

ESSAYS IN ECONOMICS Theory and Policy

James Tobin

THE PAPERS OF JAMES TOBIN

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computations when, as in the case of OPEC price increases, consumer price inflation overstates the dollar returns to operational investments. Chapter 4 uses financial data for a sample of corporations to trace the changing weights of growth, cyclicalness, debt, dividend payout, and other factors in security market valuations, and from these weights computes an index of the cost of capital for business investment.

“Keynesian” has become a bad word. Politicians and pundits, who probably have never read J. M. Keynes, blame his economics for all the discontents of the day. Economic theorists who have read Keynes find his influence at the root of mammoth analytic errors. As a beginner in economics in college I cut my teeth on Keynes’s *General Theory*. Over the forty-odd years since, I have been a friendly critic or a critical friend. I have tried to play some part in correcting, amending, extending, and generalizing Keynes’s analysis, and in constructing the “neoclassical synthesis” of Keynesian and price-theoretic traditions in macroeconomics. In part I, the message of chapters 5 and 6 is that neither recent economic history nor latter-day classical counter-revolutions in economic theory have rendered obsolete the central propositions of Keynesian macroeconomics. [This is the theme of my book *Asset Accumulation and Economic Activity* (Oxford: Basil Blackwell; and Chicago: University of Chicago Press, 1980).]

An earlier controversy in monetary theory was provoked by Milton Friedman’s brand of monetarism, beginning in the mid-1960s. I entered the lists, perhaps all too often, as the eclectic Keynesian challenging the extreme theoretical and empirical claims of Friedman and other monetarists. Chapters 7–9 continue a sequence of articles republished in volume I. Chapter 7 questions on empirical grounds Friedman’s “permanent income” theory of the demand for money; he abandoned the theory about the same time—probably not because of this article! In 1970–1971 Friedman, responding to widespread and long-unsatisfied interest, published in the *Journal of Political Economy* two articles expounding the conceptual and theoretical basis of his monetarist doctrines. Chapter 8 was my contribution to the subsequent symposium. At issue is whether fiscal policies and other nonmonetary shocks can, in the absence of accommodative changes in money supplies, systematically alter aggregate demand, output, and prices. I argued against Friedman’s essentially negative answer. Chapter 9 is a sequel in the same controversy, questioning a back-up monetarist position that fiscal policies have transient effects that are wiped out in time by the growth of public debt.

The first two chapters of part II continue the same subject: the effects of fiscal and monetary policies, short run and long run, on output, prices,

interest rates, and capital formation. The more ambitious is chapter 11, a thorough-going exposition of the macroeconomic theory of an economy with three imperfectly substitutable kinds of assets available to savers, namely, money, bonds, and capital.

In chapter 13 Martin Baily and I considered whether public service employment or wage subsidies to private employers could be expected to increase employment in aggregate. The obvious affirmative answers are naive, and “natural rate” theories suggest that these interventions will not alter employment or unemployment, only their distribution. Our verdict was cautiously optimistic. Chapter 14 takes a nonapocalyptic view of the size and growth of the public sector in the United States and argues against freezing fiscal rules into the Constitution. I wrote chapters 15 and 16 while spending the year 1972–1973 at the University of Nairobi, Kenya; they seek to use economic analysis on matters that were in the forefront of professional and public discussions of policy at the time. Chapter 17 reprints the attempt my colleague Bill Nordhaus and I made to conceptualize and illustrate a national Measure of Economic Welfare. The approach turned out to be popular not only in this country but in Japan and elsewhere. Much more ambitious and thorough statistical efforts to construct measures of this kind are in process.

My interest in international monetary economics and policies owes a great deal to my friend and colleague Robert Triffin, and to my special responsibilities on these matters when I served on President Kennedy’s Council of Economic Advisers in the early 1960s. The framework of chapter 18 is one of my reactions to the problems of balance of payments adjustment, and to the conflicts of interest these problems generate between countries. The floating exchange rate regime of the 1970s changed the game: the problems and conflicts are the same but show up in different guises. My offbeat reform proposal is set forth in chapter 20. Preceding it is a theoretical article on exchange rates, which extends to an international setting the macroeconomic modeling framework of chapter 11.

In part IV, four of the five essays were related to a crusade that engaged me in the mid-1960s. In addition to structural antipoverity strategies—measures to preserve and improve human capital and to assure equal opportunity—I favored, as I do now, some income redistribution via taxes and transfers. A national negative income tax seemed, as it does now, a very good way to accomplish humanitarian goals while minimizing perverse incentives with respect to work, family stability, and migration. Chapter 24 goes one step further by integrating welfare transfers or “negative taxes” with the regular positive income tax. Chapter 25, given as the Henry Simons Lecture at the University of Chicago

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Preface

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The papers in this volume were mostly written and published since 1974, although several earlier ones, including one (chapter 24) not previously published, are included. This is the third volume of my professional papers in economics, collected under the general title *Essays in Economics*; volume 1 bore the subtitle *Macroeconomics* (Chicago: Markham, 1971; revised edition New York: North-Holland, 1974); volume 2, the subtitle *Consumption and Econometrics* (New York: North-Holland, 1975). The three volumes do not encompass less scholarly essays on economic policy intended for a popular audience. I have previously published a collection of such papers in *National Economic Policy* (New Haven: Yale University Press, 1966).

The bulk of the present volume, parts I-III, consists of papers in macroeconomics written after the preparation of volume 1. Exceptions are chapters 7, 12, and 18. These are earlier papers now included because they are substantively related to the later articles with which they are grouped.

Part IV gathers together five articles on welfare and inequality. These are related both to my interest as an economist in these subjects and my concern as a citizen with welfare and tax reforms, and with policies to diminish poverty, discrimination, and inequality. Consequently they are close to, perhaps even beyond, the line separating professional papers from popular policy-oriented pieces that these volumes were designed to respect. If any of them cross the line, I hope the reader will excuse me, and perhaps also for chapter 14 in part III, which combines economic analysis, statistical narrative, and political opinion.

Part V is of a different character altogether. The essays, either book reviews or memoirs, concern six distinguished economists.

The monetary papers of part I fall into three groups. The first four expound, and apply to the stagflationary economy of the 1970s, a framework for monetary analysis set forth in a number of the essays published in volume 1. I stress the systematic variation and unpredictable volatility of the velocity of monetary aggregates, the persistence of inflationary trends in the face of monetary contraction, the importance of equity prices in the climate for real investment, the effects of monetary policy on equity prices, and the misleading nature of simplistic real interest rate

Law School in 1970, is on a different but related subject. It is interesting that public sentiment in a democracy demands egalitarian distribution of some goods and services and some obligations while also tolerating and even welcoming vast differences in total income and wealth.

As a student and practitioner of economics, I have always enjoyed reading what economists said about each other and discovering the human side of the authors whose scientific works I studied. Biographical portraits by Keynes, Schumpeter, and Samuelson are works of art, revealing of the artists as well as of their subjects. Though their examples inspire me to include part V in this collection, I do not pretend to join their league.

Alvin Hansen was for me a teacher and mentor, and then for another quarter-century a friend. Kermit Gordon, my contemporary, I knew for many years prior to an intimate working relation in Washington in 1961–1962, which cemented a close friendship for the rest of his life. Harry Johnson was also a very good friend from 1948 until his death in 1977, though mostly at a distance after our common experiences in early post-war Cambridge, England. Paul Douglas I knew less well but admired from afar. The other two are fortunately still living. The brief piece on Milton Friedman, on the occasion of his Nobel award, speaks my genuine admiration of his scientific contributions, transcending the dissents from his monetary theories and policies expressed elsewhere. A long friendship with Ken Galbraith, characterized fundamentally by mutual respect, has survived irreverent disagreements of the kind expressed in my book review (chapter 31).

