The Fisher Effect in General Equilibrium Models*

By Frank G. Steindl, Stillwater/Oklahoma

I. Introduction

Irving Fisher's celebrated theory of expected inflation and interest rates was developed in the context of a partial equilibrium loanable funds model. In the absence of taxation, borrowers would have fully taken advantage of and lenders fully protected themselves from a change in expected inflation when their respective actions cause the nominal interest rate to rise by the increase in expected inflation, i.e., when the real rate again is at its previous level. A natural question to ask is whether the real rate remains constant in a general equilibrium model when economic agents behave in the credit market as Fisher hypothesized in his analysis. The answer of course depends on what happens to the other variables in the supply and demand for credit functions. For example, does the change in expected inflation also affect income, which then alters the excess demand for credit?

A number of general equilibrium models have appeared which attempt to determine the behavior of the real rate when there is a change in inflationary expectations. Almost without exception, these models do not formally include a bond market, so it is difficult to know whether borrowers and lenders are behaving as *Fisher* hypothesized. This is true of the models of *Mundell* (1963), *Sargent* (1972), *Feldstein* (1976), *Melvin* (1982), and *Fried* and *Howitt* (1983). The *Infante* and *Stein* (1980) model does have a credit market in which expected inflation is an argument. It, however, is not solved for the behavior of the interest rate, though the bond market Fisher Effect, i.e., $di/d\pi = 1$, is imposed in deriving their principal result that the steady-state government expenditures multiplier is negative.

This paper addresses the question of the behavior of the real rate in a general equilibrium model when the *Fisher* relation is constrained to hold in the credit market. The reason for the imposition of that constraint is simply that

* An earlier version was read in our departmental Macroeconomics Workshop and at the 1988 Midwest Economics Association meeting. The first draft was written during my stay at the Volkswirtschaftliches Institut der Universität München.

individual behavior giving rise to the Fisher Effect is generally believed to represent rational behavior of agents in the credit market. For purposes of analytical tractability, the particular model used here is the *Patinkin* (1965) general equilibrium framework, suitably adapted to incorporate consistently the (exogenous) expected rate of inflation. The principal advantage of using that model is that it includes in a straightforward manner a well known, carefully specified bond market.

In a general equilibrium framework, a rise in the expected rate of inflation also affects other endogenous variables which then simultaneously interact in the bond market, thereby influencing the interest rate. The behavior of the real rate may then be addressed in at least two complementary ways. One is to solve explicitly for the real rate and the other is to solve for each of the variables affecting the supply and demand for bonds, and then determine the net effect of these on the interest rate.[1]

One of the recurring empirical regularities is the finding that the nominal interest rate rises at most by the change in expected inflation, in the presence of taxation, that nominal rates do not rise "enough". This indicates to some that the *Fisher* Effect does not hold.[2] The intent of this paper is to inquire into the behavior of the several variables affecting the bond market that would cause the real rate to change and then to indicate some emendations that may be made to the Fisherian view to reconcile it with the empirical literature.

II. A Model

A model based on the well known *Patinkin* (1965) framework makes the analysis tractable.[3] There are two emendations that are necessary. The first incorporates the important Fisherian distinction between nominal and real interest rates. The second concerns the issue of the specification of the expected inflation rate in the three markets. The commodity market is written in terms of the real rate and the bond and money markets in terms of the nominal rate, because this represents the terms on which one can substitute between the two assets (*Mundell,* p. 281).

---

[1] Econometric studies of the *Fisher* Effect generally employ a variant of the second approach as they estimate coefficients for income, real balances and a measure of the expected inflation rate in an interest rate equation.

[2] See the summary survey in *Hansson* and *Stuart* (1986), particularly their reasoned assessment of the evidence.

[3] The model was first presented in *Steindl* (1973) and later discussed by *Obst* and *Rasche* (1976) and *Darrat* (1985).

The formal model is:

$$i = r + \pi \tag{1}$$

$$y_0 = F(y_0, r, m, \pi); \quad 0 < F_1 < 1, F_2 < 0 < F_3 < 1, F_4 > 0 \tag{2}$$

$$B(y_0, 1/i, m, \pi) = 0; \quad B_1 = 0, B_2 < 0 < B_3 < 1, B_4 < 0 \tag{3}$$

$$m = L(y_0, i, m, \pi); \quad L_1 > 0, L_2 < 0 < L_3 < 1, L_4 < 0 \tag{4}$$

where

i = nominal rate of interest
r = real interest rate
m = real money balances, M_0/p.
π = actual and fully anticipated inflation rate; it is exogenous.

