Y - 33.7 \frac{P}{P_{-1}} + .0004 \frac{M}{P_{-1}}
\]

5) \[
\log \frac{M}{P} = - .861 + .758 \log Y - .288 \log \frac{P}{P_{-1}} + .140 \log \frac{M}{P_{-1}}
\]

Some preliminary comments are in order concerning the reliability of the results. In the first instance, there is the highly satisfactory degree of explanation of the variance in real balances and price changes. In addition, all of the coefficients have correct signs, and almost all are significant beyond the .05 level. The principal exceptions, the signs on the lagged money balances in equations 4) and 5), reveal that the observed money balances are in fact the desired levels. Any adjustment occurs within the unit of observation, the year,
and there is no carry-over to the next. Hence current demands respond to current levels of income and price change and are independent of those in the past.

Secondly, one should note the verification of the coefficients in equation 2) by those of equation 3). The coefficient on log $P/P_{-1}$ is not significantly different from that on $(P/P_{-1} - P_{-1}/P_{-2})$; nor is that of log $Y$ and $Y/Y_{-1}$; finally, the coefficient of $M_{1}$ is less than two standard errors away from unity; the expected value:

It therefore seems reasonable to assert that equations 1), 2) and 3) are mutually consistent, and reflect accurately the demand for money as a function of current levels of the independent variables. It is not necessary, therefore, to express a decided preference for one or another of the three forms since they yield similar conclusions. Where the quantitative magnitudes are different, moreover, they provide an idea of the range of possible variation.

The first substantive conclusions relevant to the current paper is that as of June 1967, liquidity levels in the economy were still slightly below desired levels.

This result derives from our use of the demand functions as the appropriate standard against which to evaluate money holdings in the economy. If actual balances are larger than those predicted by the equations, then liquidity may be regarded as excessive to the extent of the potential price rise that would make them equivalent; if actual balances are smaller, the contrary is true. In the case of equation 3) the same definition holds, but directly in terms of price changes: if price changes are larger than predicted, liquidity levels are below normal; if smaller, excess balances exist. This definition of "normal" liquidity against which to measure deviations is superior to alternatives because it reflects the demonstrated behavioral reactions of the system. Any averaging system, or arbitrary selection of base, does not have this feature.

Table 2 below contains the deviations of real balances and price changes over the last 5 years, all in terms of required equilibrating price changes.
Table 2

<table>
<thead>
<tr>
<th></th>
<th>Equation 1</th>
<th>Equation 2</th>
<th>Equation 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>June, 1963</td>
<td>-2.8</td>
<td>-1.1</td>
<td>-8.7</td>
</tr>
<tr>
<td>1964</td>
<td>-1.2</td>
<td>-1.4</td>
<td>-2.3</td>
</tr>
<tr>
<td>1965</td>
<td>3.5</td>
<td>4.6</td>
<td>7.8</td>
</tr>
<tr>
<td>1966</td>
<td>-0.9</td>
<td>-1.4</td>
<td>-8.7</td>
</tr>
<tr>
<td>1967</td>
<td>-0.3</td>
<td>-0.7</td>
<td>-1.0</td>
</tr>
</tbody>
</table>

All three measures are consistently signed: negatives indicate scarcity of liquidity. The variation in percentages among the alternatives, while occasionally substantial, is still small enough to lend support to an identical interpretation of past events.

Thus, since 1963, the levels of real monetary holdings, given the levels of real income and rate of price change, have in every year except 1965 been below desired levels. That is, control over nominal monetary expansion per se, has generally not been an efficient device for regulating the liquidity in the system. Variations in velocity, reflecting in large part the shortage of liquidity, have frustrated the intent of the monetary authorities, and have led to price increases without real growth. Only in 1967, with expansion in timely fashion of the nominal supply of money, were real liquidity and production augmented at the same time. In June of last year, although recovery from the low levels of 1966 had taken place, the analysis indicates continued below-equilibrium levels. That is, the economy, under appropriate conditions, could and did absorb still further nominal monetary expansion without undue inflation. In light of the continuation of the expansion in the money supply in the second half of the year it is of interest to extend the analysis to December. To do so correctly involves reestimation of the demand functions since the December balances reflect seasonal factors not to be found in those of June. The acceleration of transactions at the end of the year requires a larger money supply relative to the annual flow of real income. Use of June derived elasticities with substitution of December rates will therefore underestimate the equilibrium demand for
money. The equations above were therefore reestimated for December, with the data adjusted appropriately. Results are here indicated only for the simple arithmetic and logarithmic forms since the direct price equation is a derivative form of the latter and because, once again, lagged values of the real money stock did not enter significantly.

