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FISHER, THORNTON AND THE ANALYSIS OF THE INFLATION PREMIUM

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Virtually all references to the Fisher Effect assume that its appearance in nominal interest rates is a simultaneous result of borrower and lender effects. However, Irving Fisher, and Henry Thornton before him emphasized the activist role on the borrower (demand) side of the loan market. Their reasoning is extended here. Borrowers are seen increasing their demands for loans not because they necessarily anticipate inflation, but because the results of inflationary spending first appear on their income statements as higher profits. Ultimately lenders' loan supply schedules shift to the left as they, too, become aware of the decline in real rates. The conclusions reached for the loan market are seen as generalized to all contractual costs in labor and commodity markets.

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## Fisher, Thornton and the Analysis of the Inflation Premium

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[I]nsofar as there exists any adjustment of the money rate of interest to the changes in the purchasing power of money, it is for the most part (1) lagged and (2) indirect. . . . The indirectness of the effect of changed purchasing power comes largely through the intermediate steps which affect business profits and volumes of trade, which in turn affect the demand for loans and the rate of interest.

Irving Fisher, The Theory of Interest,  
New York: Macmillan, 1930, p. 494.

### 1. The Conventional View of Interest Rate Adjustment to Inflation

Persistent inflation in the world's economies has confirmed the phenomenon known as the Fisher Effect: As a rate of price level increase becomes generally expected, nominal market interest rates come to include the sum of real interest rates plus the expected inflation rate. This doctrine has few mysteries at the macro-economic level. It simply recognizes that nominal interest rates must be adjusted by the inflation rate to determine real rates in the same way that nominal prices and wages must be adjusted by price level changes to estimate real prices and wages.

However, the route by which nominal rates adjust to inflation has been largely neglected. Most treatments of this issue presume a priori that the new rate level is the result of both a borrower (demander-of-loans) effect and a lender (supplier-of-loans) effect. [For statements that give equal weight to both effects, see, in addition to any recent money and banking text, B. Friedman (1980), M. Friedman (1968), Gibson (1970, 1972), and Humphrey (1976)]. Borrowers anticipate an inflation rate that will enhance their profits either by producing a capital gain on assets purchased with the borrowed money or by allowing them to pay off their loans in depreciated dollars. They are, therefore, willing to pay this higher rate on their borrowings. Lenders, by the same token, know that the nominal rate they receive for accepting loans will be reduced in real terms by the inflation rate. Therefore, they will not lend unless they are likewise suitably rewarded. The result is a simultaneous and symmetrical adjustment in both loan demand and supply that bids up nominal rates.

This assumed simultaneity of borrow and lender effects has logical flaws. First, it is inconsistent with the conventional demand-pull explanation of inflationary wage-price adjustments in labor and product markets; thus, it is no more valid than a cost-push interpretation of inflationary increases in prices and wage rates. Furthermore, the originators of the Fisher Effect, including Irving Fisher, did not introduce the phenomenon as a "balanced" development of market forces, but saw it getting its impetus from the demand side. In so doing, they made

their theory of nominal interest rate adjustment consistent with their general theory of inflation.

The purpose of this paper is to review the origins of the Fisher Effect, and to give this concept its most logical market interpretation. The conclusion is that the demand side of the market activates the process through which nominal interest rates come to include inflation rates, just as it does in the case of nominal wage and price adjustments.

## 2. The Loan Market

Borrowers are demanders of loans, and lenders are suppliers. Their behavior in the loan market can be depicted by a conventional diagram in which loan demand and loan supply shift to the right and left respectively in response to expected inflation, leaving unchanged the long-run equilibrium real volume of loans clearing in the market (Points 0 and 2 on Figure 1). Nominal interest rates eventually increase enough to include the anticipated inflation rate (the difference between  $r_2$  and  $r_0$ ).