Several of the essays were, as indicated in the contents, written jointly with others. I thank all my coauthors both for their pleasant and fruitful collaborations and for their consents to publish our joint work in this volume. As on many previous occasions, including the two previous collections of essays, the help of my secretary, Mrs. Laura Harrison, has been indispensable. I am grateful to the MIT Press for suggesting the assembly of another volume and for patiently putting it together. Finally, I acknowledge with thanks permissions to reprint here articles originally published in *American Economic Review*, American Enterprise Institute, American Philosophical Society, Ballinger Publishing Co., The British Academy, Brookings Institution, *Daedalus*, *Eastern Africa Economic Review*, *Economic Inquiry*, *The Economist*, The Industrial Conference Board, *Journal of Development Economics*, *Journal of Finance*, *Journal of Law and Economics*, Michigan State University, the MIT Press, National Bureau of Economic Research, North-Holland Publishing Co., Princeton University Press, *Quarterly Journal of Economics*, *Southern Economic Journal*, *Yale Law Journal*, and *The Yale Review*.

Monetary Policies and the Economy: The Transmission Mechanism*

JAMES TOBIN
Yale University

I. Introduction

My subject is the process by which monetary policies are transmitted into changes in expenditures for Gross National Product. My account will be selective, and far from complete. I will concentrate on certain links between financial variables and demands for goods and services. I will say relatively little about the other part of the story, how the various instruments at the disposal of the central bank affect the financial variables. I don't have time to do both, and the proximate mechanisms of monetary control seem to me to be less important and less controversial.

As to controversy, it will be clear to you that I am presenting an account of the transmission process which is an alternative to monetarism. But I have, for the most part, resisted the temptation to point out the differences of view, preferring to let you the listeners infer them from my exposition of my own theories. It will suffice to remark at the outset that I clearly do not subscribe to the prevalent view that what the central bank does is to control the money supply, which in turn determines money income and prices. I would say instead that the central bank controls some short-term money-market interest rates and/or reserve aggregates and that these variables simultaneously affect other interest rates and financial quantities, GNP expenditures, and monetary aggregates.

Much of what I shall argue is not new but old-fashioned. I refer particularly to the attention I shall give in the second and third parts of the paper to credit, as distinct from money, i.e., to the asset, as well as the liability, accounts of commercial banks and other intermediaries. The first section concerns the link between asset valuations and capital spending. The second

*Invited address, Southern Economic Association meetings, Atlanta, Georgia, October 18, 1976. I am indebted to William Brainard and John Ciccolo for help with this paper.

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section deals with ways in which credit availabilities affect the spending of liquidity-constrained households and firms. The final section concerns some implications of the role of commercial banks in financing the working capital requirements of business customers.

II. Asset Valuation and Capital Spending

In 1965 the bond and stock markets valued the real capital of U.S. nonfinancial corporations at almost 170% of its replacement cost. In 1974, the same ratio was 75%.¹ In 1966 fixed nonresidential investment was 10% of the capital stock, valued at replacement cost. In 1975, it was 8%. The figures are illustrative of a general positive correlation between the market value/replacement cost ratio and the rate of investment.

The correlation is scarcely surprising. As Keynes wrote in *The General Theory*,

... The daily revaluations of the Stock Exchange, though they are primarily made to facilitate transfers of old investments between one individual and another, inevitably exert a decisive influence on the rate of current investment. For there is no sense in building up a new enterprise at a cost greater than that at which a similar existing enterprise can be purchased, whilst there is an inducement to spend on a new project what may seem an extravagant sum, if it can be floated off on the Stock Exchange at an immediate profit. [3, 151]

The ratio of market value to replacement cost is a summary measure of one important impact of financial markets on purchases of goods and services, in particular durable goods. I have, not very imaginatively, called the ratio q , and a couple of irreverent former students have given me a gaudy T-shirt with the legend " q is all that matters" in front and the team identification "Yale School" in back. Well, q is not all that matters, but it does matter. I would say the same for M .

In equilibrium q has a normal value—one in a purely competitive economy with constant returns to scale—which sustains capital replacement and expansion at the natural growth rate of the economy. In practice, even leaving aside statistical quirks, the normal value exceeds one by the capitalized value of rents or monopoly profits. In the short run, events, policies, and expectations move q up and down, creating or destroying incentives for capital investment. Among those determinants is monetary policy. It is certainly not the only factor. But whether the central bank is seeking to influence investment spending on its own, or merely to counter other disturbances, q is an indicator it should watch.

1. These are estimates made by Professor John Ciccolo of Boston College. The estimates of the Council of Economic Advisers [2] are 136% for 1965 and 84% for 1974. The two series agree in general contour, but the CEA series has smaller variance.

The theory is simple and straightforward. One way to look at q is that it represents the comparison between, on the one hand, the marginal efficiency of capital, the internal rate of return on investment at its cost in the commodity markets, and on the other, the financial cost of capital, the rate at which investors discount the future returns from such investment. In pages of the *General Theory* other than the one cited, Keynes gave the misleading impression that investment is inversely related to the level of "the rate of interest." His condition that the marginal efficiency of capital equal the interest rate determines the equilibrium stock of capital. In such a long-run equilibrium, net investment will be zero in a stationary economy, or in a growth equilibrium enough to expand the capital stock at the natural growth rate. In Keynesian short runs, marginal efficiency of capital and interest rate diverge. Investment is related to the difference or ratio of the two rates rather than to their absolute levels.

How can they ever diverge? Why doesn't arbitrage always close instantaneously any incipient gap between the present value of returns from investment projects, calculated with market discount rates, and their cost? What keeps the rate of investment within finite bounds when q exceeds one, or above zero when q falls short? Why, in other words, is the stock of capital ever out of equilibrium relative to the interest rate?

The answer surely is that investment takes time and that the acquisition and installation of capital goods costs more, both on average and on the margin, for both individual firms and the economy at large, the faster the capital stock is expanded. If these adjustment costs are added to the normal costs of the capital goods, then a q -like ratio so calculated may always be 1, but it takes variation in the speed of investment to keep it so. I trust that this explanation will satisfy purists who cannot bring themselves to believe that arbitrage opportunities can stand, even temporarily, as incompletely exploited incentives. Personally, I think that can happen, simply because it takes time for those individuals and bureaucracies in a position to exploit such opportunities to act.

An economy-wide calculation of q conceals the immense variation of the ratios for individual firms and diverse capital goods. When aggregate q is low, many firms and many kinds of capital bear q 's which discourage all gross investment, even for replacement. But gross investment cannot be negative. The frequency of firms in this position is smaller when aggregate q is high. This non-linearity of aggregation reinforces the economy-wide relation of investment and q .²

What is "the interest rate" whose divergence from the marginal efficiency of capital regulates investment? It is the discount rate implicit in the market valuation of securities which are claims to the capital stock and its future

2. See [4] for more discussion of the relationship of q to investment and for some disaggregated estimates of q .

earnings. It is a rate appropriate for valuation of streams of future returns with the time patterns, uncertainties, and covariances of business cash flows. It is not the interest rate on long-term government bonds, or even on long-term corporate bonds, or any other interest rate on fixed-money-value contracts. Here Keynes in the *General Theory* misled readers who took literally a convenient simplifying assumption. Since businesses are at least partly financed by shareholders, the rate required to induce them to take the risks of equity capital is clearly relevant.

The true financial cost of capital is some combination of bond, equity, and other rates. It cannot be represented by any single rate. The full cost of bond finance, for example, cannot be calculated without allowing for the effects of additional indebtedness on share prices. We do not have to follow Modigliani and Miller in their contention that one financial structure for the corporation is as cheap as any other. All we need is the proposition that if the optimal allocation of finance among equity, bonded debt, and other liabilities has been attained, the cost of additional finance on the margin is the same for all financial sources in use. Since the optimal financial structure will differ from one firm to another, so will the relevant mix of market rates.

