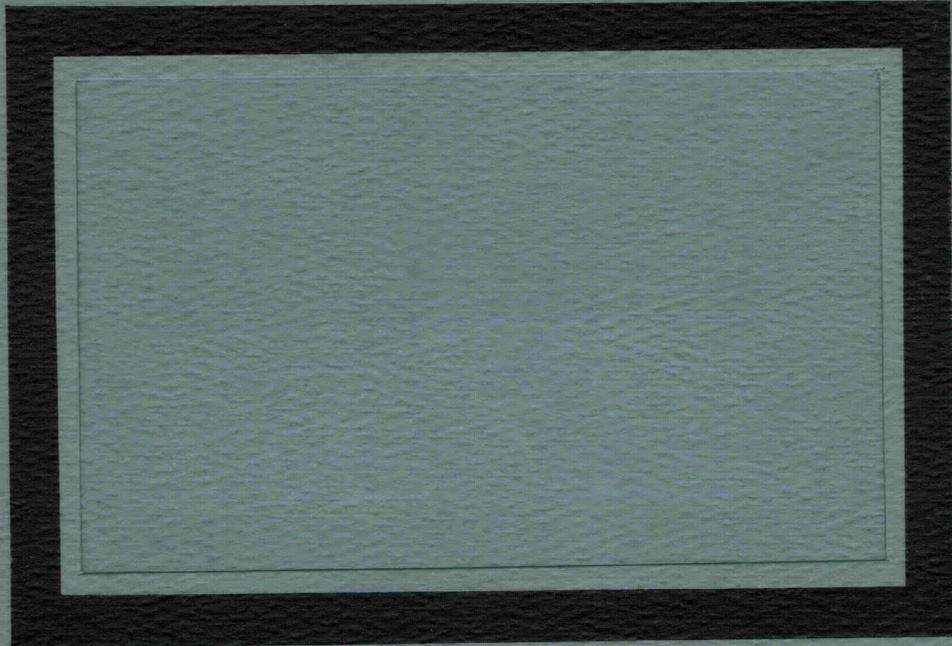


STAFF REPORT

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Monetary Policy Consistent

with a

Return to Full-Employment

by 1972:2

By

Preston Miller

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Monetary Policy Consistent with a Return to
Full-Employment by 1972:2

Preston Miller

I. Introduction.

A return to full employment by mid-1972 has been stated as a policy objective of the Nixon Administration. Faced with large projected budget deficits it is unlikely that fiscal policy will become more expansive. Monetary policy then is expected to provide much of the required stimulus. Yet, greenbook and other forecasts indicate that almost certainly the full employment goal cannot be achieved with the current money supply growth rate target of 5%. This raises two questions:

1. How fast must real GNP expand between 1970:3 and 1972:2 to reduce unemployment to 4%?
2. What is the minimum rate of growth in the money supply required to achieve the 4% unemployment target?

Limited by time and mental capacity, I adopted a pure barnyard approach to answer these questions. Partial compensation for the grossness of the method was made by specifying ranges for answers rather than point estimates.

II. Notation:

- E_t = number of civilian employees in t^{th} quarter
 LF_t = civilian labor force in t^{th} quarter
 $RGNP_t$ = real GNP in t^{th} quarter
 GNP_t = nominal GNP in t^{th} quarter
 M_t = average money stock in t^{th} quarter

- P_t = GNP deflator for t^{th} quarter
- r_t = average Treasury bill rate in t^{th} quarter
- u_t = average unemployment rate in t^{th} quarter
- \dot{X} = $\frac{dx}{ds}$, where s = time, and X is any variable

III. Relations among variables

- a. $E_t = (1-u_t) \cdot LF_t$
- b. $GNP_t = P_t \cdot RGNP_t$

IV. Method for Question 1

In order to answer question 1 (how fast must real GNP expand between 1970:3 and 1972:2 to reduce unemployment to 4 percent?) it is necessary to project what real GNP will be in 1972:2. The following equation was used:

$$(*) \quad RGNP_{72:2} = (1-u_{72:2}) \cdot LF_{72:2} \cdot (RGNP_{72:2}/E_{72:2})$$

where $u_{72:2}$ is the target value of .04.

Hence, what is required are projected figures for the civilian labor force in 72:2 ($LF_{72:2}$) and real GNP per employee in 72:2 ($RGNP_{72:2}/E_{72:2}$).

A. Projection of $LF_{72:2}$

A graph was constructed of the civilian labor force by quarter for the 10 year period 1960:3 - 1970:3 (See attachment 1). The data were taken from the department's data bank, using the last monthly figure in a quarter (as an expedient) for that quarterly labor force number. Using a ruler and assuming that the rate of growth in the labor force is positively correlated with the rate of growth in real GNP, the following projections were made:

	<u>72:2</u> <u>Labor Force (in Millions)</u>
"High" Guess	89.7
"Best" Guess	87.0
"Low" Guess	85.7

Another projection was made by extending the greenbook (November 10) forecasts for the labor force from the fourth quarter of 1971 to the second quarter of 1972.