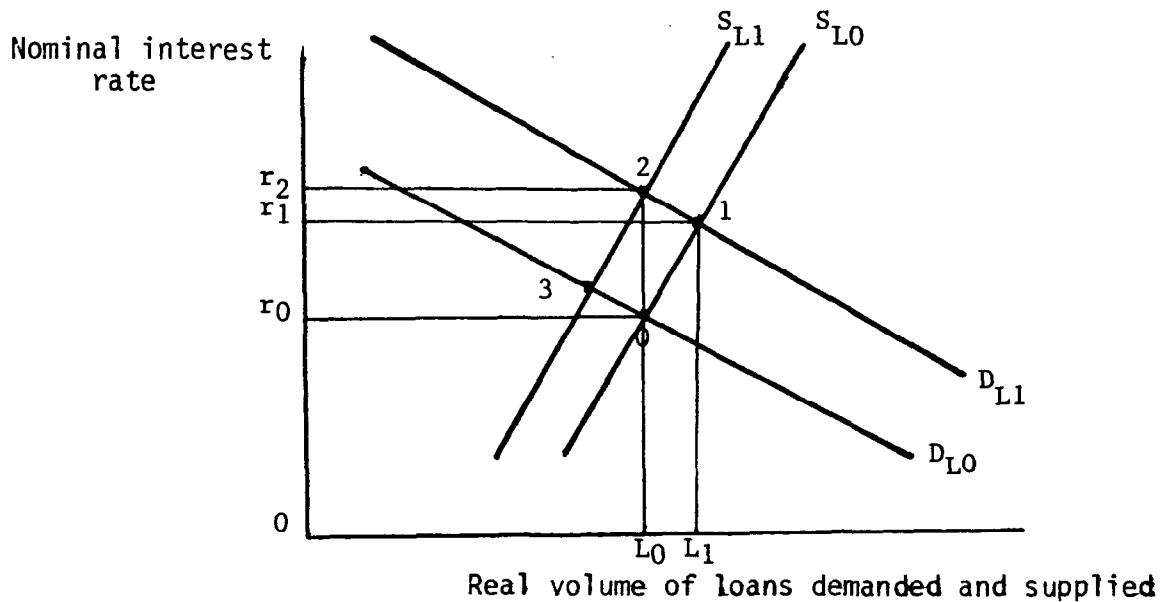


Figure 1. -- Market for Loans

This same diagram, with different labels on the axes, can also be used to depict equilibrium in labor and product markets in an inflation. If the market for labor were under scrutiny, the analyst would conclude that the growth rate of money wages would increase to match the new level of inflation. Or if the rate of increase of the money prices of specific commodities were at issue, the analyst would conclude similarly. These simple observations show only comparative static conclusions and neglect important transitional developments in the adjustment process, particularly in the loan market where interest rates are proximately determined. These developments constitute the route by which the Fisher Effect works its way into nominal interest rates.

### 3. Origins of the Fisher Effect

The Fisher Effect, as it turns out, did not begin with Irving Fisher. A recent review of the literature on this subject shows that several nineteenth century economics writers preceded Fisher in giving this event formal recognition [Humphrey, 1983]. Henry Thornton, for example, writing in 1811 during a period of paper money inflation, observed the decline in the "price" (value) of the pound sterling and the attendant effects on the balance sheets of borrowers. These borrowers, he noted,

balanced their books once a year, and, on estimating the value of those commodities in which they had invested their borrowed money, they found that value to be continually increasing, so that there was an apparent profit over and above the natural and ordinary profit on mercantile transactions. This apparent profit was nominal, as to persons who traded

on their own capital, but not nominal as to those who traded with borrowed money. . . . This extra profit was exactly so much additional advantage, derived from the circumstance of [the borrower] being a trader upon a borrowed capital, and was so much additional temptation to borrow [Thornton, 1939, p. 336].

Thornton's explicit recognition of the stimulus given to the borrower by extraordinary bookkeeping profits on the sale of his product, and the consequent increase in his demand for loans, contributed an essential element to the analysis of short-run interest rate adjustment. In view of the fact that measurement of inflation by price indexes was only a vague notion at this time, Thornton's analysis could not depend on market participants' perceptions of the inflation rate. Rather, the force of his argument focused on the borrower who experienced an unexpected residual return from the invested capital that he had financed by borrowing. Any lender effect was purely incidental in his analysis.

Alfred Marshall [1890, p. 628], John Stuart Mill [1865, p. 646] and John Bates Clark [1895, pp. 391-393] subsequently recognized the effect of inflation on interest rates. Marshall also added some sophisticated details to what was already known. He did not explain the procedure by which inflationary expectations become embodied in nominal rates; but he did imply that expectations differ between borrowers and lenders, and that these differential effects tend to generate business fluctuations.

Irving Fisher treated the entire issue comprehensively and thereby endowed the phenomenon with his name. Among other things,<sup>1</sup> he hypothesized that if all market participants had perfect foresight, price level changes would be immediately incorporated into nominal market rates:

Nominal rates and the inflation rate would go up (or down) together. However, he found upon examination of time series data that this one-for-one correspondence was not present, and that realized real rates moved inversely to nominal rates. Furthermore, he noted, the common occurrence of a change in the real volume of loans outstanding also indicated that market forces (demand and supply) did not respond synchronously to the shock of inflation [Fisher, 1930, pp. 43-44, 411 and 494].

