No. 140, July 2011

INSTITUT
C.D. HOWE
INSTITUTE

C.D. Howe Institute

BACKGROUNDER

Monetary Policy

Natural Hazards:

Some Pitfalls on the Path to a Neutral Interest Rate

David Laidler

In this issue...

Critics of the Bank of Canada have stressed that if inflation is to be kept stable after next year, then a "neutral" value for real – that is, inflation-adjusted – market interest rates must be restored by then. But the neutral interest rate's value is extremely difficult to estimate.

The Study in Brief

The Author of This Issue

DAVID LAIDLER is Professor Emeritus, Economics, at the University of Western Ontario and Fellow-in-Residence at the C.D. Howe Institute.

Rigorous external review of every major policy study, undertaken by academics and outside experts, helps ensure the quality, integrity and objectivity of the Institute's research.

$12.00
ISBN 978-0-88806-843-9
ISSN 0824-8001 (print);
ISSN 1703-0765 (online)

The Bank of Canada currently expects the Canadian economy to return to full employment by the middle of next year, but is in no hurry to begin raising the overnight interest rate from its currently extremely low level towards the 3 percent plus range that normally has been associated with full employment.

Some of the Bank's critics have stressed that if inflation is to be kept stable after next year, then a "neutral" value for real – that is inflation-adjusted – market interest rates must be restored by then. They seem to presume, first, that such a value is grounded in the basic structure of the Canadian economy (its endowments of productive inputs, available technology as well as the tastes of its inhabitants vis-à-vis work, leisure and consumption, now and in the future) and, second, that this structure is stable over time so that the neutral interest rate can be inferred from past data.

These presumptions, however, are artifacts of a certain type of economic model widely used to analyze monetary policy, which treats the Canadian economy as if its output were a single good, and its population a single representative agent. In their understandable search for analytic simplicity, this model's exponents have underestimated the importance of the fact, long well known, that these presumptions are invalid for multi-product economies inhabited by diverse agents.

In real-world economies, spending decisions depend on expected returns in specific lines of business, which are both diverse and variable over time, and economic fundamentals are not their only determinants. The neutral interest rate's value is hence extremely difficult to estimate, making other policy indicators highly relevant. Recent survey data on business intentions and expectations have shown more signs of expansion lately, but, along with still subdued rates of money growth, they do not as yet signal any imminent threat of an upsurge in long-term inflationary pressures in Canada, and these factors suggest that there might be something to be said for the Bank of Canada's current caution towards raising interest rates.

Before 2008, Canadian monetary policy was often described as having one goal, for the year-on-year inflation rate of the consumer price index, and one instrument, the overnight interest rate. This was an accurate description of the way in which economic analysis had come to model monetary policy, and also of what, at least to an excellent first approximation, the Bank of Canada actually seemed to be doing.

For a dozen years after the Bank's inflation target was set at 2 percent in 1995, furthermore, actual inflation averaged almost exactly 2 percent, while the real economy consistently delivered employment and capacity utilization levels that had not been seen for two decades. If monetary policy was partly responsible for this happy outcome, and at the time many of us thought that it was, this was surely because it had helped keep the overall level of demand for goods and services equal on average to the economy's ability to supply them.

To put matters in the vocabulary used in today's technical discussions of monetary policy, between 1995 and 2007, the Bank of Canada, taking inflation expectations into account, seems to have set the overnight rate so as to keep the real market rate of interest (see Glossary) at a neutral value.

Monetary Policy Loses Some of its Innocence

Monetary policy lost some of this innocent simplicity during the recent crisis and the recession that followed it. The stabilization of asset markets and the promotion of real economic recovery became policy goals in their own right, and the authorities deployed instruments other than the overnight rate. These included, for example, explicit announcements about the Bank of Canada's intentions for this rate's future time path, not to mention a whole series of programs for providing liquidity if and when needed to financial institutions and markets.

This episode saw a significant drop in Consumer Price Index (CPI) inflation, so all this was quite compatible with the restoration of 2 percent inflation, and in this vital sense the Bank remained an inflation targeter, but not one whose conduct could still be described in the straightforward terms deployed above. And now, as the recovery continues and interest rates remain at extraordinarily low levels relative to earlier experience, how or even whether monetary policy can get back to its pre-2007 state of simplicity are much discussed issues. As readers of the regular communiqués of the C. D. Howe Institute's Monetary Policy Council will be particularly aware, much controversy has centered on two questions: What is the neutral value of the market rate of interest? And by when should the Bank of Canada aim to re-establish it?

More specifically, these communiqués report that some members of the Council – particularly those drawn from the academic community – have argued that if, as the Bank currently predicts, full employment is likely to be regained by the middle of 2012, then interest rates need to start rising now if they are to get back to an appropriately neutral level by that time. To judge from their recommendations, they seem to believe that this neutral level is in the 3 percent plus range. The Bank's recent policy announcements, on the other hand, have shown that it does not attach the same urgency to these concerns, but whether this is because it takes a different view about what will constitute an appropriate level for rates next year,

This essay originated in an informal talk given to students at Acadia University, and I am grateful to Paul Hobson for providing both the occasion, and some thoughtful remarks on the topic. Subsequent correspondence with Geoffrey Harcourt, and extremely useful comments on various drafts from Steve Ambler, Philippe Bergevin, Colin Busby, Ben Dachis, Pierre Duguay, Thor Koeppl, Alex Laurin, Angelo Melino, Doug Porter, Finn Poschmann, Chris Ragan, Bill Robson, Nick Rowe and Daniel Schwanen are gratefully acknowledged, but none of the above is to be held responsible for any opinions expressed below, let alone any errors.

or merely about the pace at which they can safely be raised in the interim, is unclear.

