Inflation and Unappreciated Interest

By Frank G. Steindl, Stillwater, Oklahoma*

Introduction

The relationship between price expectations and interest rates of such considerable interest currently, was initially investigated over four generations ago by *Irving Fisher* in his Appreciation and Interest [7]. The theory and arithmetic expression so intimately associated with his name are developed in the first 34 pages. The following four chapters attempt an empirical investigation of the relationship, an investigation which is carried out in a much more satisfactory and complete manner in Chapter 19 of his The Theory of Interest [8].

The main empirical conclusion at which *Fisher* arrives is that the nominal rate of interest does not adjust fully to the changing price level so as to leave the real rate of interest unchanged. In a period of inflation such as is the basis for the current renewed interest in *Fisher's* seminal work, the nominal rate of interest does not rise by the expected rate of inflation, i. e., the real rate falls.

Subsequent investigators pursued two tacks. One consisted of sophisticated econometric investigations that concluded by denying the Fisherian hypothesis. *Roll* [16] and *Sargent* [20] are especially prominent in this regard[1]. The second approach offered theoretical explanations as to why the nominal rate of interest does not in general rise by the ex-

---

* Earlier versions were read at the 1976 Western Economic Association meetings, San Francisco and the Federal Reserve Bank of Kansas City. The first section of the paper was written while I was on the staff of the U. S. Senate, Committee on the Budget. The views expressed are those of the author alone, and as such, do not necessarily represent those of any member of the Committee. Especially helpful comments were received from James W. *Maxwell*, John D. *Rea*, Jack L. *Rutner*, and Akira *Yamazaki*. This paper was completed with the assistance of an Oklahoma State University College of Business Administration summer research grant.

[1] This is not to imply that all the empirical evidence rejects the *Fisher*ian constant real rate hypothesis. *Cargill* [4] and *Fama* [6] accept the *Fisher*ian hypothesis. See also the review article by *Sargent* [19].

DOI https://doi.org/10.3790/ccm.13.2.239 | Generated on 2025-11-25 20:25:57

pected rate of inflation, the foremost among these being *Mundell* [15] and *Sargent* [17]. An important factor underlying the theoretical concern was the finding from several empirical studies which indicated that the nominal rate took an "implausibly long time" — ten to thirty years [20, p. 387] — to adjust fully to a change in the expected rate of inflation. Sluggishness in the formation of expectations was the principal factor underlying the long adjustment time, see *Cagan* [2, p. 257], *Gibson* [10], and to a lesser extent [9], *Meiselman* [14] and *Sargent* [18][2].

In addition to the above cited econometric results, there is the simple popular view of taking the observed inflation rate (or possibly a weighted average of recent inflation rates) as a proxy for the expected inflation rate. Subtraction of such a proxy from observed market rates yields "estimates" of real rates so low as to reject the hypothesis that the nominal rate has adjusted completely[3]. Yet the persistence of high inflation rates serves as a powerful incentive for creditors and debtors to adjust rapidly and completely to inflationary expectations. And that is the conundrum; on the one hand, empirical evidence, sophisticated as well as crude, indicates that nominal rates have not adjusted completely to inflationary expectations while on the other, the borrowers' and lenders' substantial costs serve as a powerful incentive for complete adjustment of nominal rates of interest.

The purpose of this paper is first to develop a Fisherian model in which the nominal rate of interest rises by less than the current expected rate of inflation in the presence of complete instantaneous adjustment in the market. Basic to the model is the notion of different time rates of expected inflation. It, of course, is conventional to acknowledge the difficulty of measuring expectations. While not quantifying the inflationary expectations, the paper uses the term structure of interest rates to obtain a directional estimate of the course of ex-

---

[2] *Sargent* establishes that the usual "distributed lag tests used in testing the *Fisherian* theory are not valid, that there is no reason to expect that the distributed lags estimated in such regressions [of nominal interest rates on current and lagged values of the logarithm of the price level] provide the basis for plausible, or in some sense, optimal forecasts of inflation" [21, p. 446]. While true and thus serving to discount somewhat the above econometric results, there still remains the prominence of what below is called the simple popular view.

