Inflation Targeting in Canada: Optimal Policy or Just Being There?*

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1 Introduction

David Laidler has had the good sense not to have taken too seriously the notion that people are rational maximizers, always acting under rational expectations. One of the central themes of his work is that money is a device for economizing on the costs of processing information. People use it as a buffer stock that automatically absorbs unforeseen changes in income and expenses without the need for deliberation. They also use it as a unit of account, measure of value and standard of deferred payment because it is convenient to use, conventional and easily understood, even if this seems to introduce biases and inefficiencies into their decision making and even if economists can think of better measures and standards.[1]

In this respect David stands apart from the mainstream of macroeconomics, which has been characterized over the years by what he has called an irrational passion for dispassionate rationality. But unlike many other critics of unbounded rationality, David does not put his ideas forth as an attack on free market economics. On the contrary, he has insisted that money is part of the institutional mechanism that helps a decentralized market economy to coordinate people's activities. For example, when demand increases in some sectors and decreases in others, one of the first signals that dealers receive is an unanticipated change in cash holdings. Until it is clear that this is going to be permanent, or at least more than momentary, there is no point in changing production, employment or pricing decisions. Buffer stocks allow firms to keep these activities on schedule without having to make portfolio adjustments every minute of every day, adjustments that would disrupt economic activity in other markets, causing disequilibrium to spread through the system.

To assume that people use convenient heuristic devices for arranging their affairs in an uncertain world is not to say that they lack intelligence. On the contrary it is to say that they are smart enough to realize the folly of acting always in Bayesian fashion by fabricating a model of the world and choosing a plan that would be optimal under the incredible assumption that the model was a true representation of reality. Not only would

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[1]For example, Laidler (1974, 1984, 1988, 1993).

this be likely to lead them astray, but Bellman's curse of dimensionality would render the task of computing a solution infeasible by any imaginable 21st Century computer unless the model was made tractable by other convenient heuristic devices, like assuming all agents identical, only two possible states of the world, Cobb-Douglas aggregate production functions, and so forth.

Coping with economic life in an economy that mystifies even those of us paid the most to understand it requires simple, robust behavioral rules that are easily implemented and well adapted to one's economic environment, not cumbersome ones whose success depends on far-fetched assumptions. The adjustment mechanisms of a modern economy are largely driven by such rules. Taking money seriously, as David has argued, involves looking at the role that money plays in these mechanisms and rules, a role that has evolved differently across time and space depending on particular historical circumstances.

The adaptive, historically bound nature of human behavior that David has portrayed in his writings on money is also at the heart of the philosopher Andy Clark's book, "Being There: Putting Brain, Body and World Together Again", an account of recent developments in cognitive science and artificial intelligence, developments exemplified by the idea of "neural networks." Clark's thesis is that human intelligence is not to be thought of as an abstract reasoning capability joined to a memory bank of facts, but rather as a device for controlling the body's varied set of adaptive behaviors in a way that helps the body cope with the particular environment it finds itself in.

Clark calls this view "embodied, environmentally embedded cognition." It portrays intelligence not as a central computer program solving a well defined maximization problem but as a decentralized network of autonomous neurons that interact with each other, often sending conflicting messages, and often competing to execute the same task. Intelligence emerges not from the capacity to solve planning problems but from simple chemical reactions that reinforce the neural responses that have been associated with improvements in the body's well being and weaken the responses that have not.

Clark points out that what sorts of neural reactions constitute an improvement is not something that one can evaluate independently of the environment in which the body finds itself, or independently of what other processes are at work. He also points out that the intelligent human is always working to economize on neural resources by manipulating the environment, as when we tie strings around our fingers or make entries on a to-do list in order to remember facts which a computer-like mind would have stored internally; he might have added that the intelligent human relies also on money as a way of coping with an uncertain future and keeping track of material resources. Finally, Clark points out that the process of human adaptation is not guided by an internal model of the world which the brain takes as defining the constraint set for optimization, but rather it consists of simple rules for acting in ways that cope quickly and effectively with environmental hazards such as the presence of predators, the need for food, and so on; these rules may sometimes make use of internal representations but typically they need to operate much faster than the construction and use of any such representation would allow, just as people need to make economic decisions faster than would be possible by the use of dynamic programming.

The title of Clark's book derives from a quotation that he attributes[2] to Woody Allen: "Ninety percent of life is just being there." The idea is that intelligence depends not just on a person's internal capabilities, which are inherently limited, but also on the external physical and cultural environment, which contains external devices which the mind can use as props, to be manipulated with clever tricks and strategies. Thus: "Language and culture...emerge as advanced species of external scaffolding 'designed' to squeeze maximum coherence and utility from fundamentally short-sighted, special purpose, internally fragmented minds." One of David's contributions to economics is to point out how money plays just such a scaffolding role.

In this essay I argue that the adaptive model of human behavior which Clark presents

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[2]Clark's attribution to Woody Allen seems to be incorrect; according to all the references found in a Google search, Allen is reported as having said something like "80 percent of success in life is just showing up." But perhaps the cinematic reference is nonetheless apt in the present case, because "Being There" is the title of a movie in which a simpleton played by Peter Sellers was taken by everyone as being a genius.

sheds useful light on much else that David has written about, not only monetary theory but also monetary policy, its interrelationship with monetary theory, the evolution of Canadian Monetary Policy, and most particularly the policy of inflation targeting which the Bank of Canada and many other central banks around the world are now practicing.

2   Monetary Policy and Adaptation

2.1   The two tasks of monetary policy

A central bank is the sole issuer of the base money on which a country's monetary and financial systems rest. Because of this it has two central tasks to perform. First, it needs to ensure that the supply of base money varies enough from day to day so as to avert financial panics and collapses of the sort that used to characterize the seasonal shortages of means of payment in the United States in the 19th and early 20th centuries and the periodic banking crises in England in the 19th century. This task requires a central bank to stand ready to act as lender of last resort from time to time. It also requires the central bank to stand ready on a regular basis to buy or sell short-term financial instruments at prices that do not fluctuate wildly from day to day. In effect, a central bank oversees a country's money market in much the same way, and for much the same reason, that more conventional commercial enterprises manage the markets for the products they buy and sell. That is, to make the market function efficiently it must provide assurance to other transactors that they can trade when they want, on reasonably predictable terms.