Fisher deduced from these observations that the demand side of the loan market was the active element in promoting nominal interest rate increases sparked by inflation. Entrepreneurs, he reasoned, are net borrowers who must have superior foresight in order to survive. Even more critical, he argued, are the windfall profits they realize from the inflation boom. Since these borrowers are alert to the slightest change in firm profitability, an unusual profit "raises an expectation of a similar profit in the future, and this expectation, acting on the demand for loans, will raise the rate of interest." This process continues, he concluded, until "the rate approaches the true [long-run] adjustment" [Fisher, 1896, pp. 75].

Fisher here reiterated Thornton's insight, a point that subsequently has been overlooked.<sup>2</sup> To begin with, he observed, nobody--borrower, lender, or even central banker--anticipates inflation in an operational sense (that is, beyond a few vague mutterings) [Fisher, 1930, p. 399]. When unanticipated inflation begins, one of its first manifestations is a rise in the volume of business receipts relative to sticky nominal interest and wage costs, resulting in higher residual returns to entrepreneurs. [Fisher, 1930, p.439].<sup>3</sup> Entrepreneurs extrapolate these

realized profits forward thinking they will obtain higher future rates of return, and are thus willing to pay more for borrowed capital even if they know nothing about the inflation that is already gestating. Expectations of greater profit, not of inflation as such, provide the driving force for increases in nominal and, at this stage, real interest rates.

Fisher recognized that this initial impetus to interest rates was incomplete and that it had real consequences on the volume of loans [Fisher, 1896, p. 77]. His exposition, however, accounted only for the movement from point 0 to point 1 in our Figure 1. He also realized that, if the inflation were to be "neutral" with no relative price or distributional consequences, nominal interest rates had to rise by the full amount of the inflation rate to point 2. However, he did not provide an analysis to get from point 1 to point 2. He simply stated that, "If the rise [in nominal rates] is still inadequate, the process is repeated, and thus by trial and error the rate approaches the true adjustment" [Fisher, 1896, p. 76].<sup>4</sup>

This statement leaves the long-run position unresolved. If all the activity takes place on the borrower-demand side of the market, as Fisher suggested, no long-run adjustment will ever bring both real interest rates and the real volume of loans back to their initial equilibrium values.

#### 4. The Role of the Lender

The lender is an essential ingredient in the market adjustment. His phlegmatic and lagged reactions are due to the fact that he lacks some essential information available to the borrower. Because he does not operate in the borrower's commodity market where business receipts are increasing, his income statement does not reflect windfall profits or losses. His contractual claim is one-dimensional because he deals only in



loans. Where the borrower-entrepreneur need only observe the higher accounting profits from his own product relative to the sluggish nominal interest rate he is paying, the lender's awareness of a real loss on his contractual income is contingent on an understanding of a lagged and abstract price index datum that signals a reduction in his real returns from lending. Over a short interval of time, borrowers observe changes in their cash flows and, possibly, in their commodity prices; lenders obtain such data only after the fact and after a lag. In sum, information that becomes available to lenders at period  $t$  tends to be embodied in the expectations that were held by borrowers at  $t-1$ .

An explicit analysis for the short-run equilibrium at point 1 is given by Milton Friedman in his analysis of inflation's impact on the labor market. When he discussed sticky nominal wage adjustment, Friedman noted that product prices typically rise faster than factor prices. Therefore, realized real wages fall, even though

real wages anticipated by employees [go] up, since employees implicitly evaluate the wages offered at the earlier [lower] price level. Indeed, the simultaneous fall ex post in real wages to employers and rise ex ante in real wages to employees is what [enables] employment to increase. [M. Friedman, 1968, p. 10.]

This same analysis applies to the loan market. As the demand for loans shifts out to  $D_L$  in Figure 1, the quantity of loans supplied increases. Lenders perceive what they think is an increase in the real interest rate--from  $r_0$  to  $r_1$ . Borrowers, however, experience an ex

post fall in the real rate equal to  $r_2 - r_1$ , which is the difference between the inflation rate,  $r_2 - r_0$ , and the incomplete rise in the nominal rate,  $r_1 - r_0$ . To paraphrase Friedman's conclusion on wage changes: The simultaneous fall ex post in real interest rates to borrowers and rise ex ante in real interest rates to lenders is what enables real lending to increase.