72:2
Labor Force (in Millions)

Greenbook's Projection (Extended) 85.6

B. Projection of $RGNP_{72:2} / E_{72:2}$

As with the labor force, a graph was made of $RGNP/E$ by quarter for the 10 year period 1960:3 - 1970:3 (See attachment 2). The quarterly values for real GNP were copied directly from the data bank printout, while values used for E were the last monthly figures in the respective quarters. It was observed that the $RGNP/E$ series showed a rapid rate of growth in the early 60's. In the beginning of the 60's the economy was marked by high employment and low capacity utilization. Following was a period of sustained real growth. It was assumed for the projections of $RGNP/E$ for 72:2, that the behavior of this series in the period 1970:3 - 1972:2 would be similar to that of the early 60's. Using a ruler, the following projections were made:

	<u>1972:2</u> <u>RGNP/E</u>
"High" Guess	\$10,000
"Best" Guess	9,800
"Low" Guess	9,600

In addition a projection was made from the November 10 greenbook numbers. The values for E from 1970:3 to 1971:4 were computed from the civilian labor force and unemployment rate forecasts in the greenbook; the quarterly real GNP numbers were taken directly.

1972:2
RGNP/E
 \$9,550

Greenbook's Projection (Extended)

Annual growth rates for real GNP were made combining the "high" LF and RGNP/E projections, "best" LF and RGNP/E projections, "low" LF & RGNP/E projections, and the greenbook extended projection, using the following formula:

$$g = \left[\frac{.96 (LF_{72:2}^P) \cdot (RGNP_{72:2}/E_{72:2})^P}{RGNP_{70:3}} \right]^{4/7} - 1, \text{ from Eq(*)}$$

where P = projected

g = annual rate of growth of RGNP

V. Results for Question 1

<u>Projection</u>	<u>LF</u> _{72:2}	<u>(RGNP/E)</u> _{72:2}	<u>RGNP</u> _{72:2}	<u>g</u>
"High"	89.7	\$10,000	\$861.1	10.1%
"Best"	87.0	9,800	818.5	7.0%
"Low"	85.7	9,600	798.8	4.8%
Greenbook extended	85.6	9,550	784.8	4.4%

The greenbook projection must be highly discounted as being indicative of the growth in real GNP required to reduce unemployment to 4 percent by 1972:2. The Board's staff projections of the labor force, real GNP, and the unemployment rate are consistent with a slowly growing economy. However, if the economy grows at a rapid pace ($g(\text{RGNP}) \geq 4\%$), historical evidence suggests the labor force and real GNP per employee will also grow more rapidly. The "best" guess of 7 percent growth in real GNP seemed to be in line with Administration economists' projections (Wall Street Journal; November 9, 1970; p 1) Brookings researchers' projections (Wall Street Journal; November 12, 1970; p 26), and others.

VI. Method for Question 2

Two equations were used in answering question 2:

$$(a) \frac{\dot{GNP}}{GNP} = \frac{RGNP}{RGNP} + \frac{\dot{P}}{P} \quad (\text{time derivative of IIIb})$$

$$(b) \frac{\dot{M}}{M} = .81 \frac{GNP}{GNP} - .06 \frac{\dot{r}}{r}$$

Equation (b) is a money demand function estimated by Kareken for an Okun-Perry seminar paper. Kareken assumed $M_t = A(GNP_t)^{a_1} (r_t)^{a_2}$, from which it follows: $\frac{\dot{M}}{M} = a_1 \frac{GNP}{GNP} + a_2 \frac{\dot{r}}{r}$. He estimated this function for the quarters 1968:1 to 1969:4 using quarterly percent changes as proxies for instantaneous percent changes (ie $\frac{X_t - X_{t-1}}{X_{t-1}}$ for $\frac{\dot{X}_t}{X_t}$). He estimated $a_1 = .81$, $a_2 = -.06$. Substituting his estimates for a_1 and a_2 yields relation (b), a forecasting equation for $\frac{\dot{M}}{M}$.

Although equation (b) is called a demand function, it is really an estimate of the relation between the observed money stock, GNP, and the bill rate. With a single equation he can not estimate the demand for money.