The other task of a central bank is to ensure the long-run value of the monetary unit. To use a well worn metaphor, a central bank is the only agent in an economy in a position to provide a "nominal anchor" for the unit in terms of which contracts are written, accounts are kept and prices are quoted. It does this by controlling the growth in the supply of base money.[3] We have known since Edgeworth, Wicksell and Keynes that unless the supply of

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[3]This is not to say that the central bank must use the base as its instrument. On the contrary, operating

base money is controlled, the overall supply of money and credit cannot be controlled, and we have known for even longer that unless the supply of money is controlled the price level cannot be controlled.

Frequently these two central tasks of a central bank conflict with one other. To maintain a well-functioning money market the bank must often dampen interest-rate fluctuations by expanding or contracting the monetary base to meet the market's day-to-day demands. But to avoid long-run inflation it must not supply whatever is demanded without limit. Thus there is a constant tension between the two tasks.

In carrying out this difficult balancing act, a central bank must deal with three major sources of difficulty: interference from partisan political interests, an ever-diminishing ability to control nominal spending, and lack of understanding of the process by which its own actions affect the course of the price level.

2.2 Politics and central banking

As for political influence, the central banks that have been most successful in controlling inflation have been those with the greatest degree of independence from the executive and legislative branches of government, like the late 20th-century central banks of Germany and Switzerland.[4] The simplest explanation for this phenomenon is that governments find it hard to resist demands for deficit spending when they can rely on a central bank to finance the deficits by printing money, whereas the costs of inflation that might result from increased monetary expansion may lie too far in the future to influence their decisions.

Central bankers that do not enjoy such independence often spend much of their time and effort finding ways to gain some degree of de facto autonomy that would help insulate them from political pressure. The infamous Coyne affair presents a case in point. When it was resolved by the resignation of the governor, his successor, Louis Rasminsky, took

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directly on the base would conflict with the obligation to maintain a well-functioning money market, especially when, as is now the case in Canada, the base consists entirely in notes. The point is just that whatever instrument the central bank uses must have the effect of limiting the growth rate of the base.

[4]See Bade and Parkin (1987).

office only after securing agreement from the government concerning the nature of the joint responsibility of the Bank and the government for the conduct of monetary policy. A crucial part of this agreement was the "directive clause," according to which if ever the governor and the minister of finance were unable to resolve their differences in private, the Minister could exert ultimate authority, but only by issuing a directive that was to be tabled in the House of Commons. Moreover, the directive would have to specify exactly what instructions the Bank was required to follow, and it would have to specify a limited time period during which the instructions would be binding on the Bank. Although this clause affirmed that the Bank was de jure subordinate to the minister of finance, all the more so because of the implicit understanding that a governor faced with such a directive would have no choice but to resign, nevertheless it can be argued that it enhanced the Bank's independence in the sense of making it more difficult for a government to exert pressure on the Bank to pursue inflationary policies for partisan political reasons, the sort of pressure from which the Bank is most in need of protection. That is, the threat of dismissal would not be a very credible one with which to exert such pressure because the government would be required to make its reasoning explicit and very public.[5]

2.3   Monetary control

The ever diminishing control over nominal spending that I identified above as the second major difficulty that central banks must deal with arises because of the increasing depth and sophistication of financial markets in advanced countries. Because of these developments, the base money that a central bank controls is a vanishing part of a country's entire stock of liquidity. This poses the question of how a central bank can continue to provide a nominal

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[5]There are other levers by which a government might still exert such pressure, as John Crow (2002, ch.2) observes, because of its power to veto a governor's appointment or reappointment and to disapprove salary increases for the governor and deputy governors, but presumably the elimination of one possible lever does help to insulate the Bank to some extent from the pressure.

Crow also rejects Pierre Fortin's (1996) claim that "No sane minister of finance would ever dare start such a process", on the grounds that there might indeed by circumstances under which a sane minister could produce a well thought-out directive. But it seems unlikely that these circumstances would include cases in which the minister was trying to engineer an inflation without having to pay a price in the short run.

anchor to a system which is coming more and more to resemble Wicksell's imaginary pure credit economy.

When the Bank of Canada wants to tighten monetary conditions it raises the "operating band" whose upper limit is the bank rate and whose lower limit is the rate the Bank will pay on positive balances of participants in Canada's Large Value Transfer System (LVTS).[6] This effectively raises the overnight interest rate. If tightness is expected to persist, a chain of substitution will transmit the rise to other interest rates. In turn this rise in domestic interest rates will produce at least an incipient rise in the demand for Canadian dollars on the foreign exchange market as investors shift from foreign to Canadian securities, and the result is likely to be a stronger Canadian dollar.

By affecting interest rates and the exchange rate, Bank of Canada actions can thereby exert an influence on the flow of aggregate expenditures. Businesses and households facing higher interest rates and/or tougher credit terms will tend to spend less. Businesses, including financial intermediaries, will also be less willing themselves to grant credit to their customers, which will reinforce the effects on expenditures by reducing the overall availability of credit[7] in the economy. How this works will depend very much on how expectations react to the tightening of policy. If investors take the tightening as a signal that the Bank is resolved to stem potential inflationary pressures that will require it to maintain its stance for some time, the anticipation of persistent tightening will hasten and amplify the rise in other interest rates and in the exchange rate.

Without supportive expectations, however, a central bank has only limited scope for controlling the level of aggregate expenditures. If no one thought that interest rates beyond the overnight rate would be affected by the Bank's tightening, there would be little effect on the longer-term interest rates that influence spending decisions in the economy. Nor would there be any point in the Bank trying to intervene directly in longer-term asset markets

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[6]For a simple description of how the Bank of Canada operates under the LVTS, see Howard (1998).