\[
\begin{align*}
6) \left( \frac{M}{P} \right)^X &= 46.8 + .2315 \text{PIB} - 32.44 \frac{P}{P_{-1}} \\
&\quad R^2 = .94 \\
&\quad (0.0166) \quad (12.69)
\end{align*}
\]

\[
\begin{align*}
7) \log \left( \frac{M}{P} \right)^X &= -1.020 + .9630 \log \text{PIB} - .3234 \log \frac{P}{P_{-1}} \\
&\quad R^2 = .95 \\
&\quad (0.065) \quad (0.119)
\end{align*}
\]

What is immediately apparent from these new equations, in comparison with 1) and 2), is the much higher values of the coefficients associated with income. These reflect the seasonal character of activity, and demonstrate the difficulties of using seasonably unadjusted data to reach conclusions concerning movements of longer duration.

Table 3 below presents data for December analogous to those of Table 2 for June, again in terms of required equilibrating price changes:

<table>
<thead>
<tr>
<th>Year</th>
<th>Equation 6</th>
<th>Equation 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>December, 1963</td>
<td>3.0</td>
<td>4.1</td>
</tr>
<tr>
<td>1964</td>
<td>-1.7</td>
<td>-0.4</td>
</tr>
<tr>
<td>1965</td>
<td>10.4</td>
<td>10.6</td>
</tr>
<tr>
<td>1966</td>
<td>-11.6</td>
<td>-10.8</td>
</tr>
<tr>
<td>1967</td>
<td>-3.2</td>
<td>-3.9</td>
</tr>
</tbody>
</table>

(x) To estimate a June to June flow of real national income, the geometric average of products from adjoining calendar years was used. The December price index was derived by applying the ratio of the December value of the wholesale price index to its annual value to the implicit deflator. Ratios of change of prices were calculated from this new index. Necessarily, these adjustments yield data with greater errors of measurement than would be characteristic of those for June.
The December balances exhibit more volatility than those of June. This may be a consequence of greater errors in estimating the data, but also possibly reflects the failure of monetary policy adequately to respond to seasonal variations in demand, as well as to altered demands created by different rates of price deceleration.

The important conclusion that emerges with regard to the liquidity position of the economy in December 1967 is that, contrary to popular thought, it continued to be insufficient rather than excessive! The increase in the money supply in the last six months of 1967 was in fact slightly smaller than in the first six, in spite of the larger demands normally present at the end of the year. At the same time real activity simultaneously continued its growth, and deceleration of inflation was somewhat greater than in the previous year. As a consequence, while the situation considerably ameliorated with respect to 1966, the equations indicate continued slight deficiencies in liquidity.

It is well to examine this conclusion in light of other evidence since its very novelty will make it suspect. The principal additional information which supports this thesis is current high that concerning the money rate of interest. Despite attempts to attribute this to high levels of bank operating costs, these are not very convincing. High prices generally are taken to reflect scarcity, and I do not understand why this conclusion is not equally valid in this case. Money interest rates have remained at high levels since 1966, even though the rate of inflation has declined in the interim, because over this same period real balances have been deficient, thereby driving up real interest rates. The initial success in reducing rates in the first months after March reflected the dramatic easing in liquidity after the tightness of 1966; but subsequently the situation did not continue to improve -- if equations 6) and 7) are accurate, it actually slightly deteriorated -- and the rate stabilized toward the end of the year. A second observation relates to price performance in January and February. In spite of the devaluation and other price increases such as that of steel, the recorded price changes in the last two months have
been moderate — below levels in 1967. If substantial excess liquidity in fact existed, one would have expected the price increases deriving from cost changes to have been multiplied up by a demand factor. Since it did not happen, the conclusion is that there was and is a demand for the real increases in money which occurred over last year.

The principal recommendation that emerges from this part of the analysis is that any substantial reduction in the expansion in the money supply based upon claims that there will be spill over effect from last year is incorrect. Those who would argue that liquidity is currently excessive should be required to demonstrate the logic underlying their conclusion, and the satisfactory performance of their theory in recent Brazilian experience.