An Outline of this Essay

This essay is motivated by a belief that much of the discomfiting ambiguity surrounding today's policy disagreements has roots in a deeper theoretical problem; namely, that the concept of interest rate neutrality is less straightforward than the formal models of monetary policy that currently dominate academic thought and heavily influence modeling efforts within central banks, too, might lead one to believe.[1] It explores some of the complications here, not with the aim of settling current policy debates in any definitive way – this would be hopelessly overambitious – but with the more modest goal of clarifying some of the factors that make their resolution genuinely difficult.

The discussion begins by reminding readers of the standard three-relationship model (hereafter the standard model) in terms of which inflation targeting policies were usually designed and discussed before 2007, not least at the Bank of Canada, whose current quarterly projection model, *ToTEM*, is explicitly based on this framework.[2] It then goes on to highlight some awkward and pervasive complexities inherent in the concept of the natural rate of interest that lies at this model's heart, and hence in the closely related idea of the *neutral* rate of interest, showing also that these are usually hidden from view by certain simplifying assumptions routinely deployed to render the model analytically manageable.

These complexities were well understood among economists over a century ago, and have reappeared from time to time in the academic literature ever since. Exponents of today's so-called mainstream macroeconomics, of which the standard model is a prime example, have however ignored them, perhaps because they lead to embarrassing questions about the claims of this body of macro-theory to be rigorously derived from state-of-the-art micro-analysis of the behaviour of individual maximizing agents.[3] As we shall see, a reluctance to come to grips with these matters has contributed to an awkward disconnect between the theory of inflation-targeting monetary policy and its practice, among whose prime symptoms was that air of simplicity that surrounded discussions of the latter before 2007.

The Standard Model of Monetary Policy

As befits a device designed to analyze the control of inflation, the standard model pays careful attention to the distinction between the nominal interest rate observed in the market place and the underlying real rate of return that this implies when adjusted for expected inflation. This distinction is widely understood and needs no further elaboration here, beyond noting that, in this context, the adjective "real" means "adjusted for inflation-expectations," not "determined independently of happenings in the monetary sector." There are economic models of monetary policy in which inflation-adjusted rates also display the latter property to be sure, but there are some in which they do not.[4]

1 Central banks' policymakers do not focus single-mindedly on such analysis in their quest for interest rate neutrality, because their research departments' formal analysis is only one of several inputs into their decision making. A recent first rate survey of the relevant issues as they appear to central banks is Bernhardsen and Gardrup (2007).

2 Terms-of-trade Economic Model: for a detailed description of this system, and its salient differences from its immediate predecessor *QPM* (Quarterly Projection model), see, Murchison and Rennison (2006).

3 These problems were central to debates among those – for example, Friedrich von Hayek (1931), Gunnar Myrdal (1932) Eric Lindahl (1939) – who in the 1920s and 30s, built their analyses of monetary policy on foundations provided by Knut Wicksell (1898). For retrospective accounts of the issues as they appeared at that time, see David Laidler (1999), esp. Part 1, and Hans-Michael Trautwein (2011). Capital theorists, have paid attention to them more recently. See Avi Cohen and Geoffrey Harcourt (2003) for a retrospective account of the controversies of the 1960s in which they figured so prominently.

4 See fn.14, below.

Box 1: Glossary of Terms

Output gap: The difference between the economy's actual level of output, and that associated with so-called "full" employment, the latter in turn being the level of output which, if sustained over time, is associated with neither upward nor downward pressure on the inflation rate.

Overnight rate of interest: The rate of interest on loans of cash made overnight between members of the clearing system. This is the interest rate which the Bank of Canada controls for policy purposes.

Market rate of interest: Some notionally relevant average of the rates of interest paid by consumers and firms on loans taken to finance their expenditures. The Bank of Canada influences this rate by varying the overnight rate.

Real market rate of interest: The market rate of interest minus the expected rate of inflation over the term of the representative loan made at the market rate of interest.

Natural rate of interest: The value of an economy-wide average of the real rates of interest at which agents transact that equates the economy-wide supply of savings to the economy-wide demand for investment, and hence ensures that the output gap is zero.

Neutral rate of interest: An abbreviation of the phrase "neutral value of the real market rate of interest"; the value of the real market rate of interest at which it is equal to the natural rate.

The Standard Model's Three Components

As is well known, three basic relationships make up the standard model.

The first of these links the rate of inflation to agents' expectations about it, and to an output gap which measures the pressure of aggregate demand on the economy's productive capacity. This relationship's key property is that when this gap is stable over time at zero, the inflation rate is stable at its currently expected value, and hence creates no reason for inflation expectations to be revised.

The model's second component is an inverse relationship between the average value of the real (inflation-adjusted) interest rate ruling in the market and the economy's demand for output. Among other things, if and when quantified, it enables the particular – neutral, so called – value of this real market rate of interest at which the output gap is zero to be specified, thus implying that a central bank that wishes to maintain a stable inflation rate should on average keep the real market rate at this level, raising (lowering) it above neutral when the aim is to reduce (increase) inflation back to its target value after some shock.