[7]By "availability of credit" I mean the non-interest terms on which financial intermediaries are prepared to lend, such as credit limits, collateral requirements, allowable debt-service ratios, minimum monthly payments, etc., many of which become more restrictive when monetary policy is tightened.

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with the hope of affecting those rates through open market operations without supportive expectations, because financial market have grown too large in relation to the Bank's balance sheet. Thus to produce a major effect the Bank must make people believe that the tightening it induces by raising the operating band will continue until it does have an effect. In other words, the "announcement effect" of monetary policy is becoming more and more the primary channel through which a central bank can control aggregate spending.

2.4   Understanding the economy

This announcement effect is a psychological phenomenon that rests on prevailing opinion. Exactly how it works is not something that we clearly understand, which leads me to the third major difficulty of central banking, namely the difficulty of knowing how central bank actions (and pronouncements) affect the ultimate objectives of policy. For we do not have a good idea of how variations in interest rates, exchange rates, the supply of liquid assets, the availability of credit, and the other variables that are more or less directly affected by monetary policy in turn affect the level of aggregate demand in the economy. Nor do we understand in much detail how variations in aggregate demand affect the overall level of economic activity and the course of the price level. On the basis of accumulated evidence we can assert confidently that monetary policy affects these ultimate targets with a long and variable lag, but that isn't much help in negotiating the narrow path between meeting the needs of trade and controlling inflation.

Consider for example what we know about the price level. Almost any undergraduate textbook you can find nowadays will tell you that it is determined by the intersection of an aggregate demand curve and an aggregate supply curve. But when you probe the under-pinnings of these aggregate constructions you find little reason to believe in their existence. Why, for example, should the aggregate amount of planned expenditures be a decreasing function of the price level? Certainly not because of the quantitatively insignificant Pigou effect. Instead the textbooks typically rely on the Keynes effect; as the price level falls, then

the real supply of money in the economy will be larger in relation to its demand,[8] and this in turn is supposed to cause interest rates to fall, thus inducing an increase in investment expenditures.

A cursory examination of the literature on investment demand shows, however, that of all the purported determinants of investment demand, the rate of interest is the one whose effect can be identified with the least confidence. Moreover, what reason do we have for thinking that the rate of interest responds to the excess demand for money rather than the excess demand for loanable funds? In any event, since the dominant element of "money" in a modern economy is trade credit rather than the bank money recorded in official statistics, why should we think that a rise in the price level would not be offset by an endogenous increase in money? The one thing we can be sure of is that a rise in the price level will result in a real transfer of wealth from creditors to debtors, because of the ubiquity of nominally denominated debt contracts. But this effect seems far more likely to result in a rise in expenditures than a fall.

Direct evidence on the price-formation process[9] suggests that the most common strategy of price-setters is that of full-cost pricing. Individual prices are typically set as a fixed mark-up over a long-run average of per-unit cost. The major exceptions to this rule arise in the case of import prices, which are often "priced to market," and in the case of basic commodities whose prices vary daily on organized exchanges. Thus it seems that the first place in which a change in aggregate demand would affect the overall level of prices would be through its effects on basic commodity prices and on labour costs that respond to fluctuations in the derived demand for labour. However, volatile commodity prices typically have a small weight in a comprehensive measure of the price level, and the subsequent feedbacks on the price

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[8]This excess supply is purely momentary in the textbook IS-LM analysis, according to which the rate of interest adjusts rapidly to equate the supply and demand for money. By contrast, the "active-money" approach that David Laidler has been proposing (see Laidler, 1999b, for a recent exposition) implies that the excess supply would persist for much longer, since the rate of interest adjusts only far enough to equate the supply and demand for loanable funds. The adjustment process implied by Laidler's analysis is considerably more complex than that of the textbooks, and as Laidler has acknowledged there is much about it that we do not yet understand.

[9]See Blinder et al. (1998) for example.

level that work through costs of manufactured goods to which these commodities are an intermediate input are slow to develop because most price setters do not want their prices to vary with every short-run fluctuation in costs. And the effects on wage costs are typically slow to develop because of the prevalence of long-term nominal contracts in labour markets.

Even after basic commodity prices and wages have started to respond to the rise in aggregate demand, the price level may still not be affected, because of the fixed overhead costs prevalent in manufacturing. That is, since the typical firm operates under conditions of decreasing average cost, the rise in demand will at first cause unit costs to fall, not rise. An increase in basic commodity prices and labour costs will offset this, but it will have to persist for a long time before a lot of firms will perceive that, all things considered, they have experienced a significant and persistent enough rise in unit cost to warrant raising their own prices.

Moreover, once a significant number of prices start to rise, because price-setting is not synchronized, and because the main element of cost to most firms is the price of the intermediate goods they buy from other firms, the response of the overall level of prices will be drawn out over a long period of time. Each firm will wait until enough of its own suppliers have raised their prices by enough, and for long enough, before reacting. What appears like a small delay at the individual level can easily amount to a very attenuated process when aggregated.[10] Because of this, the response of the overall price level, far from being the instantaneous equilibration of demand and supply, will be a delayed and sluggish response to changes in demand and supply. This sluggishness will be amplified by the fact that workers will respond after the fact to rises in the cost of living, and to each others' wages, by insisting on ex post compensation in the form of higher wages for themselves. Every step in this multidimensional wage-price spiral takes time. Thus, as countless econometric studies have confirmed, inflation will be a highly inertial process – hard to get started and hard to slow down once started.

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[10]On the mechanics of such processes see Blanchard (1986).

The story I have sketched above sounds reminiscent of the augmented Phillips curve of textbooks, according to which inflation will accelerate whenever unemployment is below its natural rate. However, the bulk of econometric evidence presented in the recent symposium on the Phillips curve published in the Winter, 1997 issue of the Journal of Economic Perspectives provides almost no support for the simple relationship described in the textbooks. Nor does it offer any good empirically supported alternative analytical framework for understanding in detail what determines the course of inflation.