This guidance against sharp curtailment of monetary expansion is still only negative and not sufficiently quantitative. The next section takes up the much more difficult question: what should the rate of expansion of the money supply be to permit continued deceleration of inflation consistent with high rates of real expansion?

2. The above demand equations for money are necessary but not sufficient for such determination. It would be an error of the first magnitude to conclude that one could merely substitute in desired rates of price change and levels of real product and solve for the equilibrium money supply. On this basis, we could elect to eliminate price change completely and control the money supply accordingly; equation 6) gives us the appropriate means of payment expansion during 1968 for zero inflation as 12.2 per cent. The error of 1966 is sufficiently recent to argue convincingly against such an abuse of the results.

Rather, what is necessary is an elaboration of the various forces determining prices in the Brazilian economy. The models which follow are an attempt to do so in an approximative fashion.
The first relates to a less than full capacity situation where prices are determined in the non-agricultural sector by costs; and in the agricultural sector by the exogenously determined supply conditions of the particular year.

We have in this case,

\[ M^D = a_1 + b_1 \cdot Y + c_1 (P/P\_1 + i_r) \]

\[ M^D = M^S \]

\[ F/P\_1 = a_2 + b_2 + \frac{w}{w\_1} + c_2 T/T\_1 + d_2 R/R\_1 + c_2 (P/P\_1 + i_r) \]

\[ P/P\_1 = a_3 + b_3 + P/P\_1 + c \cdot \frac{Q/Q^X}{A} \]

\[ P/P\_1 = w_1 P/P\_1 + w_2 P/P\_1 \]

\[ Y = a_5 + b_5 i_r \]

where \( M^D \) = demand for real money balances

\( M^S \) = supply of real money balances

\( Y \) = real income

\( P/P\_1 \) = rate of change of general price index

\( P^A/P\_1 \) = rate of change of non-agricultural prices

\( w/w\_1 \) = rate of change of labor costs

\( T/T\_1 \) = rate of change of taxes

\( R/R\_1 \) = rate of change of prices of imported inputs

\( P^A/P\_1 \) = rate of change of agricultural prices

\( Q/Q^X \) = ratio of actual to normal crop

Six variables are endogenous, \( M^D, Y, P/P\_1, i_r, P^A/P\_1, P^I/P\_1 \) and five are exogenous or subject to policy manipulation, \( M^S, w/w\_1, T/T\_1, R/R\_1, Q/Q^X \).

The functioning of the model is straightforward. Non-agricultural prices are determined as a consequence of costs-independent of levels of activity. The coefficients \( b_2, c_2, d_2 \) and \( e_2 \) reflect the relative importance of various costs in the
production process. Agricultural prices increase at a rate different from the general price level depending upon the current crop prospects. Hence the double importance of good agricultural harvests: they directly hold down prices because the extra supply is costless, and they reduce pressure for wage increases due to lower food costs. Total price increase is determined as a weighted average of agricultural and non-agricultural price increases. Given this increase, and the supply of money, we simultaneously determine real interest rates and real product. High interest rates result from the necessity to equilibrate demand for money balances with their insufficient supply. Velocity rises to sustain the independently determined price increase, while at the same time production is adversely affected by the higher interest rates. These make their influence felt upon working capital inputs by firms as well as longer term investment decisions. Firms can pass along interest rate charges but at higher rates and with uncertainty, it is easier to slow down production. The consequence is that the demand for money is equilibrated not only by interest rate changes, but also income changes. The supply of money thus determines the level of real activity and not the price level. This is clearly an extreme case. The mark-up coefficients, which are here regarded as independent, presumably also are influenced by expectations concerning sufficiency of monetary demand. Thus with a more expansive policy toward the means of payment, the cost pressures would be translated into price increases more rapidly, and money would enter into the determination of price as well. This influence need not be positive in all sectors, since increases in supply may occur in such a way to reduce cost-pressure where economies of scale are important.

One could further disaggregate to have sectors with excess monetary demand, and rising prices on that account. It is of interest within even the present generalized framework to allow to enter as such an excess demand factor the government deficit. The larger this is relative to unused capacity, the greater the problem of transferring potential surplus from the private sector to counter balance the governmental command over real resources. Moreover, since government expenditures
are almost fixed in current cruzeiro form, while receipts are relatively unit elastic to the price level, the size of the real deficit itself becomes a function of the price level. We may include this additional factor by augmenting the above non-agricultural price determination equation to read:

\[
\frac{P}{P_{-1}} = a_2 + b_2 \frac{W}{P_{-1}} + c_2 \frac{T}{T_{-1}} + d_2 \frac{R}{R_{-1}} + e_2 (P/P_{-1} + r) + f_2 \left( \frac{G}{P} - T \right) \frac{Y^X - Y}{Y^X - Y}
\]

where \( G \) are government expenditures in current cruzeiros, and \( T \) are real tax revenues, which may be regarded as a function of real income. In this way, we can see the incompatibility of price level targets which do not take into account the friction of the transfer mechanism as capacity is utilized and the additional inflationary pressures they generate from the demand side.