[3] The only pieces of work of which I am aware which consider and/or suggest that the real rate of interest increased during a period of anticipated inflation are *Steindl* [22, p. 944] and *Tobin* [23], though the latter emphatically rejects a *Fisherian* explanation.

pected inflation for the purpose of assessing the plausibility of the model.

The first section of the paper develops a partial equilibrium, multiperiod, loanable funds model to investigate *Fisher's* original theoretical problem. The behavior of the nominal rate of interest when price expectations may be different in various periods is the central problem considered. Of interest is the special case where the same rate of price change is anticipated in each period, and there is no taxation of interest [5]. The nominal interest rate in that case turns out to be exactly as indicated in the famous Fisherian expression:

$$i = \varrho + \pi + \varrho\pi \tag{0}$$

where

i = nominal interest rate,

ϱ = real rate of interest,

π = anticipated rate of price change.

When price expectations vary across time periods, the expression for the nominal rate is more complex. The relation between the nominal and real rate is shown to depend on the moderation, constancy, or exacerbation of price expectations. In particular, the model establishes that the nominal rate of interest rises by less than the present anticipated rate of inflation in the current period if future inflation rates are expected to moderate.

The second section presents the results of an attempt to get a measure of the course of future inflationary expectations in order to assess the plausibility of the model of the first section. The implicit forward rates in the observed term structure are used as a basis for measuring the direction of inflationary expectations in future periods. A summary concludes the paper.

I. The Multiperiod Model

The model is a partial equilibrium loanable funds model, exactly equivalent to the framework used by *Fisher*. The notation is:

P_0 = price index in current (base) year,

P_j = price index in year j,

ϱ = real rate of interest, annual,

i = nominal rate of interest, annual.

Individual borrowers and lenders are assumed to adjust immediately and completely to their expectations, i. e., there are no adjustment lags.

The model allows for varying anticipated rates of inflation. In what follows, $[(P_j/P_0)^* - 1]$ is understood to be a measure of the anticipated change in prices from the base period through period j. There is no taxation of interest income.

Both borrowers and lenders conduct their activities to the point where the price of a par bond is equal to the present value of the series of discounted real returns:

$$1 = \frac{i}{\left(\frac{P_1}{P_0}\right)^* (1+\varrho)} + \frac{i}{\left(\frac{P_2}{P_0}\right)^* (1+\varrho)^2} + \dots + \frac{i}{\left(\frac{P_{n-1}}{P_0}\right)^* (1+\varrho)^{n-1}} + \frac{1+i}{\left(\frac{P_n}{P_0}\right)^* (1+\varrho)^n} . \tag{1}$$

In the special case of a one-year bond, this becomes:

$$1 = \frac{1+i}{\left(\frac{P_1}{P_0}\right)^* (1+\varrho)} \tag{2}$$

which for $(P_1/P_0)^* = 1 + \pi$ is

$$i = \varrho + \pi + \varrho\pi , \tag{3}$$

the famous *Fisher* expression.

Solving (1) for the nominal interest rate gives:

$$i = \frac{\left(\frac{P_n}{P_0}\right)^* (1+\varrho)^n - 1}{1 + \sum_1^{n-1} \left(\frac{P_n}{P_j}\right)^* (1+\varrho)^{n-j}} . \tag{4}$$

If inflation is anticipated to proceed at a constant rate π, so that $\left(\frac{P_n}{P_0}\right)^* = (1+\pi)^n$, then

$$i = \frac{[(1+\varrho)\ (1+\pi)]^n - 1}{1 + \sum_1^{n-1} [(1+\varrho)\ (1+\pi)]^j} \tag{5}$$

$$(6) \qquad = \frac{[(1+\varrho)\ (1+\pi)-1]\left\{1+\sum_{1}^{n-1}[(1+\varrho)\ (1+\pi)]^j\right\}}{1+\sum_{1}^{n-1}[(1+\varrho)\ (1+\pi)]^j}$$

or

$$(7) \qquad i = \varrho + \pi + \varrho\pi$$

which is identical to (3)[4]. Thus, the appropriate relation between the nominal rate of interest and the anticipated rate of inflation is the same regardless of the maturity of the debt instrument, provided that the anticipated rate of inflation is constant over the life of the debt instrument[5].