2.5   Central banks as adaptive agents

In summary, central banks are faced with the problem of trying to regulate a variable (the rate of inflation) whose variations they cannot control except with a long and poorly understood lag and with an uncertain degree of control, and whose movements, once begun, are exceedingly difficult to reverse. They cannot just react ex post to unwanted changes in the variable, because once a significant inflation has arisen it is too late to avoid many of the consequences. They must instead try somehow to anticipate those movements. And the only way this can be done is to search for "leading indicators," that is for statistical clues that will allow them better to foresee incipient trends in inflation.

Over the years this has led central banks to adopt different strategies using the level of market interest rates, measures of liquidity, exchange rates, the term structure of interest rates, the money supply, commodity prices, measures of unit labour costs, monetary-conditions indices . . . , in their search for a solution to their dilemma. They have followed fads in monetary theory, have deployed various econometric techniques to estimate the temporal structure of the wage price spiral, and so forth. In doing so they have been adapting to new experience and to developments in economic theory, which in turn have adapted to these different policy experiments. Moreover, the economy about which central banks are trying to learn keeps changing. Indeed, not only has there been extensive technological change taking place in finance and commerce, but the very attempt to use leading indicators

in the control of inflation has degraded the quality of these indicators, in accordance with the "Lucas critique." As central banks adjust to evidence about the economy, the economy adjusts to these attempts.

Thus a central bank is constantly engaged in a social process of adaptation and learning, a process in which it is just one of the actors, and in which none of the participants has a clear understanding of how the process works or how it is evolving. Some economists would argue that as a profession we have little to say about such a process. And while there is considerable truth in this view, it does not imply that macroeconomists should focus their attention on other aspects of the economy. For the same can be said about almost any other aspect of the working of an economic system taken as a whole. Somehow or another, free enterprise economies have developed mechanisms by which economic problems get solved through the decentralized actions of countless individuals, each acting on the basis of private information and motivation, and none of them with a clear understanding of the overall system in which their actions play a part. We might not yet have much understanding of how this works. But at least we can try to learn from experience.

The same can also be said of central banks, except that they can go one step further. They can try to learn not just from experience but also from experimentation. And that is what has happened over time, as central banks around the world have experimented at various times with monetary targeting, interest-rate pegging, exchange rate control, inflation targeting, etc. Moreover, it appears as if they have learned something along the way, at least to judge by the way that inflation has come down in the past two decades in almost all OECD countries, to the point where inflation ceases to be a major concern, outside of the financial markets in which participants eagerly await inflation statistics not because inflation is a major problem but because it might allow them better to anticipate movements in monetary policy and hence movements in the interest rates and exchange rates affected by central bank actions.

In this respect central banks are aptly characterized by Clark's adaptive model of be-

haviour, since they must find rules of operation that react quickly to ongoing developments, and adapt to changing circumstances, without the aid of a reliable internal representation of reality. The job of central banking is not just to find the right model of the economy and use it to compute optimal instrument settings but rather to design mechanisms for controlling how its instrument settings are going to be regulated, mechanisms that will not just be appropriate for a particular environment but which will also adapt to an environment that changes unexpectedly, often in response to its own changes.

This is why even though all central banks in the world make extensive use of macroeconomic models in the process of instrument setting, the model is typically just one input to the process, often supplemented or even overridden by judgement and informal analysis.[11] It is also why the models being used keep evolving over time - in Canada from RDX2 to QPM and now TOTEM, a "dynamic stochastic general equilibrium" model much like those in one stage or another of development in just about every central bank in the world.

Moreover, just as the neurons being controlled by human intelligence often send conflicting messages that need to be resolved quickly into an action, so the various departments and officials of a central bank often send conflicting messages, and some method must evolve for resolving these into real-time action. All this in a hazardous external political and economic environment that must somehow be manipulated to if the limited and fragmented intelligence embedded within the institution is to result in coherent outcomes.

2.6   The case for discretion rather than rules

The main implication to draw from the above view of the nature of central banking is that a central bank could not function effectively if it were bound by rigid rules that determined its instrument settings in every conceivable circumstance. It must be free to use discretion, not so that it can react to changing indicators of the economy, which a complicated enough rule would allow, but more importantly so that it is free to change its strategies when the

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[11]See Macklem (2002) or Sims (2002).

evidence shows that these strategies aren't working or that the economy has changed in unforeseen ways, and to adopt promising new ideas for achieving the conflicting goals of monetary policy.

To illustrate this case for discretion rather than rules, consider the Canadian experiment with "Monetary Gradualism," which was started in the fall of 1975 with the goal of bringing inflation down by use of targeted reductions in the growth rate of M-1. This strategy was in conformity with the then academically dominant theory of monetarism, so much so that Milton Friedman (1975) described the speech in which Governor Bouey announced the programme as "the best speech I have ever heard from a central banker." However, the policy foundered when it became apparent that the relationship between M-1, the level of interest rates and the level of nominal income, whose stability was crucial to the effectiveness of the policy, had begun to shift unpredictably.

To some extent bad luck may have played a role in the failure of monetary gradualism. For it was shortly after the initiation of this programme that technological innovation in banking made it economical for chartered banks to offer daily interest checking accounts, which fell outside the definition of M-1. Similar technical developments made it profitable for banks to begin offering sweep accounts that reduced the need for medium- and large-size business firms to hold their transactions balances in current accounts that were included in M-1.[12] However, in retrospect, it seems that there would probably have been a problem even without bad luck. For, as Charles Goodhart has argued, in every country in which a similar monetary targeting regime was adopted, the empirical "demand function" for the targeted aggregate soon began to fall apart.

The failed attempts at monetary targeting in Canada and elsewhere illustrate well the need for a central bank to retain the flexibility to learn from mistakes. If the Bank of Canada had been forced to adopt a binding rule in 1975 it is hard to see how anyone at the time could have picked a better rule than the one it voluntarily chose. But then what would have

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[12]See Freedman (1983).

happened when the Bank learned that the rule was doing more hard than good? Presumably the Bank would have tried to persuade whatever authority was charged with enforcing the rule to revise it, which would hardly have enhanced the credibility that a binding rule is supposed to promote. As it happened, the Bank simply abandoned M-1 targeting and tried something else. The case for discretion over rules is simply that it provides a central bank with the flexibility to learn from mistakes this way instead of condemning the bank to repeat them.

