Macroeconomic Issues

Monetary Neutrality, Home Mortgages, and the Phillips Curve

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Standard mortgage borrowing practices are incorporated into a model of the loanable funds market. Contrary to the Taylor rule (which is for short-term rates), in this model an increase in inflation causes the long-term nominal rate to rise by a smaller amount, leaving the real rate lower. In turn, the lower long-term real interest rate stimulates investment, growth, and employment. As in the recent literature on the New Keynesian Phillips Curve, the long-run Phillips curve produced by this model is not vertical, and money is not neutral. Higher inflation reduces unemployment in the long run, even when inflationary expectations *are* fulfilled. The cause of this violation of the classical dichotomy is bounded rationality: to simplify a complex decision regarding how much to borrow, home buyers erroneously focus on their payment-to-income ratio, which is a function of the nominal interest rate, not the real interest rate. Central-Bank success at fighting inflation diverts loanable funds for productive investment into housing and other consumer durables.

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In classical models of the demand for loanable funds, it is assumed that rational agents base their behavior on the real interest rate. As a *pre*scription this is good advice, but as a *de*scription of what household borrowers actually do, it simply is not realistic. When considering the purchase of a home (or car, or washing machine, or credit card purchase) most people ask not about the debt but about the payment; i.e., they inquire whether the monthly payment would be reasonably affordable relative to their income. Real estate brokers, mortgage brokers, and other sales people usually encourage buyers to evaluate a potential purchase this way, thereby shifting the buyer's attention from the debt (which may be intimidating) to the payment (which may seem affordable).[1] This monthly payment depends on the nominal interest rate, not the real rate.

One would think that such a widespread borrowing practice would play a central role in models of the market for loanable funds. Yet it is assumed (in classical models) that borrowers watch the *real* interest rate.[2] To address that omission, this paper develops a model that allows for the actual practice of judging a loan's affordability by looking at the prospective payment relative to income. That modification leads to results that violate the classical dichotomy and the neutrality of money. Changes in inflation lead to only partially offsetting changes in the nominal rate, so the real rate moves opposite to inflation. Higher inflation lowers the real interest rate in the long run, thereby stimulating investment, growth, and employment. That is, higher inflation reduces unemployment, even in the long run when inflationary expectations are fulfilled. This restores the original, long-run policy interpretation of the Phillips curve, contrary to the well-known Friedman (1968) and Phelps (1967) expectations literature that generally discredited the original Phillips Curve. More recently a literature on the New Keynesian Phillips Curve has revived the original idea of a policy-relevant tradeoff between inflation and unemployment (Gali, et. al., 2005). The reason for the tradeoff suggested in this paper is that mortgage borrowers are *not* perfectly rational: they rely on a somewhat misleading heuristic piece of information (the payment-to-income ratio) rather than focusing rationally on the real interest rate.

Modeling the Effect of Inflation on the Real Interest Rate

Consider a household that is contemplating whether it can afford the purchase of a home, car, kitchen appliance, or other consumer durable good. The method of financing will be a mortgage, installment loan, or credit card debt. The household must ask how much home (or car, etc.) is reasonably affordable? Real estate brokers, mortgage loan brokers, and other sales people typically assure prospective buyers that the contemplated debt is affordable if the payment-to-income ratio (PTI) will be reasonable. Based on many decades of experience[3], there is a consensus that a reasonable maximum for the PTI ratio (combining mortgage payments, car loans, and installment loans) is 36 to 39 percent of pre-tax income.[4]

1Using the payment-to-income ratio as a guide to debt affordability can seriously mislead the borrower when inflation slows, for the borrower is tempted to take on an unwarranted increase in her debt stock burden. Warnings regarding the resulting debt trap (Haight 2003; Pulliam, 2004) are routinely overlooked by consumers.

2The (rather Panglossian) reasoning behind this modeling practice seems to be that an irrational or sub-optimal rule-of-thumb for borrowing behavior should not exist, ergo it does not exist. Yet a growing literature on heurisitcs indicates that such rules of thumb do in fact thrive in a setting of bounded rationality.

3Unfortunately, some of those many decades represented experience with relatively high inflation, so that experience can be misleading today. See Haight (2003).

4 This range for the payment-to-income ratio is not writ in stone: larger PTIs are considered acceptable for higher-income households, or in markets where home prices are rising very rapidly. Still, the PTI ratio rarely goes above 45 or 50 percent.