How does the central bank affect the cost of capital and q ? Its influence is indirect but powerful. It operates through a chain, or network, of asset substitutions. Corporate bonds and equities are imperfect substitutes for each other and for other assets in the portfolios of many investors. The other assets include deposits in banks and other intermediaries, and short-term Treasury or commercial paper. The central bank operates in the first instance on the rates on short-term fixed-money-value instruments. Via portfolio substitutions, affected both by the current levels of these rates and by expectations of their future paths, monetary operations are transmitted to bond rates and equity yields.

The linkage is loose, and there is plenty of opportunity for slippage. Events and shocks other than monetary policies affect the cost of capital. Consider, for example, increase in generally perceived uncertainties of business earnings, or diminished willingness of investing individuals and institutions to take these risks. The cost of capital will rise, q will fall, independently of monetary policy. Of course, the ratio q will also vary, independently of monetary policy, as estimates of future earnings change. These are systematically related to other economic variables, but Keynes rightly emphasized also the subjectivity and volatility of the marginal efficiency of capital.

Business firms making investment decisions are interested in the q for specific incremental investments, not in the average q for the firm, much less for the whole economy. The relevant comparison is this: An investment costing a million dollars in the commodity markets is considered. When the prospective earnings are evaluated by the securities market, will they add at least a million dollars to the value of the firm? If so, the investment can be

undertaken—financed by some combination of security issues and retained earnings—without decreasing, but possibly increasing, the equity of the existing shareholders.

It is easy to imagine cases where marginal q 's differ from average. Indeed, if capital investment were generally Schumpeterian in nature, embodying new processes or products that render existing capital, perhaps also existing firms, obsolete, this would typically be the case. Less dramatic examples are the following: Increases in energy costs or anti-pollution standards simultaneously lower the average q 's of energy-using industries while raising the marginal q 's for energy-saving or environmental-protecting investments. An increase in tax credit for new investments raises marginal more than average q 's.

Since it is average q 's that can be most easily estimated statistically, their usefulness depends on a reliable relationship of average q 's to unobserved marginal q 's. Confidence in such regularity will be much greater if most investments involve capital goods which are close substitutes for existing stocks. This is an empirical matter. Econometrically, there is a good relationship of investment to q 's, with lags distributed over eight quarters and with an elasticity of about .8 [1].

As previous remarks already suggest, we make an even stronger abstraction of aggregation in speaking of one " q " for the economy as a whole than in speaking of "the rate of interest." Estimating q 's for a cross section of individual companies with listed stocks, my colleague William Brainard and I found the standard deviation to be only slightly less than the mean value [4]. The concept can also be applied outside the corporate sector. Existing houses, for example, are traded and valued in a thriving market. The valuations presumably reflect a capitalization of future net rentals, actual or imputed. The incentive for new building can be measured by comparing the value of old homes with the cost of building new ones. The new ones won't be duplicates of the old, but will be close functional substitutes. We could expect residential investment to be sensitive to the housing q . Probably, as Keynes suggested, the valuation of houses depends on expected rentals and the mortgage rate; but other factors—rationing of mortgage credit, taxes, expected inflation in real estate prices—are also relevant. A similar mechanism applies for automobiles and other consumer durables.

I turn now to the effects of inflationary expectations on q . The first approximation is that there are none. This answer applies for a change in expected inflation which applies to the future prices of all commodities, does not alter expectations of relative prices or other real magnitudes, and is fully reflected in nominal interest rates and discount factors. After all, the goods value of claims to goods should be independent of the money price of goods. But there are several other factors leading to somewhat contradictory modifications of the first answer. Given the real quantity of money or of the

monetary base, an increase of expected inflation lowers the real interest rate on money, pulls other real interest rates down in sympathy, and raises q . The neutrality of the conventional story—which says that nominal interest rates rise point-for-point with expected inflation—requires restrictive monetary intervention by the central bank. There are other reasons why a change in the inflation rate will not be neutral, given the overlap of debts, tax valuations, and other dollar magnitudes geared to the old inflation rate. One reason for non-neutrality of great current relevance in the United States is the following: If the public believes that inflation will induce strong deflationary counter-measures by the central bank, it is understandable why inflationary news is bad for the stock market and for q .

One warning I would like to emphasize: Naive calculations of Fisherian real rates of interest are very unreliable indicators of financial incentives for real investment. It is easy to subtract moving averages of inflation rates from nominal interest rates on bonds, bills, and loans and obtain zero or negative real rates. The fallacy is the implicit assumption that at those nominal rates actual live borrowers have, or perceive themselves as having, operational opportunities to earn without risk dollar returns equaling or exceeding those rates of inflation. If such opportunities had been available during recent double-digit inflation, there would not have been a stock market collapse which took q down to .7 or a collapse of residential construction. It is not in fact possible to invest in the GNP Deflator or to hoard the basket of goods, services, and taxes valued by the Consumer Price Index. Moreover, I repeat my earlier point that the absolute level of interest rates is of no particular consequence by itself. It is important only in comparison with the marginal efficiency of capital. Although this is in the long run governed by such fundamental factors as technology and capital/labor ratios, in the short run it is, as Keynes emphasized, a highly variable and psychological magnitude. It is hard to imagine any proposition more divorced from experience than the currently fashionable proposition that marginal efficiency of capital and real interest rates are always equal to each other and constant.

III. Liquidity Constraints and Credit Policy

In the theory I have just outlined, I have spoken as if savers and investors choose freely among alternative financial and real assets, taking long or short positions constrained only by their net worth and the balance sheet identities. I also assumed implicitly that asset markets are cleared by adjustments of asset prices and yields. While I do not think the story I told is misleading, it does miss important features of the transmission of monetary impulses to demands for GNP. The features I have in mind fall under the general heading of liquidity constraints.

An individual is potentially liquidity-constrained if he possesses wealth which he can spend only at certain dates in the future, or if he can substitute current for future spending only at an interest cost in excess of what he can earn by postponing spending. Effective liquidity constraints are the combined effects of two things: (1) the nature of certain forms of wealth and of the markets, if any, in which they are traded, and (2) the time and risk preferences of the wealth-owner. For example, human capital is an illiquid asset; for good reasons, the opportunities for borrowing against, or selling shares in, future labor incomes are extremely limited. Most workers, nonetheless, are not liquidity-constrained; they would not choose to mortgage future wages even if they could do so at prevailing interest rates; they voluntarily choose a lifetime consumption pattern which implies positive net worth in non-human capital. But many households, mainly the young and the poor, are at corners of maximum current consumption; they would borrow more and spend more today if they could. Prospective social security benefits and other retirement pensions are another illiquid asset; many workers can consume such wealth now by restricting other kinds of saving, but for many others payroll taxes and pension contributions fall fully on consumption.

Over the past thirty years, some structural trends in our financial system have increased the likelihood of liquidity constraints, and others have reduced it. In the first category is the vast increase in compulsory or semi-compulsory provision for retirement. In the second is the increased availability of mortgage credit and consumer credit, both of which by making homes and consumer durables more liquid assets serve to increase the intertemporal fungibility of wages and salaries. Home mortgage debt has risen from 20% to more than 40% of the value of the housing stock, and in a number of recent years the mortgage indebtedness has risen by more than the increment in value of the stock. Outstanding consumer credit has risen from 15% to 60% of the value of the stock of consumer durables, and the fraction of new purchases covered by new debt is now $\frac{2}{3}$ instead of $\frac{1}{3}$.

Liquidity-constrained consumers behave as if they have short horizons, measured in weeks or months or years rather than decades or lifetimes. They will spend any increment of liquid resources within those short horizons, rather than diluting the impact by spreading the resources thinly over many years. That is why tax reductions, even if temporary, are more powerful than is implied by a model which relates consumption solely to fully fungible lifetime wealth. That is why the distribution of tax cuts, rebates, and other windfall gains is an important bearing on the strength of the consumption response.