Equation (1) is the standard expression for continuously compounded interest when there is no taxation of interest (*Darby,* p. 272). The first three partials in (2) - (4) come directly from *Patinkin*. The Fisherian insight that inflationary expectations create excess supply in the bond market gives $B_4 < 0$. The real demand for money is negatively related to expectations of inflation π, hence $L_4 < 0$.

The intuition behind $F_4 > 0$ derives from several considerations. There is the methodological stricture articulated by *Tobin* in his Nobel Lecture that "the best practice is to write down all the functions explicitly, even though one is redundant, and to put the same arguments in all the functions" (p. 173). Consequently an increase in π must cause excess demand in the commodity market, because it results in excess supply in the bond and money markets. In addition, *Keynes* in his critique of *Fisher* argues that "the expectation of a fall in the value of money stimulates investment, and hence employment generally, because it raises the schedule of the marginal efficiency of capital, *i.e.,* the investment demand schedule; ... This is the truth which lies behind Professor Irving Fisher's theory of what he originally called 'Appreciation and Interest' ..." (1936, pp. 141 - 42).

The usual assumption regarding the commodity market is that $F_4 = 0$; that "commodity demand responds only to changes in *real* interest rates [; ... thus] a reduced real demand for money (from an increase in the anticipated inflation rate) is accommodated exclusively by a shift in the excess demand function for bonds" (*Obst* and *Rasche,* p. 119). This assumption is clear in *Mundell* in that an increase in π does not shift his goods market equilibrium curve. Only his money equilibrium curve is affected, shifting (down) by the change in the expected inflation rate.[4] Similarly, *Sargent* has the (conventional) *IS* curve unaffected by an increase in π (1972, p. 222).[5] Another example is *Melvin* (1982, p. 842). His commodity market investment and saving equations accommodate changes in π only through the real (after-tax) interest rate. Thus, the effects of a change in inflationary expectations on the real interest rate operate through a disturbance in the money market which then interacts with the commodity market. The commodity market is not simultaneously thrown into disequilibrium.

Feldstein is an exception. His assumption of "no tax on the unrealized appreciation of the capital stock" introduces a wedge in the neoclassical optimal capital stock condition, thereby affecting the growth equilibrium condition. The effect of the wedge is that an increase in π increases desired capital intensity in the commodity market, i.e., in the growth equilibrium condition (1976, p. 812).

III. The Fisher Effect in the Bond Market or Must the Real Rate Rise?

Before imposing the Fisher Effect in the bond market, the model is solved for the behavior of the real rate. Use the commodity and bond market equations (2) - (3) into which (1) has been substituted. This gives

$$dr/d\pi = \frac{[F_3\,(i^2 B_4 - B_2) - i^2 B_3 F_4]}{B_2 F_3 + i^2 B_3 F_2} \lesseqqgtr 0 \tag{5}$$

The denominator is negative; the numerator cannot be signed. Hence the sign of (5) is qualitatively indeterminate, in the absence of any additional restrictions on the partial derivatives.

Fisher's work is concerned with the bond market, being a partial equilibrium loanable funds framework, i.e., an individual experiment in the context of a model of the economy. From equation (3), the behavior of the real rate in the bond market, ceteris paribus, is

$$dr/d\pi = [i^2 B_4 - B_2]/B_2 \gtreqless 0. \tag{6}$$

The Fisher Effect occurs when $i^2 B_4 - B_2 = 0$, i.e., when $B_4 = (B_2/i^2)$ – the excess supply of bonds (B_4) resulting from an increase in π equals the excess

[4] When solving for the real interest rate, "if we interpret the ordinate of the figure as the *real* rate of interest it becomes necessary to shift the *LM* schedule downward by the anticipated rate of inflation, while the *IS* curve is unaltered" (*Mundell*, p. 283).

