The Effects of Changes in Inflationary Expectations

RACHEL BALBACH

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OVER the past twenty years, abundant attention has been given, both in professional journals and in the popular press, to the wealth redistribution which occurs as a result of unanticipated inflation. Less widely known but equally detailed work has been done on the characteristics and allocative effects of perfectly anticipated inflation. There have been, however, few examinations of the effects of revisions in inflationary expectations and the adjustments which accompany them. It may be that this is due to the belief that such revisions take place extremely gradually, as was indicated by most empirical studies based on adaptive expectations hypotheses, so that their effects would be negligible in magnitude. More recent work suggests that this may not be the case. In particular, the theory of rational expectations implies that changes in inflationary anticipations occur much more rapidly in response to policy changes than was previously thought. If there is any validity in this view, it is worthwhile to investigate in detail the nature of the ensuing adjustments and their effects. If those effects are deemed to be undesirable, we can add yet another argument to those which have already been advanced against a monetary policy characterized by frequent changes in the rate of money growth.

Whether inflation itself redistributes wealth among net monetary debtors and creditors depends strictly upon whether it was correctly or incorrectly anticipated. The phenomenon is by its nature ex post, with any wealth effects which occur the result of *past* inflation. This paper, addressing a very different question, argues that a change in inflationary expectations has its own wealth transfer effect. That redistribution occurs immediately as a result of a change in the expected rate of *future* inflation. Furthermore, it is of no consequence whether the new expected rate of price level increase turns out to have been right or wrong.

The adjustment to revised inflationary anticipations causes shifts in both the nominal rate of interest and the rate of return on existing real assets, affecting the relative prices of claims to fixed amounts of money and of nonmonetary assets according to their respective terms-to-maturity[1] and productive life expectancies. For example, an upward revision in the expected future rate of inflation will lead to a rise in the nominal rate and a decline in the real rate. This occurrence does in general accomplish a transfer of wealth from monetary creditors to their debtors, an

[1]In the case of a bond which provides interest payments over the interval prior to maturity, there is a difference between its "duration" and term-to-maturity. It is the bond's duration which is the direct determinant of the effect of a change in the nominal interest rate on its present value. For this analysis, see Michael H. Hopewell and George G. Kaufman, "Bond Price Volatility and Term to Maturity: A Generalized Respecification," *American Economic Review* (September 1973), pp. 749-53, and Frederick R. Macauley, *Some Theoretical Problems Suggested by the Movements of Interest Rates, Bond Yields and Stock Prices in the United States Since 1856* (New York: National Bureau of Economic Research, 1938). In this paper, I use the two terms synonymously, implicitly assuming that all bonds are paid interest only at maturity.

effect superficially resembling that of unanticipated inflation. Unlike that situation, however, it is not necessary in this case that net monetary debtors (creditors) will gain (lose). What happens to the individual unit's wealth position depends on the time-dimension characteristics of the particular assets and liabilities on its balance sheet.

Wealth Transfer Under Unanticipated Inflation

The term *inflation* refers to a fall in the value of money, or equivalently, a rise in the level of prices of real goods and services. Little, if any, consideration is given to the relative price changes which may be associated; usually, it is assumed that the prices of all such goods increase proportionately.[2] The only assets which do not share in this price rise are claims to fixed amounts of money, either immediately or in the future; these are termed monetary assets. Thus, when an unanticipated inflation occurs, those who have only real assets and liabilities, or whose money-fixed claims on others are just offset by monetary liabilities, are unaffected, since by definition their nominal wealth has changed in the same proportion as the price level. Since the inflation had not been expected, no provision had been made for the lowered exchange-value of the dollar, thus net monetary creditors, those whose monetary assets exceed monetary liabilities, have less wealth than they would in the absence of inflation. Their loss is reflected in the gains of net monetary debtors, whose nominal equity rises more than the price level.