The standard model's third equation offers the central bank advice about when and by how much to move its policy interest rate in reaction to actual and forecast shocks to inflation, and perhaps in reaction to shocks to the output gap as well, in order to keep inflation on, or bring it back to, its target path. In modern formulations, it will often embody a version of the so-called "Taylor principle": namely, that shocks to inflation should be met by changes in the nominal interest rate that exceed the size of the shock in question, in order to ensure that the real value of the market rate of interest changes in a stabilizing fashion.[5]

5 The principle was first developed in the course of John Taylor's pioneering (1993) exposition of what is usually called the Taylor Rule, a label sometimes given to a family of particular variations on what is here described as the third component of the standard model.

Simplification and Its Risks

Economics thrives on simplification. The alternative to a model that abstracts from many of the real world's complications would be a complete description, and this is quite infeasible. Thus, neither the standard model in its basic academic version, nor policy-oriented models such as *ToTEM* that are based on it, ought to be criticized on the grounds that they leave many things out. So long as they remain helpful rather than misleading, their simplicity is a virtue.

The basic model in question has a long history, which suggests that it has on the whole been helpful. An informal but nevertheless recognizable version of it was described by the banker and politician Henry Thornton as long ago as 1802, and many traces of it are to be found in subsequent 19th British literature on monetary policy, much of which was written by bankers and merchants. Not surprisingly, therefore, this early literature contains often penetrating analyses of the factors affecting market interest rates, and their relationship to central bank policies, and hence to the rate or rates actually under central bank control – nowadays the overnight rate, but in earlier times the discount rate.

There are some awkward gaps between today's standard model and reality that would have bemused its pioneers. For example, in the model's basic version, the policymaker simply sets a short-term market rate of interest at which firms and households are assumed to borrow.[6] In the real world a whole financial system links borrowing rates, among other variables, to the policy instruments actually under the central bank's direct control, and it is hard to believe that the habit of ignoring this system did not have something to do with the blindness that afflicted so many economists as a crisis developed within it in 2007-2008, or that their by now well-advanced efforts to recover forgotten knowledge about these matters underlies much of what was earlier termed monetary policy's "loss of innocence." Questions about what is often called the pricing of risk arise in this context, but these have been much discussed over the last three years and are not investigated further here, despite their manifest importance to the overall picture. Other simplifications, potentially equally misleading, which have received much less attention, will be taken up instead.

The Standard Model's Two-Interest-Rate Mechanism

Formal expositions of the standard model are sometimes cast in terms of the interaction of two interest rates: the market rate, already discussed, at which agents are able to borrow to finance their expenditures, and what is often nowadays called the natural rate of interest, the real rate of interest that those same agents are willing to pay to finance a level of expenditure at which the output gap is zero. Expressed in these terms, the neutral value of the real market rate of interest is that at which it is equal to the real natural rate of interest, whose determinants underlie the relationships that link the output gap to the real market rate of interest.

Those same 19th century commentators who had so much to say about the role of the financial system were habitually vague about what determined the rate of interest that borrowers were willing to pay. Thornton himself simply referred to a rate of "mercantile profit" and, by and large, his immediate successors left matters there. It was only at the end of the 19th century that the Swedish economist Knut Wicksell (1898) probed systematically deeper, and explicitly identified this borrowing rate with the economy's long-run equilibrium rate of interest – this was already usually labeled the natural rate of interest in the 19th century – whose real (inflation-adjusted) value was thought of as

6 In the case of *ToTEM*, the Bank of Canada's policy oriented extension of the basic model, it is a long-term interest rate which influences expenditure, and this is in turn responds to the current value of, and expectations about the future time path of, the short rate.

being that at which investment would just match savings at full employment so that, to put matters in today's terms, there would be a zero output gap.[7]

Crucially, Wicksell saw incentives to investment spending as deriving from fundamental real (non-monetary) properties of that economy: namely, its endowments of productive resources, and the technology applied to them to produce output, and more specifically the real returns to capital that these generated. To these considerations, later commentators added, on the savings side, the motives underlying the population's decisions about the division of its income between consumption in the present and saving to provide itself with consumption in the future.

A Closer Look at the Natural Interest Rate

One of the most popular of those simplifications on which macroeconomics thrives involves analyzing the economy as if its output consists of a single good, and this simplification is routinely deployed in the standard model, as is the assumption that the economy behaves as if inhabited by a single representative agent. Economists should of course always ask whether the conclusions yielded by simplified models stand up when more complicated configurations are deployed, but exponents of today's two interest rate models of monetary policy have paid little attention to this question. This is unfortunate because the theoretical links between the Wicksellian concept of a natural rate of interest and the above-mentioned fundamentals of the real economy become impenetrably complex when these simplifications are given up.[8]

The Natural Rate of Interest in the Single Good Economy

To explore this matter further, let us start on the investment side. Suppose, to follow a well-worn 19th century example of a single good economy, often, but controversially, attributed to David Ricardo (1817), output consists of corn, and the capital stock of the same item, set aside both for seed and to support the labour force as it plants, tends and then harvests the ensuing crop. In this economy, the portion of output going to profits – we need not concern ourselves here with explaining what might determine this amount – can be divided through by the stock of capital to generate a number which has the dimension units-of-corn produced per annum per unit-of-corn employed as capital. Because dividend and divisor here are measured in terms of the same item – corn – this ratio can be reduced to a pure proportional rate of flow per annum, a rate of return to capital. It can then be argued, and in the case of today's single output models it still is, that this rate of return is a crucial factor driving investment decisions.