More to our present point, that is why monetary policies and events which relax or tighten liquidity constraints are especially powerful, beyond what would be expected by considering marginal responses to changes in interest rates and asset prices. Liquidity-constrained borrowers spend every cent they are permitted to borrow, or every cent they can raise by asset sales; they do

not require the inducement of lower interest rates, and they are not borrowing just to reshuffle their portfolios of financial assets and liabilities. There are several mechanisms at work here. I give three examples. (1) Lending institutions adjust down payments, collateral requirements, amortization speeds, and credit standards as their own costs of funds vary. (2) The terms of trade credit, and their enforcement, vary in the same way. (3) There are always some individuals who by circumstances or choice are spending the proceeds of liquidity or borrowing against variable-price assets, the amount of their spending depends directly on the value of those assets, which in turn depends on monetary policy.

Many businesses, like many households, are liquidity-constrained. The pace of their real investment, whether in working capital or fixed capital, is limited by their cash flow and the credit they can obtain. Their own estimate of the marginal efficiency of such capital exceeds the interest rate on such loans. Perhaps they are unobjectively optimistic; perhaps they are risk-lovers instead of risk-averse. In any case their borrowing is limited by collateral and margin requirements rather than by rates. Credit rationing is not necessarily a market imperfection. It is intrinsic to the difference of perspective between lender and borrower. As the lender cannot really control the borrower's use of the funds, there is no way the lender can make an actuarially sound loan simply by setting interest rates and letting the borrower decide how much to take. The implication is that there is almost always an "unsatisfied fringe of borrowers" at existing rates, and these borrowers are sure spenders. When easy money conditions diminish the cost of funds to banks and other lenders, extra lending to venturesome entrepreneurs is a powerful effect. An indirect mechanism by which risk-loving and liquidity-constrained businesses obtain finance, in amounts which likewise vary with general monetary conditions, is through trade credit extended by suppliers or customers who have credit ratings more acceptable to banks and other institutional lenders.

These mechanisms illuminate some phenomena of credit markets which participants in those markets understand much better than monetary theorists. A "credit crunch" is not just a time of high and rising interest rates. It is a time when some business customers of commercial banks find that they cannot fully use the credit lines they thought they had, that they cannot obtain the timely accommodation they presumably had paid for by good deposit behavior in the past. They are liquidity-constrained all of a sudden, in the sense that they need credit to carry out their investment and financial budgets. Of course many priority loan customers are partially or fully accommodated. They then displace mortgage and consumer credit applicants, many of whom are also liquidity-constrained. The upshot is that reductions in spending are exceptionally large for the interest rates nominally quoted.

The futility of "pushing on a string" is a refrain regularly heard from cen-

tral bankers around cyclical troughs. It's not a very good excuse for inaction if possible futility is the worst that can be said of an aggressive easy credit policy. But the refrain does make some sense. Just as the prevalence of liquidity-constrained unsatisfied borrowers in booms augments the power of tight money and credit crunches, so the relative absence of such borrowers in depressions and deep recessions weakens expansionary monetary policy. There is some merit to the view that in those times few credit-worthy households or firms are limiting spending for lack of liquidity. Once the system is thrown back on the marginal responses of unconstrained agents to reductions of interest rates, the gains from monetary actions are much less dramatic.

IV. Commercial Banks as Financial Intermediaries

These observations lead me to a general point about commercial banks, which are after all the institutions through which monetary policies are transmitted in the first instance and the institutions whose liabilities are the major component of money stock. Like other intermediaries, their business is to borrow from one set of people and lend to another. Their liabilities are tailored to the needs and preferences of their depositors, for safe, liquid, convenient, divisible, negotiable, fixed-money-value assets. Their assets are tailored to the needs and preferences of their borrowers, longer in maturity and often risky, lumpy, and illiquid. The function which banks and other intermediaries perform is to accommodate the borrowers at lower cost and easier terms than they could get by direct loans from the ultimate lenders, the depositors. Via the fractional reserve system, the central bank controls the availability and cost of credit to bank borrowers. It also controls the aggregate scale of banks' assets, and given the balance sheet identity, their monetary liabilities. The two sides of the T account rise and fall together, and it seems to me gratuitously one-sided to say that the importance of the banks' intermediary operations lies solely in the scale of their monetary liabilities. It is equally unfortunate to ignore the similar magic of transformation accomplished by intermediaries whose liabilities are arbitrarily defined as near-money rather than money.

Let me remind you of the tremendous change in the nature of commercial banking that has occurred since the second world war, a change which is really a return to the historic role of commercial banks. In 1950, loans to private borrowers were only a third of deposits, business loans less than a fifth, and half of deposits were invested in Treasury securities. In 1970, loans to private borrowers were almost $\frac{3}{4}$ of deposits, business loans about 30%, and Treasury securities had dwindled to $\frac{1}{4}$. At the earlier date the banks were, in effect, custodians, simply sparing depositors the trouble of holding government debt directly. Now the banks are monetizing, if you like, the

debts of many private businesses and households who would otherwise be accommodated, if at all, at much higher rates. The real effects, both average and marginal, on GNP spending are certainly much more substantial.

The distinctive business of commercial banks is to finance the working capital of business, specifically their inventories of materials, goods in process, and finished products, the wages they must disburse prior to selling the produce of their labor, and their accounts receivable. To the extent that working capital is financed by bank loans, businesses can use their open-market sources of debt and equity capital to finance long-term capital accumulation. The working capital positions of individual businesses fluctuate seasonally and cyclically in many diverse patterns. In considerable degree, banks are the vehicle through which the temporary surpluses of some businesses, deposited in banks, finance the temporary deficits of others. In addition, of course, banks mobilize in deposits the fluctuating working balances of households.

The reciprocal relationship of business customers to banks, sometimes as depositors, sometimes as borrowers, is a central fact which exclusive emphasis on monetary aggregates obscures. The size of business deposits is payment for credit lines and credit accommodation when needed. The compensatory arrangements vary considerably in formality and tightness, but no one can doubt that they are there. It follows that holdings of deposits will be related, not just to the variables conventionally included in money demand relations, but also to past, present, and prospective use of bank credit by business depositor-customers, to the size of compensating balance requirements, and to the difference between the prime rate and the open-market commercial paper rate. I suspect that this relationship is a major part of the explanation of recent increases in the velocity of M_1 which are otherwise surprising. Over the past two years, until just recently, commercial lending by banks has declined, even in dollar value, partly because of the severity of the recession, partly because both business and banks have been shifting to more cautious and liquid balance sheets. The banks have allowed the differential of prime above the commercial paper rate to widen drastically. If this is correct, and if the process has run its course, the pleasant surprise which kept the Federal Reserve's conservative monetary growth targets from raising interest rates during the recovery to date may not recur in future years.

Let me conclude with some possibly controversial propositions that summarize my message. The institutional fact that our monetary supplies are predominantly "inside" rather than "outside" money is far from trivial. The system behaves quite differently from one in which monetary liabilities are subject to 100% reserves. When banks and other intermediaries monetize private debts, and indirectly the real capital asset holdings those debts finance, their economic impact is quite different from monetization of federal

debt. Indeed inside money is, in this sense, more powerful stuff than outside money.

Attention to the process of financial intermediation has other implications, derived from the inevitable realization that borrowers and lenders-depositors are different in economic behavior. The celebrated Pigou effect concerns the impact on spending of changes in the purchasing power of fixed-money-value assets. When the public is treated as homogeneous, and inside debts and credits are washed out, the base for the Pigou effect is reduced to the high-powered monetary base, the non-interest-bearing demand debt of the central government. But the neutrality assumed in the washing out of inside debts and credits is very implausible. Debtors are intrinsically bigger marginal spenders than creditors, and in this degree the effects of price level changes run counter to, and may dwarf, the conventional effect on the real value of the monetary base. In this observation I follow my great Yale precursor Irving Fisher, who emphasized the effect of price deflation on debt burdens as a factor intensifying, not cushioning, the depression.