The loss to creditors (and the gain to debtors) is the same whether the claims they hold are in the form of cash, 30-day notes or 30-year mortgages, since by definition an unanticipated inflation has not been adjusted for by a change in interest rates. Thus, if we should observe that, overnight or over the course of the past year, the price level *has* doubled, just as we find that the $100 under the mattress still adds up to $100, so does the bond of whatever maturity which had a market price of $100 still maintain its nominal value, and the real wealth reduction associated with holding either comes strictly from the fact that its purchasing power has been halved. This is the case so long as we confine the analysis to that realized, unexpected inflation alone, without confounding its certain effect on wealth with any effect that observations of past changes in the price level may have on expectations for the future and so on interest rates. Nor does the age of the debt affect the size of the creditor's or debtor's wealth change. Rather, the gain or loss is strictly a matter of how long over the period of rising prices he holds monetary assets or owes monetary liabilities of whatever vintage.

Wealth Transfer Due to Changes in Inflationary Expectations

An upward revision in expectations as to the *future* rate of inflation leads to a quite different set of events. Interest rates adjust, the makeup of portfolios is altered, and changes in the *relative prices* of assets in these portfolios cause wealth transfer. The process of adjustment involves a complex set of revisions which occur simultaneously. For the sake of clarity of exposition, however, we can assume that they take place in consecutive steps.

We can begin with the commonly cited Fisher effect which has been the basis for numerous estimates of inflationary expectations.[3] When the expected rate of price level change is zero, market forces insure that the nominal rate of interest on money-fixed obligations is equal to the rate of return on real investment, with appropriate adjustment for risk. If the expectation of price change is raised to some positive number, the expected real value of money-fixed future payments falls; that decline will be capitalized in the form of lower present values of existing claims. That is, the nominal rate of interest will rise to a level which is higher than the real rate by the amount of the expected rate of price increase, and is the relevant interest rate for old and new loans alike.

If we assume the rate of return on real assets to be unchanged, the lower market price of existing bonds

[2]Frequently, we encounter an insistence upon distinguishing between a "once-and-for-all" increase in the price level as opposed to a "continuous" or sustained rise, with the term inflation generally reserved for the latter. For the issues addressed here, that distinction is irrelevant; it is unnecessary to speak of continuous rates of inflation although we typically do so, perhaps as a convenient way of dealing with our ignorance of past or expected future time-paths of price change.

In the case of unanticipated inflation, the predicted wealth effects do not at all depend upon the time-path of the rise from one price level to another. Rather, they are a function of the fall in the value of money and of claims to fixed amounts of money in terms of real goods and services; no systematic, predictable changes in the relative prices of those goods are implied. Implicitly, the same assumption of constant relative prices is made in discussions of anticipated inflation. For this reason again, predicted wealth effects are due only to the higher cost of holding money.

[3]Irving Fisher, *The Rate of Interest* (New York: The Macmillan Company, 1907), pp. 77-86 and 356-73.

makes the expected real yield to their holders equivalent to the real rate. The loss to bondholders and the gain to their debtors is realized immediately, and no further redistribution is envisioned. And the present loss (gain) is greater the longer the term-to-maturity of the obligation.[4]

But this is not the whole adjustment; in particular, the assumption of a constant rate of return on real assets is not justified. The perceived cost of holding money balances is now higher, since their real value is expected to decline with rising prices. In view of this, people will attempt to reduce money balances by shifting into other assets and, as a result, the prices of those assets will rise. It is important at this point to specify just what sort of asset substitution will take place and which prices will rise as a consequence. Traditionally, treatments of this phenomenon refer to a one-shot price level surge as people attempt to shift out of money and monetary assets into real assets.[5] The easy inference, and one which apparently is commonly drawn, is that there occurs an indiscriminate increase in the demand for real goods and services which simply raises all prices proportionately. But this is not the implication of the portfolio adjustments made as people try to acquire assets whose value will be protected from inflation. They will not, for example, be willing to pay more now for current services or highly perishable goods because they expect their prices to be higher a year hence; that is to say, the demand for avocado trees will rise more than the demand for avocados. Nor is there anything in economic theory which implies that this behavior is equivalent to an increase in consumption.[6]