Saving and the Price of Time

Where this might lead, we shall see in a moment. But first it must be noted that there is more to economic life than production, and that the basic economic theory underlying today's models of monetary policy, in addition to treating endowments

7 It is a matter of some historical interest that Wicksell (1898) himself argued that this natural rate of interest had been unstable over the course of the 19th century, with deviations of its value from the market interest rate being responsible for the swings in long-run inflation that marked the epoch. The fact that the end of the deflationary episode that ran from the early 1870s into the mid '90s, and the beginning of a subsequent inflation that lasted until the outbreak of war in 1914 came immediately in the wake of the boost to gold production given by the introduction of the cyanide process, later caused him to soften his views on this matter.

8 Wicksell himself set an early and interesting example here of how to evade these issues, as Hans-Michael Trautwein (2011) shows. He had already explored some of the complexities to be discussed in a moment in his (1893) book, *Value Capital and Rent,* but in his (1898) *Interest and Prices*, from which modern approaches to the theory of monetary policy derive, he bypassed them by making just the right and extremely special assumptions needed to ensure that they did not impinge upon his analysis. In their otherwise extremely comprehensive discussion of the idea of a neutral real interest rate, Bernhardsen and Gerdrup (2007) do not take up these issues, and though the Bank of Canada's *ToTEM* moves beyond the single-good, single-agent case, it does not (at least yet) follow a path where it might encounter them. See fn. 11, below.

and technology as economic fundamentals that determine a rate of profit that drives investment decisions, also pays attention to the motives that underlie consumption and saving decisions.[9] In particular, it focuses on the rate of time preference, broadly speaking the interest rate by which agents discount future relative to current consumption when they make their saving decisions, and shows that market mechanisms enable the rate of return on capital to interact with this rate to determine the natural rate of interest.

The above qualifier "broadly speaking" invites clarification. Note first, therefore, that the comparison that matters in a saving decision is between the benefits sacrificed by a small reduction in today's consumption and those that are expected to accrue in the future as a result of this reduction. To use economist's jargon, the relevant comparison, and the resulting saving decision, is made on the margin. Note, second, that some factors can lead to a discount being applied to future increments in consumption that have nothing intrinsically to do with the passage of time. For example, someone expecting to be better off in the future will, for this reason alone, likely attach less value to an extra unit of consumption then than to one immediately available. Even so, it is plausible that, when we abstract from such differences, there is still reason to discount the future relative to the present. People are impatient, and the concept of pure time preference formalizes this trait so that it can be subjected to economic analysis. Economists sometimes call it "the price of time."

The upshot of bringing these ideas to bear on questions about savings behavior is that if, as they would were they accurately represented by a single individual, all agents discount future consumption at the same theoretically appropriate rate, market mechanisms will ensure that the rate of return on capital will converge on it, in the process determining the aggregate economy's real natural rate of interest. If the real natural rate of interest is indeed thus determined, independently of the actions of the monetary authorities, by such fundamentals as the motivations of agents, not to mention the technology and endowments of productive resources available to the real economy, and if these fundamentals can also be relied on to remain rather stable over time and are observable at the level of the aggregate economy, then perhaps this natural rate can be estimated and used to provide an anchor for the neutral value of the market rate of interest that lies at the heart of inflation targeting policies. This, at least, is one way in which attempts to use the standard model as a tool of practical policymaking have proceeded.[10]

Some Complications

Sadly, however, this story does not generalize when the standard model is extended to deal with an economy that produces a multiplicity of goods and is inhabited by a multiplicity of diverse agents, except in some empirically irrelevant special cases.[11]

9 Systematic consideration of these matters, which, for example, dominate Woodford's (2003) treatment of the standard mode, is a surprisingly recent development. Only in the early 20th century did Irving Fisher (1907) and Frank Ramsey (1928), make serious analytically explicit attempts to explain saving as an effort on the part of agents to maximize utility by smoothing out the time path of their consumption and hence as an activity potentially sensitive to variations in the rate of interest. Even in the second half of the 20th century, this approach was still sometimes ignored by those who followed John Maynard Keynes (1936) in treating the division of current income between consumption and saving as driven by a fundamental psychological propensity – i.e. a habit – rather than by a rational maximizing choice.

10 Bernhardsen and Gerdrup (2007) Section 5, provide a useful survey of the outcome of such endeavours, both at the Norges Bank and elsewhere.

11 The problems to be discussed here do not arise in a multi-good economy if the production processes used in each sector display the same degree of capital intensity. Significantly, though, in *ToTEM* output emanates from four distinct sectors, making it a meaningful multi-good economy as far as the analysis of terms-of-trade and import-price pass-through effects are concerned, this model imposes the same degree of capital intensity on all four of them. Murchison and Rennison (2006) suggest that this restriction will be relaxed as the model is developed further.

Heterogeneous Goods and the Rate of Return on Capital

The problems created by multiplicity and heterogeneity of the goods making up output and the capital stock become evident the moment we contemplate dividing the flow of real profits yielded by a stock of capital by the stock itself in order to generate a real rate of return to capital, because when those profits come in the form of goods different from those employed as capital, units of measurement no longer cancel out.[12] For example, if one sector of a multi-product economy uses trees to produce apples, and another vines to produce grapes, the rate of return in the former has the dimension of apples per annum per tree, and in the latter, grapes per annum per vine. These are not pure proportional rates of flow per unit of time and do not reduce to rates of profit or interest.