It remains to give approximate quantitative content to the parameters of the model, and to the values of the policy and exogenous variables in order to use it. Statistical estimation is impossible at the moment since much of the required information is not available, and because the crucial relationship between income and the real interest rate must be specified in less aggregative form to be usable. In spite of the apparent arbitrariness and crudity of the attempt, the exercise is a reasonable first step toward determining what the rate of money supply increase ought to be, given the limitations in the rest of the system.

In the first instance, and to simplify, let us fix the real rate of interest at its 1967 level for 1968. This will permit us to use the estimated parameters of the demand for money, starting from the observed values. In the second place, let us initially assume that the reaction coefficients in the price determination equation for non-agriculture correspond to the shares of the inputs in unit costs. This establishes the
minimum extent to which costs are passed forward, since an alternative would be to maintain the share of profits in the total, by increasing price by the same percentage as a weighted average of costs. This latter assumption thus constitutes a second alternative to fix a maximum level.

It remains now only to predict the relationship of agricultural prices to the general price level, and the weights for each of the components of the general price level. It is unnecessary to specify the relationship of income to the real product rate since by assumption we are maintaining it at approximately its 1967 level. Since at these levels it did not apparently prejudice expansion, this simplifying assumption enables us to bypass the difficult problem of identifying the system's response to monetary tightness:

For the relationship between agricultural and general price changes, since the crop in 1968 is expected to be equally favorable, if not more so, than that in 1967, we may extrapolate the same relationship to 1968. The reason for framing the change in agricultural prices in terms of the general price index rather than independently is the necessity to include money demand factors in its determination. The ratio between the agricultural price change in 1967 and the increase in general prices was 0.86. We use this same value for 1968, and in addition use a weight of one-third for the agricultural index.

Finally, we use for the 1968 wage increase, 20% with a weight of .5; an average tax increase applicable to non-agricultural sector of about 12%, with a weight in costs of .2%; and a devaluation of 18%, with a weight of .1. This produces a total minimum cost effect of 14.2 per cent; extended to maintain capital's share it is 17.8 per cent. Note that these results are relatively independent of specific assumptions concerning the weights, since increases are clustered similarly.

\*The tax increase above represents a weighted average of about a 28 per cent increase in the IPI and 20 per cent in the ICI in the South-Central states, most of which is concentrated on the non-agricultural sector, and unchanged other taxes.
Likewise, a larger share for capital would obviously increase the maximum, but by no more than about two percentage points. The latter adjustment is made in the subsequent calculations.

Weighting this with the results for the agricultural price index we thus have as our two approximate limits

\[
P/P_{-1} - 1 = .33 \left[ .86 \left( P/P_{-1} - 1 \right) \right] + .67 (.14) = .13
\]
\[
P/P_{-1} - 1 = .33 \left[ .86 \left( P/P_{-1} - 1 \right) \right] + .67 (.20) = .19
\]

It is at this juncture in addition, that we must bring to bear the effect of the potential government deficit upon the inflation. Monetary targets and fiscal policy are closely interrelated. Receipts have been estimated at Nkr$ 9.8 billion in 1968 prices, and a cash deficit of Nkr$ 1.2 billion programmed. The revenue estimates, however, incorporate for the most part an inflation assumption of 20 per cent to extrapolate from the Nkr$ 6.8 collected this past year. At the lower limit of inflation of 1.13 established above, with nominal outlays maintained at Nkr$ 11 billion, the cash deficit would amount to almost Nkr$ 2 billion. Apart from the consequences on the supply of money, such an increased relative command upon resources would generate a self-defeating inflationary pressure that makes such a lower target unrealistic. In fact, of course, it is unlikely that monetary controls can be regulated to prevent finance of the deficit from triggering unwarranted monetary expansion. And if it could, cutting back credit to the private sector will have an adverse effect upon real interest rates -- since it is not only the quantity of money but also its distribution which matters. Note that even with the upper limit of cost pressures of 19 per cent, the deficit would expand by Nkr$ .1 billion in the absence of further cuts. On the other hand, slightly higher rates of inflation have a built-in dampening tendency due to smaller real deficits.