The decline in the demand to hold money balances is an increase in the demand for those real assets whose nominal prices and income streams are expected to change with the price level and for bonds, whose expected returns are equivalent, given their now depressed market values. This raises the prices of both forms of wealth, so that the nominal rate of interest falls from its elevated level and the rate of return on real assets also falls below its initial equilibrium, with the difference between the two rates continuing to reflect the expected rate of inflation. The measured price level will, of course, shift upward, but this is the result of a systematic, predictable change in relative prices.[7] Just as the higher nominal rate of interest means that the present value of a bond falls by more the more distant its maturity, so does the lower real rate imply that nonmonetary, or real, assets will rise more in price the longer their life expectancy.[8]

The Two Phenomena Compared

In sum, a rise in the anticipated future rate of inflation causes (1) a rise in the nominal rate of interest and a fall in the real rate, which changes the relative prices of monetary and nonmonetary assets, and (2) a rise in the measured price level of real goods and services, which lowers real money balances for a given level of nominal balances. This set of adjustments can result in a transfer of wealth from net monetary creditors to net monetary debtors, so that if we observe that such a wealth transfer has taken place during a period in which prices have been rising, we cannot safely take this as evidence that the inflation was inadequately anticipated over that interval. But the redistribution due to changed *expectations* is very different in nature from that which occurs as a result of *realized*, unanticipated inflation. As has been noted above, the latter imposes losses on holders of all fixed money obligations equally, whatever the form of those obligations, because their nominal values remain constant while those of real goods rise together. Net monetary creditors must lose; net monetary debtors must gain.

[4]This assumes that the expected inflation rate is constant through the time-horizon of the longest-term existing bond. If this is not the case — if, for example, the anticipation is of a higher near-term rate of inflation which will then be dampened — the relative loss associated with longer term bonds will be smaller.

[5]On this point, see Reuben A. Kessel and Armen A. Alchian, "Effects of Inflation," *Journal of Political Economy* (December 1962), pp. 521-37, upon which I have drawn heavily in this article. Also see Martin J. Bailey, "The Welfare Cost of Inflationary Finance," *Journal of Political Economy* (April 1956), pp. 93-110, and much of the literature which developed from that work, surveyed in John A. Tatom, "The Welfare Cost of Inflation," this *Review* (November 1976), pp. 9-22.

[6]Joseph Bisignano, in his article, "The Effect of Inflation on Savings Behavior," Federal Reserve Bank of San Francisco *Economic Review* (December 1975), pp. 21-26, apparently followed this line of reasoning to conclude that there is an inverse relationship between the anticipated rate of inflation and the savings rate.

[7]It is this shift which accomplishes the reduction in real money balances, insofar as the nonbank public cannot affect the stock of money in existence.

[8]It may be argued that, given the definition of inflation presented in the previous section with its emphasis on constant relative prices, this particular price level increase should be given a different name. It really does not matter. The significant distinction lies in the fact that these price changes have different implications for wealth transfer than does unanticipated inflation with its assumed constant relative prices (see the following section) and that they occur as a result of changed expectations which themselves take no account of relative price changes.

On the other hand, when the cause of the transfer is expectation-induced changes in rates of return, the size of gain or loss, and even its incidence, is determined by the longevity or terms to maturity of the assets and liabilities of the individual economic unit. For example, the smallest loss associated with holding monetary assets is the one to cash balances, since their nominal value remains constant. A greater loss to bondholders must occur insofar as those debts are existing obligations the terms of which cannot be renegotiated on demand. Because of this, even a net monetary creditor may gain (or a debtor lose).

Consider only one example. Suppose we construct a simple balance sheet for a net monetary creditor, again defined as one whose claims to fixed amounts of money exceed his money-fixed liabilities. His net monetary assets of $100 comprise the difference between monetary assets held in the form of cash ($1100), and his monetary liability, which is a note promising to pay $1100 in one year. Assuming that no change in the price level is anticipated and that the market rate of interest is ten percent, the present value of the note is $1000. His balance sheet is presented below:[9]

Assets		Liabilities	
Cash	1100	Note	1000
Goods	100		
		Equity	200

Suppose there occurs an unanticipated increase in the price level, but that the new level is expected to persist. The market rate of interest will not be affected; hence, only the nominal value of his real assets will change, rising in proportion with the price level, and his total real wealth (the constant-dollar value of equity) must fall.[10] Thus, if the price level has doubled, the only entries on his balance sheet to be affected are "goods," the nominal value of which becomes $200, and his equity, which consequently rises to $300. Adjusted for the price level change, this equity is $150, representing a fall in his real wealth of 25 percent.