Nor does this problem vanish if we construct some index in terms of which output and the capital stock can both be measured prior to calculating a pure rate of profit. It simply turns up in another form. Just as an index of the price level is obtained by weighting the prices of individual items by appropriately selected quantity weights, so indices of the quantity of real output are obtained by using relative prices as weights. But it is one of the oldest results in the theory of relative prices – due to David Ricardo (in the 3rd 1821 edition of 1817) – that if the capital intensity of production processes varies across goods, then their relative prices vary with the rate of interest. Specifically, more capital intensive goods become more expensive as the rate of interest rises, and vice versa.

This result implies in turn, however, that the weights needed to construct an index that measures capital and output in the same units so as to produce a pure rate of return on capital, themselves depend upon the market rate of interest that we had hoped this very rate of return could be used to determine. Or to approach the same point in another way, if we are given market prices for apples and grapes, we have to use the rate of interest to value the trees and vines that produce them, and we can't then go on to use the results of this calculation to determine rates of return to capital in these activities as a basis for determining the interest rate in question. Approximate measures of capital and output based on index numbers of quantities can certainly be constructed, and might also have their uses therefore – we can leave it to others to argue about this in specific instances – but not as independent determinants of an economy's natural rate of interest. This is precisely how today's standard model of monetary policy invites us to deploy such data, however, despite these compelling micro-theoretic arguments against the logical validity of doing so.

Diverse Agents and Time Preference

Even so, if we maintain the assumption that all agents have the same constant rate of time preference, these problems with heterogeneous goods are not fatal to the standard model. This rate of time preference will tie down the economy's natural interest rate because the structure of relative prices among its many goods will move so as to ensure that the rate of return available in the production of each of them is equal to an interest rate given by this rate of time preference plus the economy's growth rate.

This result, however, does not extend to more complicated structures where agents are diverse in their tastes and opportunities, as a moment's thought makes clear.[13] What if different agents have different outlooks concerning the amount of

12 As Wicksell (1893) was aware, as has been noted; so,subsequently, were many others including, in alphabetical order, Gustav Cassel (1903), Franklin Fisher (1971) Irving Fisher (1907), Friedrich von Hayek (1941) John Maynard Keynes (1936), Erik Lindahl (1939), Gunnar Myrdal (1931), Joan Robinson (1953-54), and Piero Sraffa (1932). Debates about these matters have often carried a heavy political charge, but the issues at stake nevertheless concern the logic of economic models, not ideology.

13 *ToTEM* permits a limited degree of diversity among consumers, dividing as it does the population between those who have access to capital markets and can borrow for consumption, and those who do not and hence cannot. However, it permits no diversity or variation in the rate of time preference among agents.

consumption goods that will be available to them in the future? What if individuals' rates of pure time preference are not constant, but vary with their wealth – poorer people might, for example, be less patient than richer? What if individuals' rates of time preference vary with age, so that demographics affect its average value for the economy as a whole? But if agents are heterogeneous along any or all of the above lines, any economy-wide value for the rate of time preference will vary, among other things, with the prevailing distribution of income and wealth, and will therefore vary with the structure of relative prices.[14]

None of this means that, in equilibrium, there will be no such thing as a determinate economy-wide rate of return on capital and an economy-wide rate of time preference, but it does mean that these variables, and hence the real natural rate of interest, will find their values simultaneously within the system's overall structure of relative prices rather than being directly derivable from some deep relationships characterizing endowments, technology and tastes that are visible at the level of the economy as a whole and independent of the myriad factors that are constantly affecting the underlying structure of relative prices in any evolving economy. It is at least risky therefore, to accept the invitation, implicit in the standard model, to base monetary policy on the assumption of the real natural rate's essential stability.

Expectations and Relative Prices

It is nevertheless not quite enough to point to the above theoretical difficulties surrounding the concept of the real natural rate of interest to justify treating the standard modes of monetary policy with a degree of skepticism. There should also be plausible arguments that the factors giving rise to these difficulties are of practical importance.

The Importance of Heterogeneity

Variability over time in relative prices and the structure of output, as well in the distribution of income and wealth, are critical here, but these are prominent features of real world economies precisely because they produce many goods and are inhabited by many agents. And, it is worthwhile noting explicitly, any national economy such as Canada's is itself but a segment of a larger world-wide entity across which such forces are always at work.

The real rates of return that actually matter for private-sector investment and borrowing decisions, furthermore, even within the boundaries of the national economies for which today's inflation-targeting central banks make policy, are not those that agents have realized in the past or are realizing in the present, or will in fact eventually realize in the future, but those that they expect or hope to realize in the future, and from particular investments, too. In the real world, that is to say, would-be investors compare the market rate of interest at which they can borrow, not to some economy-wide average real rate of return, but to expected future real rates of return in specific sectors of the economy.[15]

Full equilibrium in such a multi-good, multi-agent economy requires that all plans for the level and composition of consumption now and in the

14 These considerations are particularly pertinent to analyses of inflation targeting, because of questions surrounding the so-called *non-super-neutrality* of money – the effects of expected inflation on real variables. (See, among others, Martin J. Bailey 1962, Harry Johnson 1969, Robert Mundell 1971, and Miguel Sidrauski 1967.) In a monetary economy, agents in the private sector hold stocks of real money balances and near-monies in portfolios that also contain real productive durable goods and/or claims on the real outputs that the latter yield, and the composition of those portfolios is likely to be sensitive to their expectations about the rate of inflation, which after all represents a (negative) rate of return on real stocks of money and near monies. At higher (lower) expected inflation rates, it is plausible to suppose that agents will tend to hold less (more) of their wealth in the form of money and near monies, and more (less) as productive durable goods. But this, in turn, is likely to result in lower (higher) real returns to the latter, changes in the economy's structure of relative prices, and hence in our interdependent aggregate measures of capital, output and the real (inflation-adjusted) rate of interest. Sidrauski's (1967) model used the assumption of an exogenously given economy-wide rate of time preference to produce a model in which money was super-neutral.