The upshot of this discussion is that a manageable, realistic monetary policy for 1968 must be geared to a rate of expansion of the money supply sufficient to support an inflation of between 20 and 23 per cent. An attempt to secure less
will, by generating reductions in real activity in the one hand, and a larger real governmental deficit on the other, be frustrated by resulting in more -- but without any of the beneficial characteristics. What the Brazilian economy especially needs is a stable, predictable policy. An attempt to tighten credit in an effort to attain the unattainable will have patently undesirable effects.

This does not mean that one is giving up on the fight against inflation. Next year’s budget can be planned more realistically to embody smaller rates of price change and avoid the deficit pressure. Restoration of optimism, higher realized growth rates, and increased efficiency will reduce the tendency to pass along cost increases -- and thus push toward the minimum part of the spectrum noted above. The deceleration in price change need not be constant to achieve success in reducing the inflationary pressures in the economy. Quite to the contrary. A policy in 1968 which held price increases to say 22 or 23 per cent, and at the same time saw a real rate of growth in excess of 6 per cent, both of which are excellent possibilities would set the stage for a greater success in 1969. A policy of monetary expansion which foresaw a price increase of 15 per cent, but achieved 25 or 30 per cent, would set the economy back on a stop and go motion that is disastrous to long term growth.

Table 4 below presents the rates of expansion of the nominal money supply from December to June, 1968 and to December, 1968 consistent with various price policies and the arithmetic demand functions for money.

| Table 4 Indicated Nominal Money Supplies |
|-----------------|--------|-----------------|--------|-----------------|
| Bilhões NCR$     | June   | % Dec 1967      | Dec    | % Dec 1967      |
| P/P-1            |        |                 |        |                 |
| 1.00             | 14.1   | - 6.1           | 16.8   | 12.1            |
| 1.10             | 15.3   | 1.6             | 18.3   | 21.7            |
| 1.20             | 16.4   | 9.2             | 19.7   | 31.0            |
| 1.22             | 16.6   | 10.6            | 20.3   | 32.9            |
| 1.25             | 16.9   | 12.7            | 20.3   | 35.2            |
These values are derived from the regression equations themselves, rather than the last observation. For June it makes virtually no difference since the deviation is so small. For December, however, it is larger, and if we make the decision that the same difference be maintained in 1968, we arrive at lesser rates of required monetary expansion. This is the equivalent of asserting that liquidity is currently adequate, and that the December real money balances ought to be the basis for projection. The values for the required monetary expansion under these conditions are as follows:

Table 5

<table>
<thead>
<tr>
<th>P/P_{-1}</th>
<th>M</th>
<th>%ΔDec. 1967</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.00</td>
<td>16.4</td>
<td>9.1</td>
</tr>
<tr>
<td>1.20</td>
<td>17.3</td>
<td>18.4</td>
</tr>
<tr>
<td>1.30</td>
<td>19.1</td>
<td>27.3</td>
</tr>
<tr>
<td>1.40</td>
<td>19.4</td>
<td>29.1</td>
</tr>
<tr>
<td>1.25</td>
<td>19.8</td>
<td>31.6</td>
</tr>
</tbody>
</table>

A check upon these last orders of magnitude is provided by the results of a linear equation to slightly altered data. Instead of using the ratio of December to annual average wholesale prices to estimate values of the implicit deflator for December, a geometric average of adjoining years was substituted. The consequent equation is

\[
\frac{\Delta M}{\Delta P} X = 36.6 + .2048 Y - 13.88 P/P_{-1} \quad R^2 = .95 \\
(0.0155) \quad (13.34)
\]

The price term is still of the right sign, but now statistically insignificant, and the elasticity of money balances with respect to income is reduced. This equation no longer predicts an insufficiency of liquidity in December, 1967 but rather approximate equilibrium. Actual real money balances calculated in accord with the new price index are Nkr 208.4 million; estimated balances demanded are Nkr 207.3 million. The same excess of balances in 1965 and insufficiency in 1966 persists with this new equation, it should be added.