3   Inflation Targeting

In February 1991, the Bank of Canada and the Department of Finance announced the new inflation-targeting policy that the Bank has followed, with periodic revisions, ever since. It appears that this policy has been a great success, judging from the fact that inflation came down ahead of the targeted reductions and has remained within a narrow band around 2 percent per year, with a few temporary deviations, ever since. I say that the policy has worked despite the fact, pointed out by Ball and Sheridan (2005), that inflation targeting countries have not reduced inflation by any more than non-targeting countries since the early 1990s, once one controls for the country's average rate of inflation prior to the inflation-targeting era. My reason goes as follows.

My own interpretation of the evidence presented by Ball and Sheridan is that when central banks around the world were learning to rein in inflation, those that had the most difficult time doing so were those that had the least independent central banks, for the straightforward reasons discussed in section 2.2 above. These countries ended up adopting inflation-targets as a way of reducing the inflationary political pressure on the central bank. According to this view what was critical was not so much that the central bank signed on to inflation targets but that its political masters signed on. In effect this made the central banks more independent *de facto*, by increasing their freedom to pursue their objective of low

inflation. Thus countries that adopted inflation targets started with higher inflation than non-targeters, because of their low central-bank independence, and ended with inflation rates that looked much like the non-targeters, because of their enhanced *de facto* independence. This that means that inflation fell by more on average among inflation targeters than non targeters, not because they started with higher inflation rates and were reverting to the mean but because they were starting with less independence and would not have been able to revert to the mean without the increased independence offered them by inflation targets.

According to this view, those central banks that adopted inflation targets should have been the ones that had the least degree of independence *de jure* in the pre-inflation-targeting era. This seems reasonable given the countries that adopted inflation targets, such as New Zealand, Canada, the United Kingdom, Sweden and Australia. To confirm this impression more formally I took the 20 countries in the Ball-Sheridan sample, for each one calculated the median of the four measures of central bank independence surveyed by Eijffinger and de Haan (1996), each measure having been transformed linearly so as to vary from 0 to 1. The coefficient of correlation between this median measure of central bank independence and a dichotomous indicator of whether the country adopted inflation targets turns out to be -0.46. My interpretation of the Ball-Sheridan evidence is also corroborated by the fact that the coefficient of correlation between inflation and this measure of independence fell (in absolute value) from 0.75 in the pre-targeting era to 0.37 in the post targeting era.

3.1 Inflation targeting as a successful adaptation

The adoption of inflation targets by the Bank of Canada can be seen as a successful adaptation to a particular economic and political environment. Of course the general idea of inflation or price-level targeting did not originate with the Bank, having been espoused by Simons (1936) among others, and having been put into practice by New Zealand shortly before the Bank's adoption and by Sweden long before the Bank's adoption. Even the specific idea of implementing the policy in Canada in 1991 originated not in the Bank but in

the Department of Finance (Crow, 2002). But the Bank was clearly an active partner in adopting the new policy. As is common with historically embedded cognition, the Bank was economizing on its own internal resources by opportunistically learning from others and following others' suggestions.

The adaptation was successful largely because it dealt with all three of the main difficulties facing the central bank. First, the Bank managed to gain extra insulation from political pressure as a result of the move, as argued above, because its political master, the Department of Finance, also signed on. Once these targets had been sanctioned by the Minister there was little scope for him to pressure the Bank into more inflationary policies. Thus even when the Canadian government decided in 1993 that it was politically expedient not to renew the contract of the governor that had become the public face of inflation targeting, it chose to replace him with his former senior deputy, who remained committed to those targets, and under whose regime the measured rate of CPI inflation in Canada remained for several years at or below 1.5% per year.[13]

As for dealing with the control problem, as many have observed, inflation targeting sharpens the focus of central bank announcements and creates increased transparency. It thereby makes it easier for the Bank to communicate its reasoning to the public, thus allowing people better to anticipate future movements in the overnight rate. The increased transparency also allows people to see that the Bank is really doing as announced, and thus enhances the credibility needed for the crucial announcement effect to work. The announcement effect itself is of course a good example of how an adaptive agency opportunistically manipulates aspects of its external environment, in this case expectations of external private agents, in such a way as to leverage its own limited and fragmented analytical capabilities.

Inflation targeting has helped the Bank dealing with its third major problem by allowing

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[13]See Howitt (1997). Crow (2002) argues that inflation targeting actually resulted in a decrease of the Bank of Canada's independence because it brought the Finance Department into the process of formulating monetary policy more than ever in the past. Although this does mean a shift of policy-making power from the Bank to the Ministry, I would argue nonetheless that it made it even more difficult than before for the minister of finance to pressure the bank into financing deficits with highly nflationary policies.

it to continue to learn from experience and experimentation without sacrificing its own credibility. Recall what happened when the Bank attempted to follow a policy of targeting the growth rate of the money supply in the second half of the 1970s. After having committed itself to targeted reductions in M1 growth, the Bank soon learned that the demand for M1 was undergoing negative shocks which were nullifying the effects of these reductions on inflation. This put the Bank in the awkward situation of having to choose between allowing inflation to persist, thereby defeating the ultimate objective of the policy, or violating its commitment to the targets, thereby undermining its own credibility and reducing its ability to talk inflation down. Nor was the Bank of Canada the only central bank in the world that found itself in such a dilemma. As Goodhart (1984) pointed out, every country in the world that undertook a monetary targeting policy found that the demand for whatever M that they were targeting somehow suddenly started to decrease.

If these central banks had been committed to inflation targets rather than money-growth targets, the lessons that they learned in the 1970s when they tried reducing monetary growth could easily have been put to use without jeopardizing the long-run goal of inflation reduction. They could have started right away aiming for much lower monetary growth, or switched to controlling some other monetary aggregate, or they could even have abandoned the discredited policy in favor of some other approach to inflation control that placed less reliance on monetary aggregates. In the end that's what many of them did, but only after a lengthy and costly delay caused by the understandable wish to maintain their reputation for constancy.