15 At this point once again, the role of potentially variable risk premiums as factors affecting the relationship between market and natural interest rates, alluded to above but beyond the scope of this paper, would enter the picture.

future be compatible with all plans for the level and composition of production, and when they are, an equilibrium – natural – value for the real rate of interest can also be calculated, in principle at least, by using these relative prices to generate an index in terms of which the overall volumes of production and of the capital stock may be measured. If however, this economy is constantly exposed to shocks to technology, and perhaps to tastes as well, and hence a constantly changing array of future consumption and production opportunities, it will not usually have time to settle at such an equilibrium characterized by a single natural interest rate. Rather, rates of return in expanding sectors will usually exceed those in contracting sectors, thus inducing resources to move among them. There will of course, still exist at any moment some level of the real (inflation-adjusted) market rate of interest that would induce just the right overall amount of current saving to provide for the economy's overall demand for investment, but there is no reason to think that this rate will remain constant, let alone be equal to some real natural rate of interest uniquely dependent upon unchanging elements in the economy's structure.

Expectations, Borrowing and Spending Decisions

We cannot therefore rule out the possibility that the complexities of an evolving multi-good, multi-agent economy create scope for investors' instincts, hunches, even what Keynes (1936) called their "animal spirits," to play an occasional role in investment and borrowing decisions. Furthermore, since the prospects for the future profitability of any one line of investment depend on the likely market for whatever it is going to produce, and since the state of that market is in turn likely to depend, among other things, on whatever borrowing and investment decisions others are now taking, it is not obviously irrational for individual decision-makers to take note of the perceptions underlying the activities of others and to factor them into their own decisions. Thus, the effects of instincts, hunches and animal spirits, if they do come into play, can be contagious and cumulative too.

In short, the idea that reliable links are always in place between the "rate of mercantile profit" as Thornton called it, and a natural interest rate grounded in the fundamentals of the real economy, such as the modern theory of monetary policy relies on, is hard to swallow once we take heterogeneity seriously. It is not necessary to believe that investment and borrowing decisions are always dominated by psychological factors also to believe the following: first, that the rate of interest dominating the borrowing side of financial markets can sometimes differ from the real equilibrium value implicit in fundamentals; and second, that when such a discrepancy does arise, it is this psychologically conditioned real borrowing rate, and not one related to fundamentals alone, that sets the benchmark relative to which the monetary authorities must move the real market rate of interest as they seek to maintain or restore the targeted inflation rate. This rate of interest can be hard to estimate even at the best of times, let alone in the wake of a major shock to asset markets such as was so recently experienced, so it is hardly surprising that sharp disagreements about the appropriate present and future stance of monetary policy could have arisen in recent years and still persist.

Summary and Policy Implications

The main substantive conclusions of this essay for today's debates about monetary policy are easily stated.

There Are No Short-cuts to Estimating the Neutral Rate of Interest

When the central bank seeks to hit a single target – the inflation rate – by controlling a single instrument – the overnight rate – the latter can be set too low, and cause inflation to rise above target, or too high, and cause inflation to fall, or set at a nominal neutral level that will generate stable inflation. However, that neutral value cannot safely be estimated by adding expected inflation,

presumably equal to the central bank's target rate, to some unique real (inflation- adjusted) rate of interest that reflects so-called "deep" parameters of an aggregate representation of the real (non-monetary) economy. In any actual economy, as opposed to a one-good, one-agent model economy, estimates of any such aggregate parameter are not the products of the logic of economic theory, but of empirical best guesses that will often be all that policymakers have to go on.

Expectations Unrelated to Fundamentals Sometimes Matter

The real natural rate of interest is determined simultaneously with all the other relative prices in the economy and there is no feasible way of finding out enough about that economy's structure to enable us to calculate it. In an evolving economy, moreover, changing differences among real rates of return in different activities are of the essence. Expected rather than actually realizable rates of return are what matter for private-sector expenditure and borrowing, and divergences here can be very hard to identify when they arise. When they do arise, however, monetary policy must in any case respond to expectations if it is to keep credit and money growth on time paths that will neither feed asset-market booms (or slumps) nor overall price inflation (or disinflation). The neutral value of the real market rate of interest is thus not always equal to the real natural rate, and even if remarkably well-informed policymakers could in fact calculate the latter, this would still not always provide them with sufficient information to guide their policies.

Monetary Policy is Therefore Difficult

In short, monetary policy, even under a regime with so simple a goal as an inflation target, is difficult, and not susceptible to being reduced to simple rules or principles, such as, for example, the widely recommended Taylor principle mentioned earlier. That a deviation of inflation from target should attract policymakers' attention, and that a response to it should be considered, are uncontroversial matters, but whether there should in fact be a response, and of what size, can only be settled once prior questions about what has or has not happened to the expected rate of mercantile profit have received at least a tentative answer.