Since approximate equilibrium is indicated as of December, 1967 the expansion of the money supply required for
1968 according to this equation differs little from those in Table 5 above. Explicitly, they are:

<table>
<thead>
<tr>
<th>P/P-1</th>
<th>M</th>
<th>% A Dec. 1967</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.00</td>
<td>16.0</td>
<td>6.7</td>
</tr>
<tr>
<td>1.10</td>
<td>17.5</td>
<td>16.3</td>
</tr>
<tr>
<td>1.20</td>
<td>19.0</td>
<td>26.2</td>
</tr>
<tr>
<td>1.22</td>
<td>19.3</td>
<td>28.3</td>
</tr>
<tr>
<td>1.25</td>
<td>19.7</td>
<td>31.1</td>
</tr>
</tbody>
</table>

Although both of the latter sets of projections possibly exaggerate the seasonal factor inherent in desirable expansion to June and December, it seems clear that for the year as a whole an expansion in the neighborhood of 28-29 per cent is called for. Until June itself, a rate of increase that yields something like 10-12 per cent seems to be consistent both with liquidity requirements at that date, and with orderly expansion through the year as a whole. The current rate of increase of 2 per cent in the means of payment in the first six weeks of the year is approximately equal to that which is called for above.
3. In light of such an indicated expansion for compatibility between real growth, fiscal execution, and continued control over inflationary pressures, let us examine the monetary budget, which is the principal instrument for directing the money supply. The most recent version of that document calls for an expansion of 23.1 per cent in the Exigibilidades Monetárias. This represents a compression of a number of accounts and expansion of one, acquisition of reserves. It is extremely optimistic in its treatment of the financing of the deficit, which itself will be difficult to keep within bounds, and it would be better to maintain the estimate of NOr$ 800 milhões. Similarly, although reserve acquisition bestows cruzeiros to holders of dollars, and thereby provides a basis for expansion, it does so in a discriminatory way. Those who are able to secure dollar credits — typically foreign enterprises — are benefitted at the expense of local borrowers. Whatever the virtues of the substantial increases in reserves called for in the monetary budget — which is another issue — there is no good reason to simultaneously curtail Bank of Brasil loans to the private sector. The indicated expansion of 23.4%, with a real growth anticipated in the industrial sector in excess of six per cent, will reduce liquidity unless commercial bank credits expand to fill the gap, which is unlikely. Moreover, the lending policy of the Bank of Brasil is a useful instrument for guiding the allocation of credit in accordance

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*The difference between this and the indicated expansion of 22.3% is in the treatment of the deposits of autarquias. In order to be consistent with past practice the assets of the monetary authorities are defined net of such deposits.*
with development objectives. Restoring the original NCr$ 801 milhões for this item, gives an expansion of 26.8 per cent in the assets of the monetary authorities. This represents a reasonable basis on which to try to secure a monetary expansion, say, on the order of 28-29 per cent as discussed in section 2, because it liberates commercial bank deposits and thus loans to the private sector. Table 5 presents this corrected proposal.

Table 5

<table>
<thead>
<tr>
<th>DISCRIMINAÇÃO</th>
<th>SALDO OCORRIDO</th>
<th>PROPOSTAS PARA 1968</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1967</td>
<td>fluxo</td>
</tr>
<tr>
<td>1. Financiamento do déficit do Tesouro ...........................................</td>
<td>2.537</td>
<td>800</td>
</tr>
<tr>
<td>2. Preços mínimos ..........</td>
<td>316</td>
<td>70</td>
</tr>
<tr>
<td>3. Autorquias ...............................................................................</td>
<td>247</td>
<td>-12</td>
</tr>
<tr>
<td>4. Empréstimos a Governos .................................................</td>
<td>16</td>
<td>-</td>
</tr>
<tr>
<td>5. Redescontos (exclusive café) ...........................................................................</td>
<td>283</td>
<td>14</td>
</tr>
<tr>
<td>6. Empréstimos do Banco do Brasil no setor privado .................</td>
<td>2.986</td>
<td>801</td>
</tr>
<tr>
<td>7. Saldo líquido das demais contas .....................................................</td>
<td>1.277</td>
<td>200</td>
</tr>
<tr>
<td>8. Saldo líquido das operações de café .................................................</td>
<td>-102</td>
<td>-429</td>
</tr>
<tr>
<td>9. Contra-parte em Cr$ (FL 480 e AID) ........................................</td>
<td>-223</td>
<td>-42</td>
</tr>
<tr>
<td>10. Encargos Cambiais ....................................................................</td>
<td>-146</td>
<td>-</td>
</tr>
<tr>
<td>11. Contas cambiais ..................................................................</td>
<td>3.891</td>
<td>730</td>
</tr>
<tr>
<td>12. Conta de Capital e demais exigibilidades .................................................</td>
<td>-1.902</td>
<td>-333</td>
</tr>
<tr>
<td></td>
<td>9.179</td>
<td>1.799</td>
</tr>
<tr>
<td>13. Reservas estrangeiras líquidas .............................................................................</td>
<td>2.199</td>
<td>+26,8</td>
</tr>
</tbody>
</table>
It remains to determine the particular values of the parameters of the multiplier consistent with such an expansion, and with other targets for paper money in the hands of the public and commercial bank loans to the private sector. The present monetary budget it may be noted, presumes the same value in 1968 for each of the parameters as in 1967, and this leads to an exactly proportional expansion of the money supply of 23.1 per cent. As shown below, however, there is good reason to expect a continued decline in \( f \) rather than a constant 1968 value. This would imply counterbalancing changes in the other parameters to maintain proportional expansion.