Moreover, the open and transparent framework of inflation targeting helps the Bank of Canada not just with the control problem, as explained above, but also with the problem of understanding the economy.[14] This is because transparency allows the Bank to explain more clearly than ever what is going on when it changes tactics. It can explain openly that

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[14]Transparency also helps, of course, to make the Bank more accountable to the general public. Although this involves a sacrifice of the Bank's independence from political factors, it clearly does so in a way that does not imply increased nflationary pressure. As David Laider (2005) points out, this kind of dependency is needed to make the Bank of Canada fit into a modern democratic system in a way that Henry Simons might approve.

what it is doing is just a tactical policy that in no way diminishes its commitment to the publicly announced policy of inflation control, as for example when it abandoned use of its monetary conditions index or when it moved to a schedule of fixed action dates for setting interest rates. In other words, the Bank is now free to benefit from new information that teaches it something about how the economy works and indicates that a change of tactics is in order, without having to sacrifice its credibility, rather than having to hope that no such lessons will be forthcoming.

3.2 The Game-theoretic view of inflation targeting

In contrast to the account I have just presented, many contemporary accounts of inflation targeting are presented as extensions of the following game-theoretic model, according to which inflation targeting is a rule which, being imposed on the central bank, delivers it from the temptation to deliver surprise inflation. According to this account the central bank that is not constrained by such a rule would use its discretion to yield to this temptation unless expected inflation were so high as to make the cost of the surprise even higher than the gain in terms of reduced unemployment.

A simplified formal model of this game-theoretic view goes as follows.[15] At each date t we have:

$$\pi_t \quad \text{rate of price-inflation}$$
$$\pi_t^e \quad \text{expected rate of inflation}$$
$$u_t \quad \text{rate of unemployment}$$
$$v \quad \text{natural rate of unemployment,}$$
$$a \quad \text{relative importance of inflation}$$
$$b \quad \text{inverse slope of Phillips curve}$$

The parameters v, a, and b are all positive.

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[15] The seminal article from which this game-theoretic approach originates is Kydland and Prescott (1977). Other central contributions were made by Barro and Gordon (1983), Canzoneri (1985), Rogoff (1985), Cukierman and Meltzer (1986) and Walsh (1995).

The central bank sets the rate of inflation each period knowing that the rate of unemployment will be determined by the expectations-augmented Phillips Curve:

$$\pi_t = -(1/b) \cdot (u_t - v) + \pi_t^e. \tag{1}$$

Its objective is to minimize the social loss from unemployment and inflation:

$$L_t = (u_t)^2 + a \cdot (\pi_t)^2. \tag{2}$$

According to this consensus model, the key choice of monetary policy consists in choosing the combination of inflation and unemployment that minimizes the social loss (2) subject to the tradeoff (1). It is standard to assume that rational expectations prevail, which in this non-stochastic world implies that the expected rate of inflation entering the Phillips curve tradeoff will be determined by perfect foresight:

$$\pi_t^e = \pi_t. \tag{3}$$

According to this theory, the difference between having an inflation target imposed on the central bank and leaving it free to use its discretion can be modelled as the difference between whether the central bank chooses the actual rate of inflation before or after people form their expectations. Under discretion, people have to form their expectations first, and the bank retains the option of varying inflation afterwards. In that case, the central bank will minimize (2) subject to (1), taking the value of π_t^e as predetermined. Thus it will set:

$$\pi_t = \frac{b \cdot v + b^2 \cdot \pi_t^e}{a + b^2} \tag{4}$$

From (3) and (4), the equilibrium values of actual and expected inflation will be:

$$\pi_t = \pi_t^e = \frac{b \cdot v}{a} > 0, \text{ under discretion.} \tag{5}$$

Suppose, however, that the central bank is constrained by an inflation target. This target determines the rate of inflation π_t before people form expectations. Whoever sets the target can anticipate that expected inflation will be governed by (3). So according to the Phillips tradeoff (1) the rate of unemployment will always equal the natural rate v no matter what target is chosen. In that case, the only variable in the loss function (2) affected by the target will be the rate of inflation, which should therefore be set to its optimal value of zero. Hence:

$$\pi_t = \pi_t^e = 0, \text{ under the optimal inflation target.} \tag{6}$$

It follows immediately that having the best inflation target is better than discretion, in the sense that it results in a lower value of the loss function (2). The assumption of rational expectations together with the expectations-augmented Phillips curve (1) imply that in both cases the rate of unemployment will be the same, namely the natural rate v. So allowing the central bank to use discretion just results in a higher rate of inflation, with no payoff in terms of lower unemployment.

Many economists have been convinced by this game-theoretic argument, because it does not rely either on mistaken perceptions by the public[16] or on faulty objectives or incompetence on the part of the central bank. The presumption is that the objective being pursued by the central bank is a worthy one, and that everyone is acting in a way that is individually optimal. In effect, the argument portrays discretion as a misplaced softness, like the weakness of a judge that always feel sympathy for a criminal and treats bygones as bygones. An inflation target is needed to stiffen the bank's backbone. Failing that we would need to appoint a central banker who had no concern for unemployment, who would act as if the parameter a in the objective function were indefinitely large, and who would therefore approximate the first-best inflation target even though not constrained to do so.

Thus inflation-targeting has been embraced by many monetary economists as a way,

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[16]Except perhaps the perception that the monetary authority that they had created would serve them well.

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although perhaps not the only way, to avoid the useless inflationary bias of benevolent but uncommitted central banks who cannot be counted on to resist the temptation to help society by giving it a bit of surprise inflation. In effect this is exactly the opposite of the adaptive view explained above, for while the game-theoretic analysis would rationalize inflation targeting as a way to use rules rather than discretion, the adaptive view sees them as an example of discretion rather than rules.