Observations of realized aggregate variables such as the inflation rate, output, employment, etc. etc., can certainly help with such a diagnosis, but it is hard to avoid the conclusion that disaggregated survey data on, for example, the expectations and expenditure plans of firms and households, and the likelihood that these will be acted upon, are at least as useful. Factors provoking variations in the economy-wide neutral rate of interest, to which policy must respond, are likely to be signaled by such data, to which central banks, the Bank of Canada included, already pay careful attention. Furthermore, because the neutral value of the real market rate of interest is susceptible to hard-to-observe and even harder-to-quantify variations, any monetary policy regime that relies solely on central bank control of market interest rates to achieve inflation-rate stability is open to the suspicion of putting too many eggs in one basket. This consideration used to form a large part of the case for having central banks also pay attention to such variables as the growth rates of money and credit aggregates. It still supports this case, as Bergevin and Laidler (2011) have recently argued.

So the Bank of Canada Might Be On the Right Track After All

In this essay I examine the robustness of the concept of the neutral value of the interest rate, which figures prominently in current debates about Bank of Canada policy. I do not argue the specifics of Bank policy, but I do see their practicalities as hinging on the following considerations. Nominal and real interest rates are extremely low by historical standards, particularly for an economy experiencing an uncomfortable spike in headline inflation, and which is apparently within a year of returning to full employment.

These facts, when interpreted in the light of today's standard model of monetary policy, suggest that administered interest rates need raising. On the other hand, the incipient tightness revealed by

recent survey data, in some areas of the economy, does not yet seem to signal an imminent upswing in long-term inflationary pressures, and the growth rates of narrow and broad monetary aggregates have, if anything, been slowing down.

These factors suggest that the need to raise rates is not urgent. Accordingly, the less weight is given to the logic of the standard monetary policy model – in which the neutral interest rate concept plays a pivotal role – and the more weight to less formal indicators, the more coherent and reasonable does the Bank of Canada's current, unhurried, policy stance, on whose intellectual underpinnings it has elaborated in Technical Box 2 appended to the July Monetary Policy report, appear to be.

References:

Bailey, M. R. 1962. *National Income and the Price Level*. New York: McGraw Hill.

Bank of Canada. 2011. "Technical Box 2 – Headwinds, Tailwinds and the Policy Rate." Monetary Policy Report, July 2011, pp. 28-29.

Bergevin, P., and D. Laidler. 2010. *Putting Money Back into Monetary Policy: a Monetary Anchor for Price and Financial Stability*. Commentary 312, Toronto: C.D. Howe Institute.

Bernhardsen, T., and K. Gerdrup. 2007. "The Neutral Real Interest Rate." *Norges Bank Economic Bulletin*, 78:2, 52-64.

Bliss, C., A Cohen, and G. Harcourt (eds.). 2005. *Capital Theory, 3 Vols*. Cheltenham: Edward Elgar.

Cassel, G. 1903. *The Nature and Necessity of Interest*. London: Macmillan.

Cohen, A., and G. C. Harcourt. 2003. "Whatever Happened to the Cambridge Capital Theory Controversies?" *Journal of Economic Perspectives*, 17 (Winter) 191-214.

Fisher, F. 1971. "Aggregate Production Functions and the Explanation of Wages," in C. Bliss, A. Cohen, and G. Harcourt (eds.). 2005. *Capital Theory, 3 Vols*. Cheltenham: Edward Elgar.

Fisher, I. 1907. *The Rate of Interest*. New York: Macmillan.

Hayek, F. A. von. 1931. *Prices and Production*. London: Routledge.

————————. 1941. *The Pure Theory of Capital*. London: Routledge and Kegan Paul.

Johnson, H. G. 1969. "Inside Money, Outside Money, Income Wealth and Welfare in Monetary Economics." *Journal of Money, Credit and Banking* 1 (Feb.) 30-45.

Keynes, J. M. 1936. *The General Theory of Employment, Interest and Money*. London: Macmillan.

Laidler, D. 1999. *Fabricating the Keynesian Revolution: Studies in the Inter-war Literature on Money, the Cycle, and Unemployment*. Cambridge: Cambridge University Press.

Lindahl, E. 1939. *Studies in the Theory of Money and Capital*. London: Allen and Unwin.

Mundell, R.A. 1971. *Monetary Theory*. Pacific Palisades: Goodyear.

Murchison, S., and A. Rennison. 2006. "ToTEM: the Bank of Canada's New Quarterly Projection Model." *Technical Report 97*, Ottawa: Bank of Canada.

Myrdal, G. 1931. *Monetary Equilibrium* (tr. 1939, with revisions). London: W. Hodge.

Ramsey, F. P. 1928. "A Mathematical Theory of Saving," as repr. in C. Bliss, A. Cohen and G. Harcourt (eds.). 2005. *Capital Theory, 3 Vols*. Cheltenham: Edward Elgar.

Ricardo, D. 1817. *Principles of Political Economy and Taxation* (3rd ed 1823), London.

Robinson, J. 1953-4. "The Production Function and the Theory of Capital," as repr. in C. Bliss, A. Cohen and G. Harcourt (eds.). 2005. *Capital Theory, 3 Vols*. Cheltenham, Edward Elgar.