[5] The *LM* relation shifts down by π, with the consequent excess real money balances then driving up the price level until the real interest rate is again at its initial level, i.e., the nominal rate rises by the increase in π.

demand (B_2) resulting from an increase in the nominal interest rate ($1/i^2$). Thus, when the Fisher Effect holds in the bond market, equation (5) becomes

$$(5') \qquad dr/d\pi = \frac{-i^2 B_3 F_4}{B_2 F_3 + i^2 B_3 F_2} > 0$$

which is clearly positive because the numerator is definitely negative. The real rate must rise when the Fisher Effect holds.

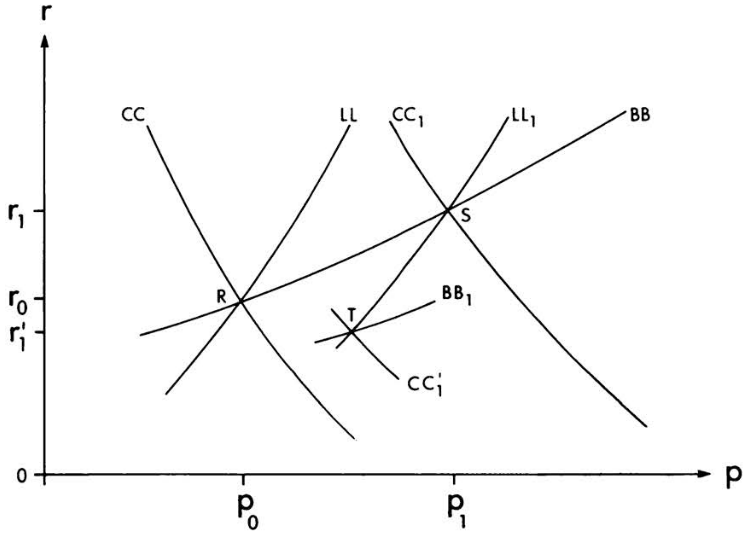

Figure 1: Fisher Effect in Bond Market

Figure 1 depicts the adjustment. The initial equilibrium is at point R. The increase in π results in CC shifting up.[6] When the *Fisher* Effect holds in the bond market, BB does not shift. At p_0, the excess supply in the bond market raises the nominal rate by π, thereby keeping the real rate at r_0. Economization of real balances owing to the expectation of inflation results in excess supply in the money market; LL correspondingly shifts down to LL_1.[7] The new equilibrium is at S, at which there is both a higher price level and real interest rate.

In terms of the bond market, the expectation of inflation initially leaves the real rate unchanged, by the assumption that the *Fisher* Effect holds

[6] The commodity market (CC) curve shifts by $dr/d\pi = [F_4/F_2] > 0$.

[7] The money market (LL) shifts down by more than the increase in π. Its shift is $dr/d\pi = [-(L_2 + L_4)/L_2] < -1$.

there. The inflationary expectation, however, causes a rise in the price level as a result of the increase in the demand for commodities, $F_4 > 0$. The consequent fall in real balances then generates further excess bond supply, thereby resulting in the real rate increasing.

An alternative way to obtain this result is to solve the bond excess demand function (3) for the nominal interest rate.

$$(3') \qquad i = \beta(y_0, m, \pi); \quad \beta_1 = 0 > \beta_2, \beta_3 = 1$$

The only variables affecting i that change are π and m. The former increases by assumption; ceteris paribus, the effect of that change on the nominal rate is unity, by assumption that the *Fisher* Effect holds in the bond market, i.e., $\beta_3 = 1$.

Note that $B_3 > 0$ in equation (3) implies $\beta_2 < 0$. The induced reduction in real money balances m occurs because the expectation of inflation causes a rise in the price level which thus lowers m. Given $\beta_2 < 0$, the fall in m generates an excess supply of bonds which then increases the nominal, hence the real rate. Real income y does not change because of the full employment property of the model owing to wage flexibility.[8]

IV. Generalization

Assume now that another model is being analyzed, and that it contains a bond market. The particular specification of the model is not known, except for its bond market. The question is: if the real rate of interest is either to remain unchanged or decline as a result of an increase in inflationary expectations, what is happening to the individual arguments in the supply and demand for bonds functions that result in the bond market clearing in the new equilibrium at a nominal interest rate no greater than given by the *Fisher* Effect? The typical arguments in the bond excess demand function are the price of bonds – which is inversely related to the nominal interest rate i – real income y, capital k, real balances m and inflationary expectations π. Solving the excess demand function explicitly for the nominal interest rate gives an expression analogous to (3′).

$$(7) \qquad i = i(y, k, m, \pi), i_1 \geq 0, i_2 < 0, i_3 < 0, i_4 = 1.$$

[8] In fact, from equation (3), had there been an effect on income, it would have altered the demand and supply of bonds by the same amount, thereby leaving unchanged the excess demand for bonds, hence $\beta_1 = 0$.