Following standard practice, then, suppose the household takes out a loan to buy its house and other consumer durables. Let r represent the nominal interest rate, while R is the real interest rate. To simplify calculations, assume the household is infinitely-lived, so it can make interest-only payments. Then the mortgaged amount (m) is related to the household's income (y) by the equation

} (1)

where PTI_{max} is the maximum allowable payment-to-income ratio. Rearranging,

}

(2)

} For example, if the nominal interest rate is .09 and the maximum acceptable payment-to-income ratio is .36, then the (infinitely lived) household will be willing to take on a mortgage that is about for four times its income. Let π represent the inflation rate. Then we know from the Fisher equation that

} (3)

Combining (2) and (3) gives

} (4)

} Let N represent the number of households in the country. Aggregate household income is $Y = Ny$, and the aggregate demand for mortgage funds is M=Nm . Multiplying (4) by N converts it to the aggregate relationship:

} (5)

Clearly, the aggregate demand for mortgage funds is a decreasing function of both the real interest rate and the inflation rate:

} (6)

This is the source of the upcoming violation of the classical neutrality: the country's demand for loanable funds (which will influence the *real* interest rate) is partly a function of a nominal variable, the inflation rate.

Let I(R) represent firms' aggregate investment demand for loanable funds. Firms are managed by rational agents who (unlike home buyers) watch the *real* interest rate:

} . (7)

Using (6) and (7), the market for loanable funds can be written

} (8)

To simplify, aggregate saving (S) is treated as fixed. Now consider the effect of a fall in the **}** inflation rate. Totally differentiating (8), assuming dS=0, and rearranging gives

} (9)

}Recalling (6), clearly the numerator of (9) is positive. Using (6) and (7), the denominator of (9) is negative. Hence the sign of inflation's effect upon the real interest rate in (9) is negative:

} . (10)

From (6) we know that a rise in the real rate R and a rise in inflation have the same effect on mortgage demand M, so (10) can be rewritten as

} (11)

Combining (9), (10), and (11):

} (12)

Taking the derivative of (3) with respect to the inflation rate,

} (13)

which is positive because (12) shows that

}

Hence

}

(14)

Combining (7) and (12),

. (15)

Back to the Original Phillips Tradeoff

As is well known, an increase in inflation increases the nominal interest rate. The question is, how much? Equation 14 indicates that in the context of this model, the nominal rate "under-reacts" to changes in inflation; the inflation-induced rise in the nominal rate is not sufficient to prevent a fall in the real rate. An increase in the steady, long-run, fully anticipated rate of inflation raises the nominal rate by a smaller amount. That rise (like any rise) in the nominal rate will raise mortgage payments and discourage myopic mortgage borrowers. The funds thereby released from buying homes and other consumer durables are then available to be used for more productive investments. Evidently a little inflation can be good for productive investment (15). The resulting improvement in long-run productivity and competitiveness can reduce unemployment. Higher inflation can increase investment, which improves productivity and competitiveness, leading to increased employment.

Summary

This paper supports the original interpretation of the Phillips curve: higher inflation lowers unemployment, even in the long run when inflationary expectations are fulfilled. The focus is on a setting where the inflation rate is steady and correctly anticipated. The suggested policy tradeoff does *not* require that agents have mistaken expectations about the inflation rate, and therefore it is *not* confined to the short run.[5]

On this ground, where there are no inflation surprises, the classical dichotomy and monetary neutrality are often considered impregnable. Indeed, Keynesians have often ceded this long-run, perfect foresight territory to the classical viewpoint. Yet it may be that in the long run we are all ... still looking at a sloping Phillips curve.

Basically, I advocate a "crowding out" type of argument, but in this case the villain is housing expenditure, not government expenditure. Housing expenditure (which is driven by myopic mortgage borrowing) crowds out investment. Low, steady, predictable inflation is often considered very desirable, but it has a drawback: it stimulates housing expenditure, which then crowds out productive private investment.

This may be the case in the USA, where former chairman Alan Greenspan's long tenure and successful vigilance against inflation have coincided with a long expansion of home construction activity. Without that home construction expansion, US productivity and employment would have been higher.

5It does require, however, that agents be somewhat myopic in another (more common and enduring) way; viz., they must trust the payment-to-income ratio as their guide to borrowing. Of course, in the very long run, borrowing customs might change.

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