A second implication of the approach I have sketched is that the effects of an expansion of monetary aggregates depends on how it is brought about. Here is another and final example. A common feature of various definitions of money is that the included assets have legally controlled interest rates. It is possible, therefore, to increase their supply by raising these rates, e.g., by allowing interest on demand deposits and lifting ceiling rates on savings deposits. Anyone who thinks an expansion thus induced has the same effects as one stimulated by open market purchases is mistaking appearance for substance. There really is no substitute for analysis which does justice to the significant institutional complexities of our monetary and financial institutions and markets.

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MONETARY POLICY, INFLATION, AND UNEMPLOYMENT

WHAT DETERMINES THE rate of price inflation in an economy like ours? How is it related to unemployment? In particular, what is the role of monetary policy in controlling inflation and unemployment?

Economists differ among themselves on these questions, and recent history contains unpleasant surprises for all theories and forecasting models. But even more striking than differences within our profession is the gulf between economists and the informed lay public – businessmen, financiers, journalists, politicians – in their views of the inflationary process and the mechanisms by which “money” and Federal Reserve policy affect the economy. In the hope of bridging this gulf, I seek here to set forth economists’ approaches to these questions.

I shall try in the course of the paper to outline the major disagreements among economists, between monetarists and neo-Keynesians. But I cannot pretend to be a neutral rapporteur. I am not a monetarist. I am, if I must be labeled, a neo-Keynesian. Truth in packaging requires this advance disclosure. Nevertheless, I shall hope to show that some reconciliation of the two approaches is possible, and that differences in policy recommendations arise more from differences of objectives than from disagreements about mechanisms.

“Inflation is at all times and everywhere a monetary phenomenon.” This famous aphorism of Milton Friedman is a good place to begin. The message is two-fold: On the one hand, look to central banks – in this country the Federal Reserve System – both for the source of inflation and for the remedy. On the other hand, do not try to understand inflation by looking at trade unions, monopolies, unemployment rates, oil cartels, and food shortages. In the monetarist view, these phenomena may explain *relative* prices – the cost of oil in terms of construction labor, the cost of beef in terms of television sets. But, the monetarists argue, they are only superficially and transiently related to the *average economywide absolute price level* – the cost of a representative bundle of goods and services in terms of *money*.

“Inflation” is the increase in that cost from day to day, month to month, year to year, and the very definition supports the claim that “money,” in some sense, plays some role. For that reason, few economists would quarrel with Friedr in’s aphorism. But large issues of diagnosis and policy remain. Monetarists are inclined to blame most of our recent double-digit inflation on erroneous policies of the Federal Reserve and other central banks. They argue that, given the will to avoid similar errors in the future, the monetary authorities can cure this inflation and even achieve price stability.

Nonmonetarists assign both less blame and less future control to the central banks. They observe that monetary policies aimed at offsetting the impacts on price indexes of large and rapid increases of individual prices, like petroleum and food, are bound to cause recession and unemployment, as happened in

1974-1975. They fear a stubborn anti-inflationary monetary policy will hold the economy well below its potential for production and employment for many years. I shall return to this basic disagreement in detail below.

Wage and Price Inflation in a Modern Industrial Economy

I shall begin by a description of the inflationary process which will seem to violate Friedman’s aphorism and to ignore “money.” But the omission is only superficial and temporary. In succeeding sections I will put money and central-bank policy into the picture I now start to sketch.

The sketch itself is intended to be a distilled exposition of the framework – economists would call it the “model” – which many economists use in thinking about the problems and issues with which this paper and this conference are concerned. Time and space do not permit, however, an extended theoretical and empirical defense of the framework.

To predict the rate of inflation next quarter or next year, the most valuable single piece of information is the rate of inflation in the period immediately preceding. If prices have been increasing at 5 percent per annum, continuation at 5 percent is a better bet than a sudden change to 0 percent, 10 percent or even 3 percent or 8 percent. The trend of prices is solidly built into the economy, with a powerful and persistent momentum.

Obviously this does not mean that the speed of inflation never changes. Inflation accelerates or decelerates in response to economic events, random shocks, and government policies. But it takes large stimuli to alter significantly and quickly the entrenched inflationary pattern.

It takes particularly strong stimuli to *diminish* whatever rate of inflation has been built into the economy’s habits and expectations. This asymmetry, this “ratchet effect” – the difficulty of reversing increases in speed of inflation – has been especially evident in the last decade.

The self-sustaining momentum of inflation is distinctive to that part of the economy Galbraith calls the “planning system” – in the United States, the bulk of the private nonfarm economy. The relevant features of this sector are: (1) the predominance of *hired* labor, in contrast to self-employed labor; and (2) the prevalence of *administered* wage rates and prices, in contrast to wages and prices determined jointly by buyers’ and sellers’ bids in market transactions. In this context, “administered” means simply that someone consciously, deliberately sets the price – the seller, or the buyer, as in the case of labor, or the two sides together in explicit agreement.

“Administered” does *not* necessarily imply monopoly or oligopoly. The prices of gasoline at service stations are administered, but the industry is often highly competitive. In contrast, the soybean farmer does not decide and announce a price for his crop and wait for potential takers. He sells, if he wishes, at impersonal prices determined continuously by supply and demand in an organized market.

Competition affects administered prices, too, but indirectly and often slowly. Disappointing sales may eventually induce the sellers to set lower prices, as we

have recently observed in the automobile industry. Labor shortages may induce employers to offer higher wage rates or to consent to them in collective bargaining. But since policy decisions at discrete intervals are involved, the adjustment of prices and wages to imbalances of supply and demand is imperfect and slow.

Wage setting is especially crucial in the private nonfarm economy. Wage scales are reviewed and announced periodically, usually annually. In organized sectors, they are set contractually in periodic collective bargaining. Both for employer and employee, the pattern of wage increases observed and experienced in relevant geographical areas, industries and occupations is an important reference point. If competing employers are giving 10 percent increases, an employer knows that he will not be at a competitive disadvantage in either product or labor markets if he follows suit. If he follows the reference pattern, he does not damage the morale of his existing work force or invite higher turnover. Likewise, union leaders who keep up with the pattern do not risk unfavorable comparison with rivals.

For these and other reasons, the "wage-wage" spiral is usually stubborn. Patterns of wage increases in one market are followed in others. For the same reasons, however, an irrational competitive escalation, such as occurred in the construction trades a few years ago, is hard to stop once it gets started.

Nonetheless wages and unit labor costs rise faster in markets of labor shortage, as employers bid above the previous pattern for needed workers, or are forced to upgrade workers beyond their skill and experience. For similar reasons, wages rise more slowly in markets of labor surplus. But there is considerable asymmetry in these two responses. Not only unions, but employers too, are slow to recognize the availability of unemployed replacements for employed workers as a reason for retarding the accustomed and expected advance of wages. A stingier wage policy risks costs in lower morale and higher turnover. However, when employers have compelling financial reasons for reducing their work forces, by layoffs and short hours rather than by gradual attrition, we can observe significant responses of wages to job shortages.

There is a two-way relation between wage inflation and price inflation. The price-wage direction is often discussed. Obviously workers like to be compensated for increases in the cost of living. This is a frequent debating point in wage complaints and negotiations, and some employees have obtained formulas for partial escalation.

But in thinking about the feedback from cost-of-living inflation to wage rates, it is important to distinguish among three components of the cost-of-living index: (1) prices received by the workers' employers themselves; (2) prices paid for goods and services imported from elsewhere; and (3) taxes. Employers enjoying normal sales volume can compensate their workers for inflation in the first component. But they cannot do so for cost-of-living inflation from the other two sources except at the expense of their profits. Employers will resist wage demands inspired by increases in the prices of Arabian oil or Iowa corn, especially when their own sales and prices are threatened by recession. That is why wage increases in 1974 were more moderate than might have been feared in view of the double-digit inflation in consumer prices.