An increase in y increases both the demand and supply of bonds. *Patinkin* (1965, p. 282) makes the explicit assumption, followed above in equation (3), and (3′) for which $B_1 = \beta_1 = 0$, that the two shifts are equal, hence $i_1 = 0$. The observed empirical procyclicality of interest rates suggests, however, that the supply effect dominates the demand shift. This is the assumption made by *Infante* and *Stein* (1980, pp. 263 - 264); consequently $i_1 > 0$. Since it is not clear which is the "appropriate" view, each is included.

The second partial reflects the view that an increase in the capital stock lowers the marginal product of capital, thereby reducing the supply of bonds and lowering the nominal interest rate. The last two partials are identical to those given in equation (3), except for the fact that the *Fisher* Effect is imposed here so that $i_4 = 1$.

Assume an increase in inflationary expectations. That raises the nominal rate by the *Fisher* Effect, i.e., by the assumption $i_4 = 1$; consequently the real rate is unchanged on that count. In addition, however, the rise in π reduces real balances, thereby raising the nominal rate further and therefore increasing the real rate.

If the real rate is to fall as a net result of the other reduced form forces operating in the bond market, then either income must decline and/or the capital stock must increase, implying for the "and" option a curious combination of joint movements suggesting a perverse aggregate production function, one which need not be considered further. Of course, the decline in income puts downward pressure on the real interest rate only insofar as $i_1 > 0$.

The behavior of the capital stock depends inter alia on the behavior of the real rate, so its induced reduced form change resulting from an increase in inflationary expectations cannot be determined a priori.

Several cases may, however, be considered. The first is that of a Keynesian short-run in which the capital stock does not change even though net investment is not zero. As such, k does not change and so the only force operating to reduce the real interest rate is an endogenously induced decline in real income initiated by the increase in inflationary expectations, and this decline in the real rate can occur only if $i_1 > 0$. Notice, however, that in the absence of an explicit model one does not know the mechanism whereby the rise in π brings about a reduction in real income.

The second case is that of a growing economy, of which two possibilities are relevant. Assume a production function in which the marginal product of capital is positively related to the employment ratio, hence real income, and of course negatively related to capital intensity, as for example in

Infante and *Stein* (1980, p. 263). That is, let f be the marginal product of capital F_k. Then $f_k < 0$ and $f_y > 0$.

Suppose first the increase in inflationary expectations results in a decrease in both k and y, and of course m. The fall in k implies excess supply in the bond market, thereby pushing nominal and real interest rates higher. The fall in y and/or the size of i_1 must therefore be sufficiently large so as to induce a decline in the nominal rate to more than offset the positive effects on it of the decline in both real balances m and capital intensity k. Should that happen, the effects of an increase in inflationary expectations are a higher nominal rate, lower real rate, smaller real balances, lower real income and smaller capital intensity.[9] Thus, in the steady-state $0 < di/d\pi < 1$, though in the behavioral equation (7) the *Fisher* Effect holds, i.e., $i_4 = \delta i / \delta \pi = 1$.

Lastly, the rise in inflationary expectations in a growing economy could also have resulted in an increase in both real income and capital intensity. For the real rate in the steady-state to decline in this case, the excess demand resulting from the rise in k would have to be greater than the sum of the excess supplies owing to the rise in y and fall in m. That an increase in π could have these effects implies an unstable model in that the feedback effects on the real interest rate from the rise in capital intensity must be greater than the initial effect on it of a decline in the real rate.[10]

General equilibrium considerations thus suggest that when the *Fisher* Effect holds in the bond market, it is a decline in real income that is responsible for the empirically observed fall in the real rate of interest. Absent the decline in real income, the real rate of interest must be higher.[11]

V. Why the Fisher Effect Need Not Hold

The appeal of the *Fisher* Effect in the bond market is that it suggests rational behavior on the part of agents who have fully adjusted, ceteris

[9] One avenue by which the above steady-state movements come about is that the impact effect of the increase in inflationary expectations is a higher real rate which then reduces desired capital intensity, consequently investment. In the steady-state, therefore, there is a lower capital intensity and real income, with the decline in y being sufficient to pull the nominal rate down by more than the upward pressures on it resulting from the fall in both k and m.