Assume that prices are anticipated to increase at some constant rate π. Then, by (7), the nominal rate is easily ascertained. Now, let expectations of inflation moderate[6]. For the case where expectations decelerate monotonically, the nominal interest rate is higher when prices are anticipated to continue rising at the current rate π than when prices are anticipated to rise at successively lower rates. The proof is as follows.

Define $R_j = \left(\frac{P_j}{P_0}\right)^* (1+\varrho)^j \qquad j = 1, \ldots, n.$

Equation (1) becomes

$$(1') \qquad 1 = \frac{i_R}{R_1} + \ldots + \frac{i_R}{R_{n-1}} + \frac{i_R}{R_n} + \frac{1}{R_n}\ .$$

Thus, solving for i_R yields

---

[4] When interest is taxable and deductible at the marginal tax rate τ, each i in (1) is multiplied by $(1-\tau)$. In solving for i, be it the one-year bond or the multiyear security, the denominator is multiplied by $(1-\tau)$. This gives the same result that *Darby* [5, p. 272] first reported, though for a one-year bond on which interest is continuously compounded.

[5] In his Appendix, *Fisher* considers the problem of the nominal rate of interest when securities have maturities greater than one year. He does this by formulating the multiyear security as a series of one-year notes [7, pp. 21 - 22].

[6] That is for $(P_n/P_0)_a^* = (1+\pi)^n$ and $(P_n/P_0)_b^* = (P_1/P_0)^* x\, (P_2/P_1)^* x \ldots x\ (P_n/P_{n-1})^*$, then $(P_n/P_0)_a^* > (P_n/P_0)_b^*$. The dampening of inflationary expectations may take the form of a monotonic deceleration $(P_1/P_0)^* > (P_2/P_1)^* > > \ldots > (P_n/P_{n-1})^*$.

$$(4') \qquad i_R = \frac{1 - \dfrac{1}{R_n}}{\sum\limits_{j=1}^{n} \dfrac{1}{R_j}} .$$

Set $Q_j = [(1 + \pi)\ (1 + \varrho)]^j \quad j = 1, \ldots, n.$

(5′) By the argument giving (7), $i_Q = \varrho + \pi + \varrho\pi.$

Now, since $$Q_1 = R_1$$

and $$Q_k > R_k, k = 2, \ldots, n ,$$

then (6′) $$1 - \frac{1}{R_n} < 1 - \frac{1}{Q_n}$$

and (7′) $$\sum_1^n \frac{1}{R_j} > \sum_1^n \frac{1}{Q_j}$$

Therefore, (8′) $$i_R = \frac{1 - \dfrac{1}{R_n}}{\sum\limits_1^n \dfrac{1}{R_j}} < \frac{1 - \dfrac{1}{Q_n}}{\sum\limits_1^n \dfrac{1}{Q_j}} = iQ .$$

For the case where the moderating of inflationary expectations takes the form of the price level in period n bring less than it would if expectations continue at the constant rate π, the average annual rate of expected inflation is less than π. Substituting the average inflation rate into (7) and solving for i establishes that the nominal rate is lower when inflationary expectations moderate than when they continue at the constant current rate π.

The corollary proposition is that the calculated real rate of interest — the one obtained by subtracting the current observed inflation rate (and interaction term) from the observed nominal interest rate — will be understated when inflation is expected to moderate.

The fact that nominal rates of interest appear never to rise "enough" during periods of inflation may therefore be explained quite simply. If in fact borrowers and lenders both visualize decelerating rates of inflation, then the nominal interest rate is less than it would be if the current rate of inflation is expected to continue. By an analogous argument, the nominal interest rate when inflation is anticipated to accelerate is higher than the interest rate under constant anticipated inflation.

Much of the period of the 1970s appears to be characterized by the nominal rate of interest not having risen "enough"; that indeed seems to be the conventional view. If, of course, the foregoing analysis is the correct interpretation, there has been complete adjustment of the nominal rate, but adjustment based on the expectation of declining rates of inflation. Whether or not inflationary expectations have been moderating cannot be decided on an a priori basis. Thus, to assess the plausibility of the model, it is necessary to obtain evidence on the course of inflationary expectations, and that is the subject of the next section.