The other direction is from wages to prices. In the administered-price sector, prices are commonly set to mark up unit labor costs estimated at normal rates of operating capacity. Because of labor-saving technological advance and capital accumulation, unit labor costs rise less than wages. Thanks to the trend of labor productivity, annual inflation in the prices of the nonfarm economy is normally 2.5 to 3 percent points below the rate of wage inflation.

This relation applies strictly to the pricing of the net "value added" by industry to materials imported from U.S. agriculture and resource industries and from overseas. As recent events have reminded us, sharp increase in materials costs may cause *gross* prices to rise faster than wages. This is a manifestation of the second type of cost-of-living inflation listed above. A similar qualification is in order for increases in indirect business taxes, excises and payroll taxes.

At the beginning of 1973, the permanent inflation rate internal to the U.S. nonfarm economy was around 5 percent. To this was added the spectacular bulge in prices as the economy absorbed the price increases stemming from the fourfold increase in OPEC prices, the world shortages of food and other materials, the depreciation of the dollar in the foreign exchanges, and the abolition of price controls. The result was a temporary spell of double-digit inflation – temporary because these were one-shot events. They could not continue to contribute to inflation statistics unless they recurred regularly.

The danger was that the internal inflation rate would be permanently raised to double digits if labor successfully obtained wage increases to match the painful boosts of external prices. Events have largely vindicated the argument above that there was no reason to expect wage increases of such magnitude. "Wage-wage" momentum is a more accurate description of the process than "price-wage" feedbacks.

In this event, if we judge from current wage increases of the order of 9 to 10 percent, the permanent inflation rate is now 6 to 7.5 percent. Transient phenomena – now that external prices are level or declining – are likely to make for even lower inflation statistics toward the end of 1975. Those numbers will be as misleading as the double-digit bulge from which they are the rebound. They will not be a cause for celebration or self-congratulation.

Aggregate Demand, Macroeconomic Policy, and the Rate of Inflation

I have argued in the previous section that at any time the economy inherits from the past an internal rate of inflation which is firmly and stubbornly built into its habits, expectations and wage patterns. Cost-of-living statistics and other price indexes will reflect, in addition or subtraction, divergent movements in the prices of materials and consumer goods imported from American agriculture and from other countries.

The internal rate of inflation itself will change up or down as a result of (1) random, unsystematic and unpredictable developments in particular product and labor markets, and (2) the overall balance between the demand for goods and services and the capacity of American industry to produce, and between the demand for labor and the supply. It is the second source of acceleration or deceleration in inflation which can be influenced by the overall fiscal and money-

tary policies of the Federal Government, and it is that to which I turn now.

The unemployment rate is a good, but imperfect, barometer of the pressure of aggregate demand on the productive resources of the economy. In terms of this barometer, we can distinguish roughly three zones: (1) *Accelerating inflation*. How unemployment rates signal shortages of labor. Pressures to exceed existing norms of wage increase are very strong, both for employers and for unions. A large proportion of recorded unemployment represents voluntary movement between jobs, or selective job-seeking by workers who quit previous positions or are new entrants to the labor force. A large proportion represents workers of low skill and experience. Moreover, low unemployment is generally associated with low margins of excess capacity; in consequence, markups may accelerate at the same time as labor costs. (2) *Stable inflation*. At moderate unemployment rates, associated with normal rates of utilization of industrial capacity, inflation rates will be roughly stable. There will still be unsystematic and structural sources of change up or down, as suggested above. But the overall balance of demand and productive capacity will not be contributing systematically either to acceleration or deceleration of inflation.¹

(3) *Decelerating inflation*. At high unemployment rates, associated with high margins of excess capacity, inflation rates will gradually decline. The mechanisms of zone 1 work in reverse. But the process is asymmetrically slow. It takes prolonged periods of substantial unemployment to melt the inflation previously frozen into the economy.

It is a hazardous empirical task to give numerical boundaries to these zones. Today, perhaps the boundary between zone 1 and zone 2 is somewhere between 4.8 percent and 5.3 percent unemployment, and the boundary between zone 2 and zone 3 between 5.5 percent and 6.0 percent.

The boundaries shift over time. It is estimated that changes in the demographic composition of the labor force, in favor of types of workers with less permanent attachment to the labor force and to particular jobs, has moved boundaries of this kind up by about .8 of a percentage point since 1960. This means that if the Kennedy target of 4 percent unemployment was a reasonable noninflationary target in 1961-1965 – and we did virtually reach it in 1965 with negligible inflation consequences – 4.8 percent would be the corresponding figure now. Yet in the early 1950's, the economy operated at about 3 percent unemployment without serious inflationary effect.

The major recent trip of the economy into zone 1 began in 1966 when the Johnson Administration, ignoring the advice of its own economists as well as outside economists, escalated the Vietnam war without increasing taxes to pay

¹ A controversial issue, which we need not discuss in this paper, is whether this zone of unemployment rates – some economists would collapse the zone to a single "natural rate" – has any further normative significance. Does it signify the absence of involuntary unemployment? Is it the optimal amount of unemployment? I have argued to the contrary elsewhere. ("Inflation and Unemployment," *American Economic Review*, March 1972, Vol. LXII, No. 1, pp. 1-18.) My basic point is that, because wages and prices adjust more slowly to excess supply than to excess demand, the economy has a bias toward either accelerating inflation or involuntary unemployment.

for sharply increased military procurement. This fiscal escalation occurred when the economy was already close to the "full employment" goal of 4 percent. The result was a classic case of excess-demand inflation. A subsequent dose of overstimulation occurred in 1968-1969. Comparing 1970 and 1965, the rate of ongoing wage inflation was raised from 3.6 percent per year to 7.2 percent. The stubborn internal wage and price inflation which we still have with us is largely an inheritance from this period.

That in itself is a strong indication of the persistence of built-in inflation, and of its powerful and asymmetrical resistance to deflationary stimuli. The 1970-1971 recession was a deliberate, policy-engineered attempt to bring down the internal inflation rate. Two and a half years of unemployment in excess of 5 percent, assisted by wage and price controls, succeeded in reducing wage inflation by at most one percentage point. Price inflation abated by two points, but some of this improvement was a transient mark-up squeeze due to controls and it vanished when controls were relaxed and lifted.

Now comes the important analytical point: To a very close first approximation, the path of inflation – accelerating, stable, decelerating – depends on the overall state of the economy, i.e., on which zone it is in, and not on the combination of policies and events that put it there. Monetary and fiscal policies are important, indeed crucially important. But they do not affect prices, wages and the course of inflation directly. They do so indirectly, by helping to determine the overall pressure of aggregate demand on the economy's resources of labor and productive capacity, i.e., by helping to determine which of the three zones describes the state of the economy.

Let me be both more precise and more topical. Suppose we assume a particular path of recovery of production and unemployment for 1976, 1977, and 1978. Suppose, for example, we imagine moving from 8.5 percent unemployment in the final quarter of 1975 to 6.5 percent unemployment at the beginning of 1977, and to 5.5 percent unemployment a year later. This would involve growth in production averaging 9 to 10 percent per year through 1976, slowing down to 7 percent in 1977. Imagine three ways of accomplishing this recovery:

- (1) Without changes of fiscal and monetary policy, private consumption and investment spending miraculously revives.
- (2) Without new fiscal stimulus, aggressively expansionary monetary policy achieves the necessary expansion of residential construction, business investment, and consumer credit.
- (3) With a passively neutral monetary policy, massive tax reductions and budget expenditures provide the necessary stimulus.