Ultimately, the lenders' supply-of-loans function must shift; for lenders, like everyone else, become aware of inflation. They eventually experience a decline in real income as the reduced real returns from their fixed dollar claims lower their real consumption possibilities. Also, the decline in real income conventionally implies a decline in real saving, a factor tending to move the supply-of-loans schedule to the left.<sup>5</sup>

Lenders may also become borrowers, especially in markets that are technically efficient. To the extent that this mutation takes place, the adjustment process would be speeded up. Given the lenders' lagged perception of inflation, however, they would not assume the borrowers' role before the original borrowers had experienced their windfalls and had actively expanded their real demand for loans. Nonetheless, this transformation, together with the declines in the savers' real incomes, provides for the ultimate shift in the loan supply schedule that brings nominal rates up until they include the full inflation rate at point 2.

##### 5. Additional Determinants of Nominal Interest Rates

Other factors beside the inflation rate affect nominal interest rates. These other determinants include liquidity, time preference, and productivity. Consistent with Thornton and Fisher, the above analysis has treated time preference and productivity as provisional constants that determine the real yield on capital to which the equilibrium real rate of

interest on loans must eventually conform. Ultimately the real loan rate returns to this equilibrium level, leaving nominal rates with the Fisher Effect in place.

The liquidity factor, however, needs a more thorough treatment. If inflation results from injections of high-powered money--the usual means of generating an inflation, liquidity effects in the banking system logically precede borrower-entrepreneur awareness of windfall profits. The greater supply of money would initially shift the supply-of-loans function to the right, immediately opening a gap between the original equilibrium rate and the now lower market rate. This change in itself would be enough to increase loan volume, but it would result from a shift in the supply-of-loans function to the right along the demand curve rather than an upward shift of the demand curve itself. In this sense, a "lender effect" appears, but one moving in the other direction and preceding the subsequent expectations of ebullient borrowers. It stimulates the inflationary process, and adds another force tending to lower the market rate below the real rate. Nonetheless, it is an event independent of the implementation of the Fisher Effect proper.

## 6. Concluding Comments

The leftward shift in the supply of loans as inflation becomes manifest is induced by the prior shift in loan demand. This same analysis holds for the labor and commodity markets. Ultimately, the labor supply schedule shifts to the left as workers respond to declining real wages upon the emergence of inflation. Commodity markets show similar results.<sup>6</sup>

This analysis is thus compatible with recognized demand-pull inflation theory. Real wages and real interest rates--in general, any realized real

contractual costs--initially fall as inflation develops, thereby inducing increases in real activity. Gradually, however, contracts are re-drawn on new, more "realistic" terms that include inflation premia. Real values and real quantities--output, employment, the real volume of loans--return to their natural levels fully adjusted for inflation.<sup>7</sup> These supply responses are not independent inflation-inducing (or interest-raising) events, but are rather delayed reactions to the prior increases in demands, just as Thornton and Fisher insisted.

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FOOTNOTES

1. In his Appreciation and Interest [1896] Fisher made a four-fold contribution. He provided a rigorous derivation of the formula relating real and nominal interest rates with the expected rate of inflation. He discussed the limit values and behavior of the formula's variables under conditions of perfect and imperfect foresight. He empirically tested the perfect and imperfect foresight interpretations of the formula and, when the former interpretation failed the test, he constructed a theory of sluggish nominal rate adjustment under imperfect foresight. Finally, he employed his imperfect foresight theory to explain how price changes generate trade cycles by altering realized real loan rates. His contributions are reviewed in Humphrey [1983, pp. 7-11].
2. Fisher, strangely enough, was unaware of Thornton's contribution and did not cite it. He studied interest rate phenomena exhaustively for the better part of half a century, so might have been expected to have "discovered" Thornton. But such was not the case.
3. The increase in sales volume may be due to increased product sales, higher money prices, or a combination of both.
4. Fisher attributed "superior foresight" to borrowers. The very characteristic that led them to entrepreneurial activities also enabled them to react more quickly to an inflationary maladjustment

[Fisher, 1896, p. 77]. In dramatizing the role of entrepreneurs, Fisher overlooked the more staid, but just as necessitous, role of lenders.

5. Note that if lenders were the active element holding back loans by anticipating the price level increase before it actually occurred, the supply of loans would shift to the left. Realized real rates would rise ahead of inflation and the real volume of loans would decline as the market found short-run equilibrium at point 3 in Figure 1.
6. The theoretical conclusions summarized here have some obvious empirical implications. However, testing applicable hypotheses would unduly extend this paper beyond the scope appropriate for a single coherent article.
7. The argument can be raised that, if short-run real changes occur in the adjustment process, then final long-run equilibrium cannot be simply a return to the original equilibrium position. This issue is important in its own right, but is not a necessary part of the adjustment required by the Fisher Effect.