[10] One difficulty here is to envision a plausible framework whereby an increase in π results in an increase in capital intensity, other than one in which real rate initially falls, because that is what is to be explained.

[11] The finding that the real rate rises when the *Fisher* Effect holds in the bond market has been shown to hold in other general equilibrium models, see *Steindl* (1986).

paribus, to the expectation of inflation. Both creditors and debtors pursue and succeed in attaining their respective best interests, and in so doing there is no real "financial" spillover into any other market. As a result, any economization of real balances owing to increased expectations of inflation has as its counterpart increased real expenditure only in the commodity market.

In both the real world and in the model, one of the main forms of savings is the holding of financial assets. The expectation of inflation leads to the rational decision to economize on real balances, and thereby incur the consequent private costs (which translate into the welfare costs of perfectly anticipated inflation). If the *Fisher* Effect holds, however, the expectation of inflation must reduce real savings inasmuch as real bond holdings are unchanged but real balances are reduced. One of the primary reasons for accumulating savings, however, is to reduce the variability of lifetime consumption, a point emphasized by Fisher and by the life-cycle hypothesis.

Given that individuals behave in this manner, the expectation of (more) inflation would induce them to restructure their financial assets from real balances into additional real bonds. Their adjustment from real balances is therefore not entirely into commodities, as the *Fisher* Effect requires.

The shift of financial assets from real balances into bonds would be the basis for a smaller excess supply of bonds than indicated by the *Fisher* Effect. To the extent that agents reallocate some of their reduced real balances to increased bond holdings in order to preserve as best they can the real value of their savings, the Fisher Effect does not hold. The decreased demand for bonds induced by the increase in π is thus moderated, but not completely offset, by the shift of funds from real balances.

These considerations can be seen in figure 1. Assume that the increase in inflationary expectations reduces the real demand for money as before; that is, the LL curve shifts down as before to LL_1. Some of the restructuring of real balances shows up now in the bond market. Accordingly, the new BB curve lies, and must lie, below its former level – the amount of excess supply in the bond market is less than indicated by the *Fisher* Effect. The downward shift of BB to BB_1 is due to the economization of real balances being restructured partially in the bond market and not entirely in the commodity market. The increased demand for commodities cannot then be as large as previously; the new CC is therefore to the left of CC_1; the entire real excess supply of money is not diverted to the commodity market.

This type of adjustment can be viewed, in terms of the Keynesian view that adjustments in the money market influence the bond market to a greater extent than the commodity market, that is, the inflationary expectations induced excess supply of money generates a greater excess demand for bonds than commodities in that the BB curve shifts rightward by more than the CC curve. Quite clearly, the new real rate is less than r_1, and in the present figure it has fallen from its initial r_0 level to r_1'.

Of course, the real rate need not fall below r_o simply because some of the reduced demand for real balances appears in the bond market, moderating the excess supply there. The real rate declines only if there is "enough" of a restructuring of real financial assets, and that is the situation shown in the figure.

In the terms of equation (5), the inflationary expectations induced excess demand for commodities F_4 is smaller, as is the absolute value of the corresponding bond market excess supply term B_4. The numerator accordingly becomes positive, thereby making the expression definitely negative.[12]

VI. Concluding Comments

The *Fisher* Effect is generally formulated as a rational response of borrowers and lenders in the credit market. Empirical investigations of the behavior of nominal interest rates in response to changes in inflationary expectations, however measured, find that nominal rates do not rise by the increase in inflationary expectations. Does this mean that the Fisher Effect does not hold, or is it that other variables also affected by inflationary expectations jointly feed back into the credit market, and the induced behavior of those variables is the reason why nominal rates do not rise sufficiently?