VII. Results for Question 2

Combining (a) & (b):

$$\frac{\dot{M}}{M} = .81 \left(\frac{RGNP}{RGNP} + \frac{\dot{P}}{P} \right) - .06 \frac{\dot{r}}{r}$$

Using the best guess for $\frac{RGNP}{RGNP}$ of 7 percent, it was assumed that with the money supply growing at a moderately high rate ($\geq 5\%$), prices would increase by at least 3 percent per year in 1970:3 to 1972:2, and the Treasury bill rate would not rise for this period. These assumptions (intentionally biased) were made to get the lowest figure for money growth consistent with 7 percent growth in real GNP. Hence,

$$\frac{\dot{M}}{M} = .81 (.07 + .03) - .06 (0) \approx .08, \text{ or at least an 8 percent growth}$$

(A.R.) of the money supply is required from 1970:3 - 1972:2 to be consistent with a reduction in the unemployment rate to 4 percent by 1972:2. This pro-

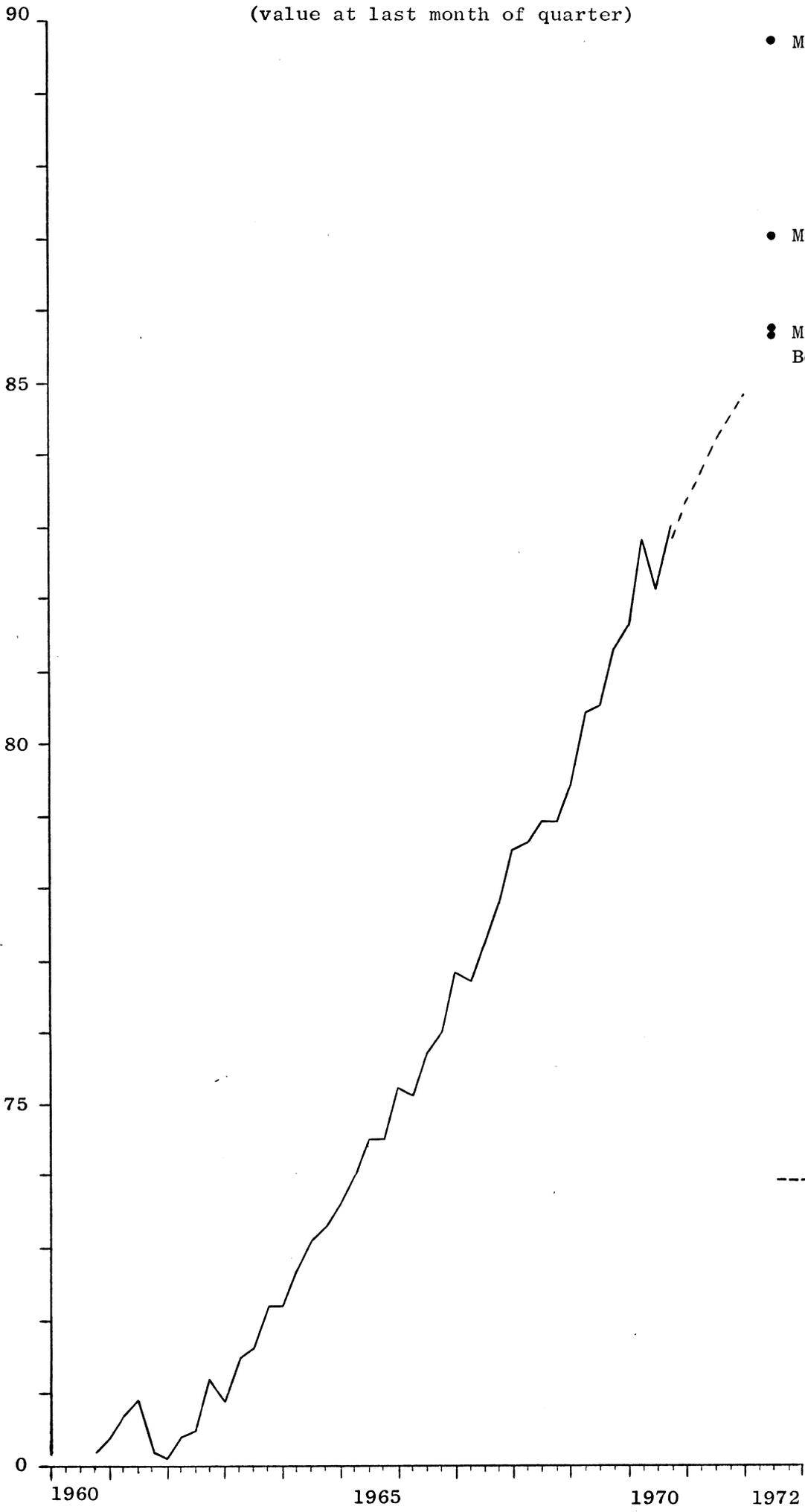
jection of money supply growth is in line with the 7%-11% range specified by Administration economists (Wall Street Journal; November 9, 1970; p 1), the 7%-8% range given by Brookings researchers (Wall Street Journal; November 12, 1970; p 26), Poole's numbers (Poole-Research paper), and the historical evidence of 1966. It is lower than what the Wharton model indicates.

... millions

CIVILIAN LABOR FORCE (value at last month of quarter)

Attachment 1

- Miller's "High" Guess
- Miller's "Best" Guess
- Miller's "Low" Guess
- Board's Projection Extended



--- Board
Projections
Quarterly
Average

RGNP/E
(value at last month of quarter)

\$ thousands