Consider now a different story. There arises a new expectation of future inflation. The portfolio adjustments which ensue cause a rise in the nominal rate of interest, say, of five percentage points, and a fall in the real rate which in turn raises the measured price level by three percent.[11] The new balance sheet reflecting these changes is

Assets		Liabilities	
Cash	1100	Note	957
Goods	103		
		Equity	246

His real assets, assumed to comprise a representative basket of goods, rise in nominal value with the price level; the present value of his future liability, now discounted at a 15 percent rate, immediately falls to $957. The nominal value of his equity is $246, his real wealth — that is, the value of his equity deflated by the rise in the price level — has increased to $239, and the net monetary creditor has gained.

One small change in his original balance sheet will alter considerably the effects of the same events. Let his net monetary position remain constant, but suppose that instead of holding all his monetary assets in the form of cash, he lends out $1000 at the original ten percent rate to be repaid at the end of two years; compounded annually, his future claim is to $1210. Given the same change in expectations with its consequent adjustments, his new balance sheet is as follows:

Assets		Liabilities	
Cash	100	Note	957
Loan	915		
Goods	103	Equity	161

His nominal equity, or wealth, has fallen by $39; when his equity is expressed in constant-dollar terms, the decline in real wealth is $44.

A similar exercise could be gone through for debtors or considering real assets of different life expectancies whose nominal values rise more or less than the price level with consequent varying wealth effects. It would serve merely to further point up the fact that the phenomenon we are examining is more basically one of relative price changes rather than price level changes.

[9]This balance sheet and those presented below differ from the typical accounting balance sheet in that they record the *present values* of both assets and liabilities, in order to reflect their current market values and thus the actual present wealth of the individual. The usual balance sheet, which values assets at their historical costs and liabilities at maturity (the note, for example, would be recorded at $1100), fails to do this.

[10]For numerical illustrations of the wealth effects of unanticipated inflation on net monetary creditors and debtors, see Nancy A. Jianakoplos, "Are You Protected from Inflation?", this *Review* (January 1977), pp. 2-8.

[11]This price level rise implies neither that the rate of return on real assets has fallen by 3 percent nor that the expected inflation rate is 8 percent. The change in the average of all prices due to a given change in the real rate depends upon the distribution in terms of the productive durability of existing goods and services.

Conclusion

If the adjustments consequent to a revision in inflationary expectations turn out to have reflected a correct prediction, no further wealth transfers will occur. But the accuracy of price level anticipations is a whole separate issue; the change in expectations itself, right or wrong, has behavioral, price and wealth effects which should be acknowledged and identified. This paper has dealt only with expectations of accelerated inflation; a downward revision in inflationary anticipations will have symmetrical and opposite redistributional effects. That is, if the members of the economy decide that the future rate of inflation will be lower than they had before expected, the nominal rate of interest will fall, the real rate will rise, and corresponding changes in the values of monetary and nonmonetary assets and liabilities will occur.

It follows from the foregoing discussion that a monetary policy which is characterized by frequent changes in the rate of money growth and thus instability in the rate of price change over time cannot avoid wealth transfers even if each rate change is correctly anticipated before it occurs — even, indeed, if it is announced in advance. It would be difficult to characterize these transfers as anything but unintended in terms of any generally accepted goals. The deleterious effects on the economy of the increased uncertainty engendered by such a policy have been pointed out often. More recently, the proponents of rational expectations have suggested that a countercyclical monetary policy is ineffective in achieving desired goals. In addition to these criticisms, the apparent inevitability of unplanned wealth transfers, whether as a result of incorrect anticipations or revisions in them, provides a persuasive argument against such a policy and in favor of stable money growth.[12]

[12]If the market's expectations are of *successful* countercyclical policy, such that the long-term anticipation is of a stable price level (or a stable trend rate of inflation), it may be that the wealth transfers will be negligible in size. The valuation of long term assets then might be affected insignificantly, while the impact on short-term assets in any case is small. Presumably, in such a case, uncertainty also would not be increased. It is by no means clear, however, that expectations are indeed characterized by such confidence.