3.2.1　The New Keynesian view

I digress briefly to discuss (a simplified version of) the variant of this argument presented by Svensson and Woodford (2005), who replace the "neoclassical" Phillips Curve (1) by a "New Keynesian" version:

$$\pi_t = -\,(1/b) \cdot (u_t - v) + \beta \cdot \pi_{t+1}^e + \varepsilon_t, \quad 0 < \beta < 1, \tag{7}$$

in which what matters on the right hand side is not last period's expectation of this period's inflation but this period's expectation of next period's inflation, with a coefficient less than unity, and where explicit account is taken of the random price-shocks ε_t. Svensson and Woodford also consider an explicitly dynamic loss function equal to the expected discounted value of (2) for all periods. Using this variant, they argue that the bank needs to be committed to inflation targets not just to avoid the inflation bias of discretion but also to avoid what they call the "stabilization bias" of discretion.

That is, following a positive price shock that disturbed the Phillips Curve, an optimal monetary policy under commitment in the New Keynesian model would require the central bank to accommodate inflation somewhat during the period of the shock but then to bring inflation below target in future periods, even if the price shock were purely transitory. This future tightening of monetary policy would increase future expected losses, but the expectation of lower inflation would allow a more favorable inflation-unemployment tradeoff during

the period of the shock, and the overall effect of the tightening would be to reduce the discounted sum of expected losses. The problem, however, is that if the central bank is not committed to this future tightening it will not undertake it, since the benefits in the form of improved inflation expectations will be bygone. More generally, Svensson and Woodford argue that the optimal inflation target should be history dependent in a way that would never be implemented by a central bank minimizing the "true" social loss function under discretion. Hence the central bank needs to be constrained by a rule that implements the optimal inflation target.

As an explanation for why inflation targeting works, this New Keynesian argument adds little to the preceding game-theoretic argument. The optimal rules derived by Svensson and Woodford all converge in the long run to a fixed target of zero inflation, for exactly the same reasons as in the Kydland-Prescott analysis. Svensson and Woodford supplement this fixed long-run target with a state-contingent short-term inflation target. But inflation-targeting central banks as a rule do not publicly commit themselves to state-contingent targets. Nor is it realistic to suppose that they deliberately aim at tighter monetary policy long after a positive price shock has finished having a direct effect on the economy. So although the management of expectations in the face of price shocks is certainly an important part of inflation targeting,[17] the kind of policy that this New Keynesian argument rationalizes is not the kind that inflation targeters have been following.[18]

3.3 What is lacking, commitment or understanding?

The game-theoretic view that I have just spelled out bears little resemblance to the adaptive view that I outlined in the preceding section. Rather than having to learn about how the economy works, everyone is portrayed as having learned all there is to learn. The struggle to retain control over something that might provide a nominal anchor to the system is assumed

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[17]See especially section 5 below.

[18]The empirical validity of the New Keynesian argument can also be challenged on the grounds that the Phillips Curve (7) on which it is based implies, counterfactually, that inflation should on average rise during recessions. See Fuhrer and Moore, 1995.

away by the taking inflation itself as an instrument of the central bank. Instead of learning and adaptation it presents commitment and the resistance to inflationary temptation as the central aspects of monetary policy. The rest of this section presents the case for seeing monetary policy as more a matter of learning than a matter of commitment.[19]

Consider the theoretical basis of the argument from the previous section. First, it is predicated on the basic idea of the expectations-augmented Phillips curve, and the related idea of the ineffectiveness of monetary policy. The reason why discretion yields no payoff is that it can be anticipated, whereas the only sort of policy that can affect the economy is that which produces unexpected changes in inflation. As a general proposition, policy-ineffectiveness has long since been discredited by numerous empirical studies, as has the augmented Phillips curve and its prediction of a unique natural rate of unemployment.[20]

Moreover, there is little reason to think that private expectations enter into the inflation process in the way portrayed by this theory. For although there is some empirical support for the idea that inflation depends upon some measure of economy-wide excess demand for goods and services and on lagged inflation, the lagged inflation terms do not appear to serve so much as proxies for forward looking expectations as for timing delays in the setting of the millions of individual prices that comprise the price index.[21] One seller's price will change with a brief lag when enough other prices of factor inputs and/or competing goods have changed, but as we pointed out above, a succession of small lags can amount to a very sluggish process in the aggregate.

The place where expectations of monetary policy seem to enter most critically is in financial markets rather than in the markets for goods and labour services. And when they respond to inflation they do so without delay. If investors begin to suspect that the Bank

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[19] A similar conclusion has been reached by Romer and Romer (1997). For another interpretation of US monetary policy that emphasizes learning, see Sargent (1999). Simultaneous learning by a central bank and private agents is analyzed by Honkapohja and Mitra (2002).

[20] On policy effectiveness, see Boschen and Grossman (1982). On the Phillips curve, see the symposium in the Winter 1997 issue of the Journal of Economic Perspectives.

[21] For evidence of this using Canadian wage contract data, see Riddell and Smith (1982). For U.S. evidence, see Fuhrer (1997).

of Canada is not committed to a disciplined monetary policy, the first thing that happens is that interest rates begin to rise and the exchange value of the Canadian dollar begins to fall.

The fact that expectations of monetary policy can have their most significant effects on the economy instantaneously implies that the game-theoretic model of discretionary policy outlined above has little basis in reality. According to that model, expectations of monetary policy matter mainly in the markets for goods and services, in which wages and prices are often fixed in advance for months or even years. If this were true then it would make sense to suppose as is done in the game-theoretic model of discretion that the central bank can rationally take expectations as predetermined when choosing its policy action. The "temptation" to raise the level of economic activity with some surprise inflation might exist if society were indeed locked into expectations. In reality, however, the temptation just doesn't arise, as practitioners of central banking have long maintained.[22] Central bankers are keenly aware that although there are long and variable lags between monetary stimulus and any resulting rise in the level of economic activity, there are no lags at all between such a stimulus and the currency depreciation and capital flight that will occur if the stimulus is taken by investors as a signal of future weakness in the currency. Because of this, there is no reason for believing that discretionary central banks have the inflationary bias that the game-theoretic view attributes to them.