To our first approximation, the path of internal price and wage inflation would be the same under all three scenarios. Specifically, the state of the economy would be zone 3 throughout the assumed recovery, and the inflation rate would be slowly decelerating. Only if the economy were pushed into zone 1 would the outcome be to accelerate inflation, and this would be the case whether the culprit was excessive fiscal stimulus, excessive monetary stimulus, or unexpected buoyancy in private spending.

The example of the previous paragraph utilized two important and well-documented empirical rules of thumb. One is that it takes about a 4 percent annual growth in real production, at constant prices, to hold the unemployment rate constant. The 4 percent growth is needed to absorb the trend increase in labor force (about 1 to 1.25 percent per year) and the normal growth of productivity per worker (about 2.75 percent per year). The second, commonly called Okun's Law, is that it takes an additional 3 percent per year growth of output in the short run to diminish cyclical unemployment by one percentage point. This rule of thumb reflects a combination of effects: the short-run response of labor force participation to the availability of jobs; the pro-cyclical variation of hours to work; the pro-cyclical variation of productivity per hour of work.

Two qualifications of the "first approximation" just advanced are in order. One concerns speed limits. The rate of inflation may depend in some degree not only on the state of aggregate demand, the zone, but also on how rapidly demand is increasing, how rapidly production and employment are increasing. Even within zone 3, a rocket-like recovery could be inflationary. Temporary bottlenecks and shortages would be encountered in a sharp recovery, but anticipated and avoided in a more gradual expansion. That is why it is not prudent to attempt to make up in one year the ground we have lost in one year. The same recovery would not be inflationary if stretched out over a longer period. I do not believe my example violates any speed limits.

The second qualification has to do with the exchange rate of the dollar with foreign currencies, and thus with the dollar prices of internationally traded goods. A money-fueled expansion, (2) of our three alternatives, would involve lower U.S. interest rates and, therefore, possibly more outflow of short-term funds than the other scenarios. For this reason, it might lead to further depreciation of the dollar relative to other currencies. However, this consequence might be reversed once a strong recovery was under way and improved profit prospects in the U.S. attracted equity purchases and direct investment. In any case, it is wrong to regard foreign monetary policies and interest rates as independent of our own. European countries and Japan are enjoying even sharper recessions than ours; they can be expected to follow our lead and to use any room we give them for easier monetary policies.

Finally, I would emphasize that monetary policy is extremely flexible. It is not locked into any particular targets, whether in terms of interest rates or of growth of monetary aggregates. The Federal Open Market Committee meets monthly and consults by telephone in between regular meetings. When, as now, there are so many months and so many percentage points of unemployment between the present state of the economy and the zone of inflationary danger, the Fed has ample time to "lean against the wind" and to apply the brakes.

The Stock of "Money," Monetary Policy, and Inflation

The foregoing account may seem to have paid little explicit attention to Friedman's aphorism that inflation is a monetary phenomenon, and the time has

come to remedy the apparent omission. To do so, I shall use monetarist language, the age-old equation of exchange:

$$(1) \quad MV = PQ$$

Here M is the stock of money. Since there are many assets denominated in the monetary unit of account, the dollar, there are vast conceptual and empirical problems in even defining a money stock. But let us finesse them for the time being and adopt M_1 , the quantity of currency and demand deposits owned by the public, i.e., not including these assets if they are held by commercial banks or by the Federal Reserve or by the Federal Government itself. Note that M is a stock, a balance sheet entry, not a flow per year of newly created money or of spending.

To convert it into a flow, the rate of spending on goods and services per year, we must multiply M by V , velocity, the average number of times per year that a unit of "money" is involved in a purchase of the goods and services counted in the Gross National Product. This velocity is not a mechanical constant. The same money stock can be used with widely varying speeds to make such final purchases. These are by no means the only transactions in which money thus defined is used, and many goods-and-services transactions are accomplished without transfer to currency or demand deposits. More important, velocity varies with the behavior of the households and business firms who hold the stock of money. Sometimes they have strong incentive to use it intensively, to minimize their cash holdings; at other times they have stronger reasons for holding large liquid balances, including cash.

Q is the rate of production, per year, in real terms, e.g., in practice, GNP in constant 1958 prices. P is then the "GNP deflator," an overall index of prices of the goods and services counted in GNP. PQ is the nominal or current-dollar value of GNP, which it will be convenient to denote as Y .

The two sides of the equation of exchange are equal by definition. That is, the only way to measure velocity is to calculate PQ/M .

From equation (1) we can derive a similar identity in rates of change. Let the corresponding lower case letter, in each case, stand for the annual rate at which the variable is increasing (or if negative, decreasing). Thus m is $\frac{\Delta M}{M}$, the annualized rate of growth of M , p is $\frac{\Delta P}{P}$, the annualized rate of inflation, and so on. Then:

$$(2) \quad m + v = p + q = y$$

Chart 1 presents quarterly series for these four rates of change, 1968-1974. The summary data are reported in Table 1. Note that v has not been constant at zero or any other number, but has varied a great deal. On average, V has an upward trend at a rate of about 2 percent per year. This means that an average Y of about 8 percent has been associated with a lower average m , about 6 percent.

The "quantity theory of money" is an ancient proposition – not a tautology like the Equation of Exchange. It says that the price level P (the inverse of the

How to Quarter Planning

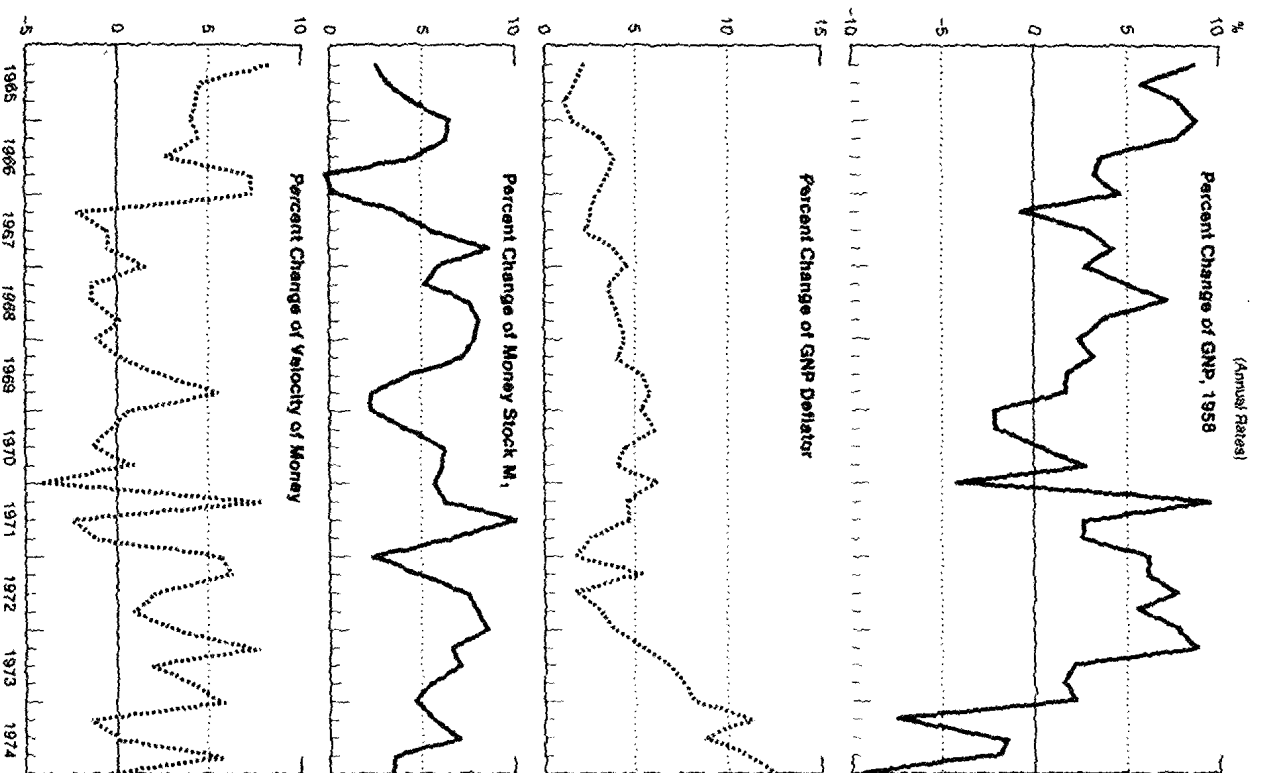


Table 1: Equation of Exchange: Statistics of Annualized Percentage Rates of Change, 1965-1 to 1974.4