Sidrauski, M. 1967. "Rational Choice and Patterns of Growth in a Monetary Economy." *American Economic Review*, 57 (May) Papers and Proceedings, 534-544.

Sraffa, P. 1932. "Dr. Hayek on Money and Capital." *Economic Journal* 42 (March) 42-53.

Taylor, J. 1993. "Discretion Versus Policy Rules." *Carnegie-Rochester Conference Series on Public Policy*, 39: 195-214.

Thornton, H. 1802. *An Enquiry into the Nature and Effects of the Paper Credit of Great Britain*. London.

Trautwein, H-M. 2011. "Old Swedes about Money and Capital." University of Oldenberg, mimeo.

Wicksell K. 1893. *Value Capital and Rent*, (tr. S. Frowen 1965). London: Allen and Unwin.

————————. 1898. *Interest and Prices*, (tr. R.F. Kahn, 1936 for the Royal Economic Society). London: Macmillan.

————————. 1907. "The Influence of the Rate of Interest on Prices." *Economic Journal* 17 (June) 213-220.

Woodford, M. 2003. *Interest and Prices*. Princeton, N. J.: Princeton University Press.

July 2011	Dachis, Benjamin, and Donald N. Dewees. "Plugging into Savings: A New Incentive-Based Market Can Address Ontario's Power-Surplus Problem." C.D. Howe Institute E-Brief.
July 2011	Parkin, Michael. "Overnight Moves: The Bank of Canada Should Start to Raise Interest Rates Now." C.D. Howe Institute Backgrounder 139.
June 2011	Poschmann, Finn, and Alexandre Laurin. "The Time is Still Right for BC's HST." C.D. Howe Institute E-Brief.
June 2011	Dobson, Wendy. "Does Canada Have an India Strategy? Why it Should and What Both Sides Can Gain from Comprehensive Talks." C.D. Howe Institute Backgrounder 138.
June 2011	Loyns, Al, and Richard Pedde. "Pulling the Plug on Monopoly Power: Reform for the Canadian Wheat Board." C.D. Howe Institute E-Brief.
June 2011	Coulombe, Serge. *Lagging Behind: Productivity and the Good Fortune of Canadian Provinces.* C.D. Howe Institute Commentary 331.
June 2011	Robson, William B.P. "Don't Double Down on the CPP: Expansion Advocates Understate the Plan's Risks." C.D. Howe Institute Backgrounder 137.
May 2011	Dachis, Benjamin, and Jan Carr. "Zapped: The High Cost of Ontario's Renewable Electricity Subsidies." C.D. Howe Institute E-Brief.
May 2011	Chant, John F. "Strengthening Bank Regulation: OSFI's Contingent Capital Plan." C.D. Howe Institute E-Brief.
May 2011	Laurin, Alexandre, et Finn Poschmann. "Que sont devenus les taux effectifs marginaux d'imposition des Québécois?" C.D. Howe Institute E-Brief.
May 2011	Laurin, Alexandre, and Finn Poschmann. "What Has Happened to Quebecers' Marginal Effective Tax Rates?" C.D. Howe Institute E-Brief.
May 2011	Brubaker, Elizabeth. *A Bridge Over Troubled Waters: Alternative Financing and Delivery of Water and Wastewater Services.* C.D. Howe Institute Commentary 330.
May 2011	Koeppl, Thorsten V. *Time for Stability in Derivatives Markets – A New Look at Central Counterparty Clearing for Securities Markets.* C.D. Howe Institute Commentary 329.
April 2011	Richards, John. *Aboriginal Education in Quebec: A Benchmarking Exercise.* C.D. Howe Institute Commentary 328.
April 2011	Richards, John. *L'éducation des Autochtones au Québec : Un exercice d'analyse comparative.* C.D. Howe Commentaire 328.
April 2011	Laurin, Alexandre, and Finn Poschmann. "What's My METR? Marginal Effective Tax Rates Are Down – But Not for Everyone: The Ontario Case." C.D. Howe Institute e-brief.
April 2011	Dodge, David A., and Richard Dion. *Chronic Healthcare Spending Disease: A Macro Diagnosis and Prognosis.* C.D. Howe Institute Commentary 327.
April 2011	Dodge, David A., and Richard Dion. *La maladie chronique des dépenses en soins de santé: un diagnostic et un pronostic macroéconomiques*. Institut C.D. Howe Commentaire 327.
April 2011	Busby, Colin, and William B.P. Robson. *A Social Insurance Model for Pharmacare: Ontario's Options for a More Sustainable, Cost-Effective Drug Program.* C.D. Howe Institute Commentary 326.

SUPPORT THE INSTITUTE

For more information on supporting the C.D. Howe Institute's vital policy work, through charitable giving or membership, please go to www.cdhowe.org or call 416-865-1904. Learn more about the Institute's activities and how to make a donation at the same time. You will receive a tax receipt for your gift.

A REPUTATION FOR INDEPENDENT, NONPARTISAN RESEARCH

The C.D. Howe Institute's reputation for independent, reasoned and relevant public policy research of the highest quality is its chief asset, and underpins the credibility and effectiveness of its work. Independence and nonpartisanship are core Institute values that inform its approach to research, guide the actions of its professional staff and limit the types of financial contributions that the Institute will accept.

For our full Independence and Nonpartisanship Policy go to www.cdhowe.org.

C.D. Howe Institute
67 Yonge Street
Toronto, Ontario
M5E 1J8

Canadian Publication Mail Sales
Product Agreement #40008848