The argument here initially concentrates on the specification of a bond market, one that would be an integral relation in a general equilibrium framework. To that end, the price expectations *Patinkin*ian model is analyzed with special emphasis on its carefully structured bond market. The real rate must rise there when the *Fisher* Effect holds, given an increase in inflationary expectations; the reason being the excess supply (in the bond market) resulting from economization of real balances.

When the bond market is generalized to include the additional variables of real income and capital intensity, the analysis leads to the conclusion that

[12] Notice that if the commodity market is not affected by a change in inflationary expectations, i.e., $F_4 = 0$, then for a given inflationary expectations induced excess supply of real balances L_4, there is now an inflation induced excess demand ($B_4 > 0$ for bonds, which is just the opposite of what Fisher argued. The real rate must therefore decline.

either income must fall dramatically or the model is unstable, if the real rate is to decline when expectations of inflation increase and the *Fisher* Effect holds in the bond market.

Whether the *Fisher* Effect need hold, as a matter of rational behavior, is the issue with which the penultimate section deals. If it need not, what is the basis for the behavior that obviates it? Life-cycle considerations and general equilibrium adjustments among markets are two important reasons, and each has the effect of reducing the real rate. These effects then serve to offset the upward push on the real rate stemming from the behavior of other variables in the supply and demand functions in the bond market.

References

Darby, Michael R.: "The Financial and Tax Effects of Monetary Policy on Interest Rates." Economic Inquiry 13 (June 1975), 266 - 76. *Darrat,* Ali F.: "Inflationary Expectations and Interest Rates a la Patinkin's General Equilibrium Model." American Economist 29 (Fall 1985), 55 - 56. – *Fried,* Joel and *Howitt,* Peter: "The Effects of Inflation on Real Interest Rates." American Economic Review 73 (December 1983), 968 - 80. – *Hansson,* Ingemar, and *Stuart,* Charles: "The Fisher Hypothesis and International Capital Markets." Journal of Political Economy 94, (December 1986), 1330 - 37. – *Keynes,* John Maynard: The General Theory of Employment, Interest and Money. New York: Harcourt, Brace and Co., 1936. – *Melvin,* Michael: "Expected Inflation, Taxation, and Interest Rates: The Delusion of Fiscal Illusion." American Economic Review 72 (September 1982), 841 - 45. – *Mundell,* Robert A.: "Inflation and Real Interest." Journal of Political Economy 71 (June 1963), 280 - 83. – *Obst,* Norman P. and *Rasche,* Robert H.: "Price Expectations and Interest Rates: Some Clarifying Comments." Journal of Money, Credit and Banking 8 (February 1976), 119 - 122. – *Patinkin,* Don: Money, Interest and Prices. New York: Harper & Row, 1965. – *Steindl,* Frank G.: "Price Expectations and Interest Rates." Journal of Money, Credit and Banking 4 (November 1973), 939 - 49. – *Steindl,* Frank. G.: "General Equilibrium Models of Inflation and Interest Rates: Specification Considerations." Kredit und Kapital 19 (Heft 2, 1986), 252 - 70. – *Tobin,* James: "Money and Finance in the Macroeconomic Process." Journal of Money, Credit and Banking 14 (May 1982), 171 - 204.

Zusammenfassung

Der Fisher-Effekt in allgemeinen Gleichgewichtsmodellen

Der *Fisher*-Effekt hat viel theoretisches und empirisches Interesse hervorgerufen, $di / d\pi = 1$. Es wird üblicherweise als das Resultat rationalen Verhaltens am Kreditmarkt dargestellt, wobei die Kreditnehmer und die Kreditgeber alle Arbitragemöglichkeiten ausgeschöpft haben. Im allgemeinen zeigen empirische Studien, daß der Nominalzins nicht um die Zunahme der Inflationserwartungen steigt. Folgt daraus, daß der Fisher-Effekt nicht gilt, oder bedeutet es, daß andere durch Inflationserwartungen beeinflußte Variable Rückwirkungen auf die Kreditmärkte haben, indem sie den Nominalzins senken, obwohl der Fisher-Effekt gilt? Dieser Artikel untersucht das Verhalten des Realzinses in allgemeinen Gleichgewichtsmodellen, wobei der Fisher-Effekt darauf beschränkt ist, im Kreditmarkt zu gelten.