	Mean	Standard Deviation
GNP	3.08063	4.39206
P	4.79348	2.68202
M1	5.44604	2.3075
V	2.42828	3.26667

	GNP	M1	P	V
GNP	1			
M1	0.186	1		
P	-0.752	-0.028	1	
V	0.596	-0.479	-0.170	1

Covariance Matrix:

	GNP	M1	P	V
GNP	1.88505	-0.173285		
M1	-8.85825	-3.61066		
P	8.55113		-1.48943	
V				

the value of a unit of money in terms of goods and services) is proportional to the stock of money M . Like most pieces of time-honored wisdom, it contains some grains of truth. Its logic is simple and appealing. The most elementary common-sense economics suggests the generalization that the value of any commodity is, other things equal, inversely related to its supply. Why should this not apply to money?

The trouble is with the proviso "other things equal." The quantity theory proposition requires that V and Q remain constant when M is changed.

Modern quantity theorists prefer equation (2). The proposition then would be that p has a one-to-one dependence on m . Thus if q stays constant at its long-term trend of 4 percent, and v at its trend value of 2.5 percent, raising m from 4 percent to 8 percent would lift p from 3.5 to 6.5 percent. Thus we have a modern version of the quantity theory proposition: other things equal, an increase in the rate of growth of the money supply will lead to an equal increase in the rate of price inflation. Again, however, we must examine the proviso that q and v are constants.

Consider first the constancy of q . Suppose for the time being we assume the constancy of v and thus assume that the rate of growth, y , of nominal GNP, Y , depends one-to-one on the rate of growth, m , of the money stock M . Even monetarists who believe this do not assert that in the short run the rate of inflation, p , depends in a one-to-one way on the rate of expansion, y , of nominal income. They do not assert that q , the rate of growth of output, is fixed independently of what is happening to total spending. They agree, I believe, that the decomposition of y between p and q depends on the state of the economy.

In slack economic times like the present, with idle men and machines in ample supply, an increase in y would go mainly into q , i.e., into a faster increase, or slower decline, in production. In times like 1966, with the economy already producing close to capacity, most of an increase in y would go into an increase in p , i.e., into acceleration of inflation.

Indeed the formulation of equation (2) is by no means inconsistent with the "zone" analysis of inflation on pages 6 to 8 above. What that analysis suggests is that in the *short run*, p has a life of its own, a value predetermined by past history. Thus suppose that the economy starts 1976 with an inflation rate of 7 percent, predetermined by past history and by contemporaneous external developments. Then to achieve a rate of growth of output q , of 9 percent, as in the illustrative recovery scenario advanced above, requires a y of 16 percent. If v stays at 2.5 percent, the required level of m is 13.5 percent. Under these assumptions, a lower rate of growth of M_1 would cut down q correspondingly.

In similar vein, consider the dilemma of the Federal Reserve in 1973 and early 1974. Because of the exceptional external contributions to our prices, the rate of inflation had reached double digits, let's say 11 percent per year. Allowing for the upward trend of velocity, the Fed would have had to let M grow at 12.5 percent in order to sustain the normal 4 percent growth of production. Failing to do so did not mean that the inflation rate would immediately fall. It meant that spending on goods and services would be insufficient to purchase the increasing output the economy was capable of producing. It meant that unemployment was bound to rise. It meant recession. Given the inflation attributable to petroleum, food and other external influences, there was no way in the short or medium run to keep inflation statistics down. That would have required sharp reduction in the rates of inflation in American industry, and probably actual reductions in many prices and wages. In the circumstances, it was foolish to blame Fed policy for the double-digit inflation, or to expect the Fed to have any remedy for it except the lengthy, circuitous, painful route they have, in fact, followed.

In less dramatic form this dilemma has repeatedly faced the Federal Reserve and other central banks, as well as the executive and legislative officials who make budget policy. Shall they provide the money to support normal economic growth at inherited inflation rates over which they have precious little immediate control? Or shall they deny the economy that money, provoke additional unemployment, slowdown and recession, and count hopefully on stagflation gradually to bring inflation down to more tolerable levels? Whenever they chose the first alternative, they could be accused of causing, or at least ratifying, the inflation. But they are not responsible for the features of democratic capitalist societies that bias non-Communist economies toward inflation and produce the recurrent dilemma. Their critics, monetarists and others, are unfair and misleading when they imply that the continuation of inflation is simply a reflection of obtuse stupidity by policymakers, of conceptual and operational errors which could be corrected at no cost to the economy.

It is true, of course, that policy does affect p in the longer run. According to the analysis above, p itself rises, stays constant, or falls depending on the un-

employment zone in which the economy is operating. To return to our 1976 recovery example, suppose that monetary expansion is, in fact, sufficient to increase nominal income at 16 percent per year, real income at 9 percent. Since the economy is in a high unemployment zone, p will in fact be falling from its assumed initial value of 7 percent per year. (We are always abstracting from random events and new external shocks which may change p for reasons unconnected with the current balance between aggregate demand and capacity.) But if policy continues to promote or allow a 16 percent per year growth of nominal income, the economy will move to lower and lower unemployment, into zone 2 and then into zone 1, causing a renewed acceleration of inflation. Indeed in the very long run, given that q cannot average better than the 4 percent compatible with labor force and productivity growth, 16 percent per year expansion of nominal income means 12 percent per year inflation.

In this sense, and for this long horizon, the monetarists are right. But does this mean that the money stock should never, even for short periods of time, be allowed to grow at the rate (12.5 percent in the example) associated with the 16 percent value of y ? Or does it mean that the monetary authorities should promote a recovery when it is needed and slow down the expansion in time to keep the economy from overshooting?

An alternative policy for 1976-1978, which has received much vocal support, is a steady 6 percent growth in money stock. In the very long run this might be associated with 4.5 percent inflation ($p = m + v - q = 6 + 2.5 - 4$). But suppose we begin 1976 with 7 percent inflation. Then $q (= m + v - p = 6 + 2.5 - 7)$ will be confined to 1.5 percent. Unemployment will rise from the initial 8.5 percent rate previously assumed. The rate of price inflation will fall, and no doubt it will fall faster than in the recovery scenario previously discussed. Only when the inflation rate has fallen to 4.5 percent will unemployment cease to rise – remember that it takes a q of 4 percent just to keep the unemployment rate constant. In a previous paper, I estimated that it would take at least 3 years of increasing unemployment to diminish the inflation rate by 3 points, but I admit I was not contemplating the deflationary pressures that might build up at unemployment rates of 8 to 11 percent, unprecedented since the Great Depression.²

Up to now we took for granted the constancy of v , the upward trend of velocity. Velocity and its rate of increase are, however, subject both to random and to systematic variability. Random changes occur when the public becomes more or less liquidity-conscious, when the distribution of M_1 among households and firms changes, when banks' compensating balance requirements vary, when the availability and popularity of the manifold money-substitutes change, and for many other reasons. Systematic variability of velocity requires closer attention.

Variation in nominal rates of interest on close substitutes for money – time deposits, certificates of deposit, savings accounts in commercial banks and thrift

² "Monetary Policy in 1974 and Beyond," *Brookings Papers on Economic Activity*, 1:1974, pp. 219-232.