II. Empirical Analysis

The theory outlined above establishes that expectations of decelerating inflation result in the nominal rate of interest rising by less than the current expected rate of inflation, for a given real rate. A major determinant of the term structure of interest rates is expectations of the future course of rates and one influence on expectations of future rates is expectations of inflation. Thus, the observed term structure should contain information on expected future rates of inflation.

Given a term structure, the implicit nominal forward rates of interest r_j can be calculated, where r_j is the one period forward rate in period j. Following the procedure of *Kessel* [12, p. 17], each forward rate can be written as the sum of the liquidity premium L_j and expected nominal rate E_j. The expected rate may similarly be broken down into the real rate ϱ and the anticipated inflation rate $\pi_j [= (P_j/P_{j-1})^* - 1]$ in period j[7]. Thus,

$$r_j = L_j + \varrho + \pi_j + \varrho\pi_j \ . \tag{8}$$

A fundamental assumption in (8) is that the real rate ϱ is constant.

Since each forward rate can be expressed as (8), take the difference between r_j and r_{j-1}. This gives

$$\Delta r_j = (L_j - L_{j-1}) + (\pi_j - \pi_{j-1}) \ (1 + \varrho) \ . \tag{9}$$

The change in the liquidity premium $L_j - L_{j-1}$ is nonnegative. *Cagan's* [3, pp. 132 - 137], *Kane's* and *Malkiel's* [11, pp. 353 - 354], and *Kessel's*

[7] Of course, there are other important influences on the expected interest rate, notably expectations of the course of real economic activity. These are not formally considered here because the present analysis concentrates on exploiting the term structure to get a measure of expected inflation in future periods. Clearly, a complete analysis requires isolating in forward rates inflationary and other expectational factors.

[12, pp. 17 - 18 and 22 - 43] results all indicate that the liquidity premium increases with term to maturity, i. e., $L_j > L_{j-1}$, all j. *McCulloch* [13, esp. pp. 110 - 116] presents evidence that the liquidity premium, though positive, essentially does not increase for securities in excess of one year to maturity. With a nonnegative change in the liquidity premium, decreasing forward rates ($r_j < r_{j-1}$) imply declining expected rates of inflation, $\pi_j < \pi_{j-1}$[8]. It is in this manner that the implicit forward rates in the term structure are used to measure the direction of expectations of future inflation.

In fact, of course, it is only if the liquidity premium does not increase with term to maturity that a decline in the forward rate implies a decline in the expectation of inflation. If the liquidity premium is positively related to term to maturity, as the preponderance of evidence indicates, then inflationary expectations may be moderating even though the forward rate is increasing slightly[9].

The strategy followed is to calculate the forward rates of interest. The data used are the constant maturity U. S. Treasury securities series. Observations are for one, three, five, seven, ten, and twenty years to maturity U. S. Treasury securities for the period 1969 - 1975. The data and a careful discussion of their composition are contained in [1, pp. 368 - 369].

The term structure data are unweighted averages of monthly observations over the business cycle. This is done as in *Cagan* [3, p. 108] in order to neutralize somewhat the influence of cyclical variations in expectations, particularly expectations regarding the course of real output and its influence on interest rates. The cycle is measured both from peak to peak and trough to trough. The peak to peak cycle is November 1969 through December 1973 and the trough to trough cycle is November 1970 through March 1975, these being the cycles in which inflationary expectations can be expected to be of consequence.

The calculated forward rates are shown in Table 1. The forward rates are not, as would be desirable, one-year rates because the con-

---

8 This is not to say that $\Delta r_j < 0$ is necessary and sufficient for $\Delta \pi_j < 0$. Equation (9) can be rearranged and written as $\Delta \pi_j = (\Delta r_j - \Delta L_j)/(1 - \varrho)$. $\Delta r_j < 0$ thus is necessary and sufficient for $\Delta \pi_j < 0$ if $\Delta L_j = 0$.