The method to be employed here is described more fully in another document, "Notes on the Monetary Budget". It is shown there that it is possible to solve with the following formulas for the values of the three parameters entering the multiplier: \( f \), the ratio of paper money in the hands of the public to total deposits; \( r \), the ratio of voluntary and compulsory reserves to deposits; and \( B \), the ratio of sight deposits in the Banco do Brasil to commercial bank deposits.

\[
f = \frac{k_2 (a-l)}{k_0 - k_1 - A - Q + R}
\]

\[
r = \frac{1}{k_0 - k_1 - A - Q + R} - \left(\frac{(a-l) (k_1 + Q - R)}{k_0 - k_1 - A - Q + R}\right)
\]

\[
B = \frac{(a-l) (k_0 - k_2)}{a (k_2 - k_1 - A - Q + R)} - 1
\]

where

- \( k_2 \) = means of payment
- \( k_1 \) = commercial bank loans to the private sector
- \( k_2 \) = paper money in the hands of the public
- \( A \) = assets of the Monetary Authorities
- \( Q \) = other net assets of commercial banks
- \( R \) = rediscounts.

The target value for the means of payment has already been discussed. That for paper money in the hands of the public is derived from the relatively constant elasticity of its expansion in recent years with respect to gross domestic
product in current cruzeiros. These have varied over the last four years as follows (December to December changes):

1964  .87
1965  .93
1966  .94
1967  .85

In 1968, values .9 and .93 are used.

Finally, for the expansion of bank loans to the private sector, a target rate of increase of 29-30 per cent has been established. The logic of such a rate is the expected real increase in industry and agriculture in excess of 7 per cent this year. With a rate of price increase of 22-23 per cent, real liquidity to the private sector will maintain itself at constant levels; any lesser price increase will permit a somewhat greater ease in liquidity with corresponding beneficial effects upon the interest rates. The proposed monetary budget, by contrast, indicates a growth of 24%, which when combined with the restriction upon Bank of Brazil expansion, yields a total increase of similar magnitude. It is difficult to see how this can do anything but create increased pressure upon interest rates, and provide a deterrent to real expansion, particularly if a price expansion of similar magnitude is envisioned.

Table 6 below indicates the parameter combinations for the indicated alternatives.

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Note that such constancy emerges when paper money in the hands of the public is related absolutely to PIB, as it should be, rather than dealing directly with the ratio $f$, which is a consequence and not a directly desired magnitude.
Table 6

Values of the Multiplier Parameters

<table>
<thead>
<tr>
<th></th>
<th>Doc 1967</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>$f$</td>
<td>.28</td>
<td>.26</td>
<td>.25</td>
<td>.23</td>
<td>.27</td>
<td>.26</td>
</tr>
<tr>
<td>$r$</td>
<td>.27</td>
<td>.26</td>
<td>.31</td>
<td>.35</td>
<td>.26</td>
<td>.29</td>
</tr>
<tr>
<td>$D$</td>
<td>.25</td>
<td>.27</td>
<td>.18</td>
<td>.11</td>
<td>.27</td>
<td>.22</td>
</tr>
<tr>
<td>$c$</td>
<td>.92</td>
<td>.92</td>
<td>.92</td>
<td>.92</td>
<td>.92</td>
<td>.92</td>
</tr>
</tbody>
</table>