Zunächst wird ein modifiziertes *Patinkin*-Modell mit seinen feinstrukturierten Kreditmärkten untersucht, um das Verhalten des Realzinses zu bestimmen. Die (exogene) Zunahme der Inflationserwartungen erhöht den Realzins, und zwar durch das Überschußangebot (am Anleihemarkt), das aus der von der Inflation induzierten Ökonomisierung der Realkassenhaltung resultiert.

Wenn der Anleihemarkt in ein Wachstumsmodell verallgemeinert wird, indem das Realeinkommen und die Kapitalintensität berücksichtigt werden, muß entweder das Realeinkommen dramatisch sinken, oder das Modell ist instabil, sofern der Realzins bei steigenden Inflationserwartungen fällt.

Ob der *Fisher*-Effekt als Ausdruck rationalen Verhaltens gelten muß, wird auch betrachtet. Zwei wichtige Gründe, die dagegen sprechen, sind Lebenszyklusüberlegungen und allgemeine Gleichgewichtsanpassungen zwischen Märkten. Beide bewirken eine Verringerung des Realzinses.

Summary

The Fisher Effect in General Equilibrium Models

There has been much theoretical and empirical interest in the *Fisher* Effect, $di/d\pi = 1$. It is usually portrayed as the result of rational behavior in the credit market resulting from borrowers and lenders exhausting all arbitrage opportunities. Empirical studies of it generally indicate that the nominal interest rate does not rise by the increase in inflationary expectations. Does this mean that the Fisher Effect does not hold, or is it that other variables affected by inflationary expectations feed back into the credit market pushing the nominal rate down, even though the Fisher Effect holds? This paper studies the behavior of the real interest rate in general equilibrium models when the Fisher Effect is constrained to hold in the credit market.

A modified *Patinkin* model with its carefully structured credit market is first studied to determine the behavior of the real rate. The (exogenous) increase in inflationary expectations increases the real rate, the reason being the excess supply (in the bond market) resulting from the inflation induced economization of real balances.

When the bond market is generalized to a growth framework to include real income and capital intensity, either real income must fall dramatically or the model is unstable if the real rate is to decline when inflationary expectations increase.

Whether the *Fisher* Effect need hold as a matter of rational behavior is then considered. Life-cycle considerations and general equilibrium adjustments among markets are two important reasons why it need not, and the effect of each is to reduce the real rate.

Résumé

L'effet de Fisher dans des modèles d'équilibre général

L'effet de *Fisher* ($di \,/\, d\pi = 1$) a connu un grand intérêt théorique et empirique. On le considère généralement comme le résultat d'un comportement rationnel sur le marché financier, résultant du fait que les emprunteurs et les prêteurs profitent de toutes les occasions d'arbitrage. D'après les études empiriques à ce sujet, il est normalement indiqué que le taux d'intérêt nominal ne grimpe pas lorsque les attentes inflationnistes s'accroissent. Cela signifie-t-il que l'effet de Fisher ne se maintient pas ou est-ce que d'autres variables touchées par les attentes inflationnistes influencent le marché financier, faisant dégringoler le taux nominal, même si l'effet de Fisher se maintient? Cet article analyse le comportement du taux d'intérêt réel dans des modèles d'equilibre général, où l'effet de Fisher est obligé de se maintenir sur le marché financier.

L'auteur étudie tout d'abord un modèle modifié de *Patinkin,* avec son marché financier soigneusement structuré, pour déterminer le comportement du taux réel. L'accroissement (exogène) d'attentes inflationnistes fait augmenter le taux réel, à cause de l'offre excessive (sur le marché des titres d'emprunt), résultant de l'économie des balances réelles induites par l'inflation.

Si le marché des titres d'emprunt est généralisé en tant que cadre de croissance pour inclure le revenu réel et l'intensité de capital, ou bien le revenu réel doit tomber de façon dramatique, ou bien le modèle doit être instable si le taux réel doit s'abaisser lorsque les attentes inflationnistes s'accroissent.

L'auteur se demande ensuite s'il faut continuer à considérer l'effet de *Fisher* comme le résultat d'un comportement rationnel. Deux raisons importantes, à savoir des considérations du cycle de vie et des ajustements d'équilibre général parmi les marchés montrent qu'il ne doit pas être considéré de la sorte et que chacun des ces facteurs fait réduire le taux réel.