9 The second derivative of the liquidity premium term to maturity relationship is negative and large in absolute value. Thus, for securities of more than several years to maturity, the liquidity premium cannot be expected to increase by more than a few basis points.

stant maturity Treasury data series contains successive term to maturity observations at least two years apart. Thus, the reported forward rate is really a geometric average marginal rate for the years between observations on maturity.

As is clear from the table, at seven years to maturity where the forward rates are respectively three and five basis points higher than for five years to maturity, there is the possibility that inflationary expectations are moderating. If the increase in the liquidity premium is, respectively, three and five basis points, then inflationary expectations are in fact moderating.

Table 1

Nominal Interest Rates and Forward Rates in Term Structure of Interest Rates, November 1969 — March 1975, U. S. Treasury Constant Maturity Series

Term to Maturity	Business Cycle Peak to Peak 11/69 - 12/73		Business Cycle Trough to Trough 11/70 - 3/75	
	Interest Rate	Forward Rate	Interest Rate	Forward Rate
1 year	6.09	—	6.29	—
3 year	6.46	6.65	6.53	6.65
5 year	6.60	6.81	6.68	6.91
7 year	6.67	6.84	6.76	6.96
10 year	6.67	6.67	6.74	6.69
20 year	6.54	6.41	6.87	7.00

For the peak to peak cycle term structure, there is clear evidence of decreasing inflationary expectations, as the successive forward rates for ten and twenty years to maturity are 17 and 26 basis points lower. In the cycle measured from trough to trough, the forward rate for ten years to maturity is 26 basis points lower but the forward rate for twenty years to maturity is 31 basis points higher. Inflationary expectations thus appear to be moderating and then accelerating. If, however, the "average" forward rate between seven and twenty years is calculated, it comes out to be 6.93 percent, which is three basis points less than the seven years to maturity forward rate. Inflationary expectations are therefore moderating, though quite slowly.

On balance, then, the evidence on inflationary expectations implicit in the term structure indicates that people expect inflation to moderate. This evidence is most clear in the case of the peak to peak cycle term structure data, but less so in the case of the trough to trough cycle term structure.

The inflationary expectations encapsulated in the term structure's forward rates thus appear to be moderating. As was shown in the first section, the moderation of these expectations results in the nominal interest rate, though fully adjusted, not rising by the rate of current inflationary expectations. The real rate of interest accordingly is unchanged.

III. Conclusions

The prevailing view regarding inflationary expectations and nominal interest is that the Fisherian hypothesis cannot be accepted, that interest rates do not seem to rise enough, though, of course, inflationary expectations are notoriously difficult to measure. This view is based both on formal econometric results and "seat of the pants" empirical judgments. The latter may well be based on subtracting the current inflation rate or an average of recent inflation rates from the nominal rate of interest.

This paper developed a Fisherian loanable funds model wherein the expectation of declining rates of inflation, to which there is complete adjustment by borrowers and lenders, results in the nominal rate rising to the extent necessary to keep the real rate constant. The famous *Fisher* expression $i = \varrho + \pi + \pi\varrho$ is shown to a special case.

Declining inflationary expectations are essential for the result that the real rate remains unchanged with the nominal rate rising by less than the current rate of expected inflation. Whether inflationary expectations are moderating is an empirical question, one for which a positive answer is crucial for accepting the plausibility of the model.

The term structure of interest rates contains information on expectations. Specifically, it is the forward rates that contain information on the expected course of inflation. Declining forward rates are shown to (be sufficient to) imply expectations of declining rates of inflation. For monthly term structure data averaged over the business cycle, the evidence indicates that, in fact, inflationary expectations are moderating. This is evidence in support of the plausibility of the model. It suggests that in the U. S., the nominal rate of interest has adjusted fully to inflationary expectations.