A: 29% change in means of payment
30% change in loans
elasticity of .9 of money in the hands of the public

B: 28% change in means of payment
29% change in loans
elasticity of .9 of money in the hands of the public

C: 28% change in means of payment
30% change in loans
elasticity of .9 of money in the hands of the public

D: Case A with elasticity of .93 of money in the hands of the public

E: Case B with sale of present assets, or increase in rediscounts, of NOR$I 34 million to permit expansion of loans.
What emerges from this exercise is the virtual necessity of almost identical rates of expansion of loans and the means of payment. Cases A and B have reasonable values for the parameters, while case C, with an expansion in the means of payment of 28% and 30% in loans does not. A second result is that the assumption made concerning the elasticity of demand of paper money in the hands of the public is not crucial to the results. Case D exhibits only small deviations from case A even though the elasticity has been set at .93 instead of .9. Thirdly, as a comparison of Cases B and E demonstrate, a policy of encouraging expansion of loans, while maintaining control over the money supply, is considerably facilitated by a policy of granting rediscounts or when banks have substantial other assets to dispose of. Since the principal latter possibility is Obrigações Reajustáveis, and the policy for the coming year is to encourage their retention, rediscounts are the only instrument. It is particularly important to note, therefore, that the revised Monetary budget has reduced the originally larger flow. Larger rediscounts, to the extent indicated in case E, permit a smaller monetary expansion with less alteration of the present parameters.

4. This paper has dealt with the three interrelated questions of the current liquidity position of the economy, the required monetary expansion for 1968, and the monetary budget necessary to accomplish it. The principal contention it has made relates to the absence of excess liquidity in the economy at the present. That the method proposed to measure liquidity actually shows a deficiency as of December, 1967 is not essential to the argument. What is, however, is that at least no excess is present. From that conclusion it follows that a policy of monetary expansion in 1968 which presumes a price increase of between 20 and 23 per cent, must provide a still larger monetary increase. The reason is the absorption of money balances by larger real product, and the small absorption due to the limited price deceleration this year.

A price increase smaller than the above range will be almost impossible to attain in view of the cost increases
built into the economy this year. Equally relevant, however, and apparently ignored is the consistency between fiscal execution and monetary policy. Since receipts have been estimated on the assumption of increased prices of 20 per cent, a lesser rate will enlarge the deficit. This in turn will create real demand pressures, as well as interact upon the supply of money and frustrate a smaller price increase. But in the process of trying to enforce a smaller price increase by rigid monetary controls, substantial damage can be done to the recovery.

The current monetary budget reflects conclusions different from the ones reached above. It programs only a 23 per cent increase in the money supply based upon an equivalent expansion in the assets of the monetary authorities. The asset growth is limited by substantial reductions in various accounts. But at least one of these is highly unrealistic and unlikely to materialize, while another is undesirable. The assumption that the monetary authorities will only have to finance NCr$ 600 milhãoes this year strikes one as unfounded optimism — both concerning the ability to adhere rigidly to the financial program as well as being able to sell substantial quantities of obligations in the market. It is better to adopt a more accurate estimate of NCr$ 800 milhãoes than to err in the opposite direction.

Secondly, the curtailment in expansion of loans to the private sector by the Bank of Brazil, in order partially to compensate for reserve acquisition, is to put the short run ahead of the long. Creating a continuing dynamism in the private sector has been a problem in Brazil for more than five years. Longer term factors have obviously played a role, but premature controls over expansion have also been responsible. Reserve acquisition, moreover, benefits foreign firms at the expense of domestic, because they can secure and transform dollar loans more readily, as well as puts at a premium foreign investment to generate the needed foreign exchange. If such a policy, which is obviously inflationary, is to be followed, at least some counter-balance of credit to domestic firms is necessary. Simultaneously to cut credit to then is to compound the error.
The constant parameter values used in the budget are at least in one case, that of the holdings of paper money by the public, possibly in error. But that is a minor matter compared to the overall strategy. The relationship between the expansion of the assets of the monetary authorities and of the money supply can be regulated, although within limits, by controls over reserve requirements. What is important, rather, is that the deficit not exceed projected levels so as to permit credit to the private sector -- which higher reserve requirements would curtail -- and that the target for monetary expansion be determined with due consideration for real growth in the economy. The first point has apparently been settled, while the second must now be dealt with in a more adequate way than does the monetary budget.