References

(1) Board of Governors of the Federal Reserve System: Annual Statistical Digest, 1972 - 1976, Washington, D. C.: 1977. — (2) *Cagan,* Phillip: Determinants and Effects of Changes in the Stock of Money, 1875 - 1960, New York: National Bureau of Economic Research, 1965. — (3) *Cagan,* Phillip: „A Study of Liquidity Premiums on Federal and Municipal Government Securities", in Jack. M. *Guttentag* and Phillip *Cagan,* Essays on Interest Rates: Volume I, New York: National Bureau of Economic Research, 1969. — (4) *Cargill,* Thomas F.: „Anticipated Price Changes and Nominal Interest Rates in the 1950's", Review of Economics and Statistics, 58 (August, (1976). — (5) *Darby,* Michael R.: „The Financial and Tax Effects of Monetary Policy on Interest Rates", Economic Inquiry, 13 (June, 1975). — (6) *Fama,* Eugene F.: „Short-Term Interest Rates as Predictors of Inflation", American Economic Review, 65 (June, 1975). — (7) *Fisher,* Irving: Appreciation and Interest, Publications of the American Economic Association, 1896. — (8) *Fisher,* Irving: The Theory of Interest, New York: Augustus M. *Kelley,* 1930. — (9) *Gibson,* William E.: „Interest Rates and Inflationary Expectations", American Economic Review, 52 (December, 1972). — (10) *Gibson,* William E.: „Price Expectations Effects on Interest Rates", Journal of Finance, 25 (March, 1970). — (11) *Kane,* Edward J. and *Malkeil,* Burton G.: „The Term Structure of Interest Rates: An Analysis of a Survey of Interest Rate Expectations", Review of Economics and Statistics, 49 (August, 1967). — (12) *Kessel,* Reuben, A.: The Cyclical Behavior of the Term Structure of Interest Rates: NBER Occasional Paper 91, New York: 1965. — (13) *McCulloch,* J. Huston: „An Estimate of the Liquidity Premium", Journal of Political Economy, 83 (February, 1975). — (14) *Meiselman,* David: „Bond Yields and the Price Level: The Gibson Paradox Regained", in D. *Carson* (ed.), Banking and Monetary Studies, Homewood, Illinois: Richard D. *Irwin,* Inc., 1963. — (15) *Mundell,* Robert: „Inflation and Real Interest", Journal of Political Economy, 71 (June 1963). — (16) *Roll,* Richard: „Interest Rates on Monetary Assets and Commodity Price Index Changes", Journal of Finance, 27 (May, 1972). — (17) *Roll,* Richard: „Anticipated Inflation and Nominal Interest", Quarterly Journal of Economics, 86 (May, 1972). — (18) *Sargent,* Thomas J.: „Commodity Price Expectations and the Interest Rate", Quarterly Journal of Economics, 83 (February, 1969). — (19) *Sargent,* Thomas J.: „Interest Rates and Expected Inflation: A Selective Summary of Recent Research", Explorations in Economic Research, 3 (Summer, 1976). — (20) *Sargent,* Thomas J.: „Interest Rates and Prices in the Long Run: A Study of the *Gibson* Paradox", Journal of Money, Credit, and Banking, 5 (May, 1973). — (21) *Sargent,* Thomas J.: „Rational Expectations, the Real Rate of Interest, and the Natural Rate of Unemployment", Brookings Papers on Economic Activity, 2 (1973). — (22) *Steindl,* Frank G.: „Price Expectations and Interest Rates", Journal of Money, Credit, and Banking, 5 (November, 1973). — (23) *Tobin,* James: „Inflation, Interest Rates, and Stock Values", Morgan Guaranty Survey, (July, 1974).

Zusammenfassung

Inflation und unangemessener Zins

Dieser Beitrag entwickelt ein Mehr-Perioden-*Fisher*-Modell, in dem der Nominalzinssatz weniger steigt als die gegenwärtig zu erwartende Inflationsrate bei gleichzeitiger vollständiger und unmittelbarer Anpassung der Zinsen am Kreditmarkt. Zugrunde liegt diesem Modell die Beachtung verschiedener zeitlicher Steigerungsraten der zu erwartenden Inflation.

Als zentrales Problem gilt das Verhalten des Nominalzinssatzes, wenn die Preiserwartungen in verschiedenen Perioden verschiedenartig ausfallen. In solch einem Fall ist der analytische Ausdruck für die nominale Rate komplexer als *Fisher's* berühmte Gleichung: $i = \varrho + \pi + \varrho\pi$ (ϱ = reale und = geschätzte Inflationsrate). Die Beziehung zwischen dem nominalen und realen Zinssatz hängt davon ab, ob sich die Preiserwartungen verbessern, gleich bleiben oder verschlechtern. Insbesondere bestätigt das Modell, daß der Nominalzinssatz weniger als die gegenwärtig vorweggenommene Inflationsrate steigt, wenn die künftigen Inflationsraten voraussichtlich zurückgehen. Für den speziellen Fall, daß eine konstante Inflationsrate vorweggenommen wird, reduziert sich die Formel für den Nominalzinssatz auf die berühmte *Fisher*-Gleichung.

Darüber hinaus legt der Beitrag die Ergebnisse eines Versuchs dar, mit dem der Verlauf von Inflationserwartungen gemessen und eingeschätzt werden kann, wie plausibel das Modell ist.

Dabei werden die impliziten Terminsätze in der beobachteten zeitlichen Struktur angewandt. Fallende Terminsätze bedeuten dabei die Erwartung von fallenden Inflationsraten. Für über einen Konjunkturzyklus ermittelte monatliche Terminstrukturdaten deutet der Beweis darauf hin, daß die Inflationserwartungen sich abschwächen.

Summary

Inflation and Unappreciated Interest

This paper develops a multiperiod *Fisher*ian model in which the nominal rate of interest rises by less than the current expected rate of inflation in the presence of complete, instantaneous adjustment in the loanable funds market. Basic to the model is the motion of different time rates of expected inflation.

The behavior of the nominal rate of interest when price expectations may be different in various periods is the central problem considered. In such a case, the analytic expression of the nominal rate is more complex than the famous *Fisher*ian $i = \varrho + \pi + \varrho\pi$ (ϱ = real rate and π = expected inflation rate). The relation between the nominal and real rate is shown to depend on the moderation, constancy or exacerbation of price expectations. In particular, the model establishes that the nominal rate of interest rises by less than the present anticipated rate of inflation if future inflation rates are expected to moderate. In the special case where a constant rate of inflation is anticipated, the expression for the nominal rate of interest reduces to the famous *Fisher*ian equation.

The paper then presents the results of an attempt to measure the course of inflationary expectations in order to assess the plausibility of the model. The implicit forward rates in the observed term structure are used. Declining forward rates are shown to imply expectations of declining rates of inflation. For monthly term structure data averaged over the business cycle, the evidence indicates that inflationary expectations are moderating.

Résumé

Inflation et inappropriation du taux d'intérêt

L'article développe un modèle de *Fisher* sur plusieurs périodes dans lequel le taux nominal d'intérêt augmente moins que le taux d'inflation actuellement anticipé tandis que simultanément les taux d'intérêt sont complètement et directement adaptés au marché du crédit. Ce modèle s'appuie sur l'observation de divers taux périodiques de l'inflation escomptée.

Le problème central est le comportement du taux nominal d'intérêt lorsque les anticipations de prix tombent différemment dans des périodes diverses. En pareils cas, l'expression analytique du taux nominal est plus complexe que la célèbre équation de *Fisher:* $i = \varrho + \pi + \varrho\pi$ (ϱ = taux d'inflation réel, et π = taux d'inflation estimé). La relation entre le taux d'intérêt nominal et réel dépend de l'amélioration, de l'immobilisation ou de la détérioration des anticipations des prix. Le modèle confirme en particulier que le taux nominal d'intérêt croît moins que le taux d'inflation actuellement anticipé, lorsque l'on attend que les futurs taux d'inflation régressent. Dans le cas particulier où l'on anticipe un taux d'inflation constant, la formule du taux nominal d'intérêt se réduit à l'équation de *Fisher*.

Au surplus, l'article présente les conclusions d'un essai de mesure de l'évolution des anticipations d'inflation afin de pouvoir évaluer la plausibilité du modèle.

L'on a dans ce but utilisé les taux d'intérêt à terme implicites dans la structure des périodes à l'examen. Des taux à terme en baisse signifient une anticipation de chute des taux d'inflation. Pour des données mensuelles de structures à terme couvrant un cycle conjoncturel, l'on apporte enfin la preuve que les anticipations d'inflation s'atténuent.