Another weakness of the game-theoretic model is its assumption that central bank actions are motivated by the desire to minimize a cost function with inflation and unemployment as objectives.[23] Aside from some serious doubts as to the form of that cost function and whether or not it could have anything to do with conventionally defined economic welfare, it is doubtful that this is a reasonable description of the motivation of any governor of the

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[22]See Blinder (1998).

[23]As Chuck Freedman has emphasized to me, the way a central bank responds to price shocks, trying to allow some of the effects to come out in inflation and some in real output, make it look as if the bank was trying to minimize a loss function nvolving these two variables. But these short-run responses are part of the detailed implementation of policy having little to do, in my opinion, with the first-order questions of keeping inflation anchored and avoiding financial collapse.

Bank of Canada or of any other central banker. Instead, I believe the evidence favours the account that has been given over the years by such astute observers as Thornton (1802), Bagehot (1873) and Milton Friedman,[24] namely that responsible people entrusted with such important and delicate jobs as the management of a country's central bank are typically motivated by the desire to be seen as having done a good job, to have acquitted themselves well. They pursue this objective by doing everything possible to avoid major inflations, financial panics, and runs on the currency, while carrying out the day to day job of making available the base money needed for the financial system to function.

4   The evolution of monetary policy

If we look beyond inflation targeting, I believe that the adaptive view of monetary policy in general provides a more coherent account than the game-theoretic view does of the way monetary policy has evolved in North America and elsewhere. One of the strongest argument in favor of taking the trial-and-error point of view is that one does not have to be a committed monetarist to agree with Friedman and Schwarz that the history of major depressions and inflations in the United States and other countries is to a large extent a history of errors made by those in charge of monetary policy. Not a history of insufficient resolve to resist the temptation to do good, as would be portrayed by now conventional rational expectations theory, or a history of too low a weight placed on inflation in the central bank's loss function, but a history of insufficient understanding of how best to carry out the task of central banking.

In the 1950s and 1960s, the Federal Reserve Board operated largely on the principle of what its Chairman William McChesney Martin called "leaning against the wind;" that is, of trying to counteract short term movements in nominal interest rates. As Friedman argued, this policy was almost guaranteed to amplify the rise in unemployment when aggregate demand fell, and to add momentum to inflation in the face of either supply or demand

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[24]Friedman has been cited indirectly on this subject by King (1997).

shocks that started an incipient inflation spiral. In making this criticism, Friedman was reopening a debate that goes back to the "real bills doctrine" espoused by Adam Smith and others, a debate that is still unresolved, and which involves the fundamental conflict referred to above between the two main tasks of central banks.

Friedman's insistence that central banks pay strict attention to conventional monetary aggregates was treated by conventional Keynesians in the early 1970s as crankish nonsense. Monetary policy was largely influenced by those Keynesian ideas and by the related Radcliffe view according to which monetary policy was largely ineffective because conventional monetary aggregates were only one component of the multidimensional notion of "liquidity" that really influenced the level of aggregate expenditures in the economy, to the extent that these were influenced at all by financial considerations. It would be hard to find a monetary economist today that did not agree that Friedman was right, and did not agree that high inflation is certain to occur in a situation in which all known monetary aggregates are growing persistently at rates between 15 and 25 percent per year. Yet in the early 1970s in Canada such was the situation, and the then governor of the Bank of Canada, Louis Rasminsky apparently saw no reason to change course.[25]

Rasminsky was not a lover of inflation. Nor was he by all accounts a man of weak resolve easily given to short-run temptations. He just made an honest mistake. He saw the need to preserve "orderly markets," which led him, like Martin and other central bankers at the time, to pursue a strategy of dampening interest rate movement. He didn't see the conflict between this strategy and the goal of avoiding a disastrous inflation.

The next governor of the Bank of Canada, Gerald Bouey, apparently saw things differently. He set out on the course of "Monetary Gradualism," that was described in section 2 above, which foundered when the targeted M-1 aggregate began to exhibit an unstable relationship with interest rates and nominal income. What ruined monetary gradualism was not lack of commitment but lack of understanding. And so it has been in case after case.

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[25]See Courchene (1976).

The disappointments that we have seen in monetary policy have largely been the result of error, not deception.

Moreover, the history of central banking has been one of trial as well as error. When mistakes have been made, central banks have learned from them, as have economists. We have learned that interest rates must often be allowed a wide latitude from time to time, and that when all monetary aggregates start growing at high rates inflation is sure to follow if nothing is done to reverse course. We have learned that a policy of publicly focussing on a single aggregate is not enough, because once people get used to the new regime, the chosen aggregate will cease to be indicative of the overall level of aggregate demand.

Another aspect of monetary policy that can be explained by seeing it as a question of trial and error rather than strategic manipulation is the apparent herd instinct of central bankers. As the above sketch of Canadian monetary history has indicated, the history of successive attempts to formulate a monetary strategy in Canada parallels in broad outline that of most other advanced countries.[26] And the resulting movements in inflation have been remarkably similar in different countries despite many differences in institutional and political arrangements that give different central banks quite different incentives and different opportunities to make credible commitments.

This herd behaviour on the part of central bankers has a straightforward interpretation if we view monetary policy as a history of trial and error. For as Keynes once argued so persuasively, people faced with unquantifiable uncertainty tend to rely on custom and convention. When there is no rational basis for assessing the probable consequences of alternative courses of action, the prudent course is to do what is commonly accepted as the sensible thing. And surely there is nothing about which we have more uncertainty than the precise way in which central bank actions today will affect such variables as the level of economic activity and the price level two years from now.

Of course many people in uncertain situations will strike out on uncharted courses that

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[26]I have argued this in greater detail in Howitt (1993).

defy conventional wisdom. Those that succeed are recognized with hindsight as creative geniuses. But the financial world does not generally accord credibility to people with such proclivities. On the contrary it tends to favour those who don't deviate much from conventional opinion. Those whose expectations are just a little ahead of the crowd are handsomely rewarded in their speculations without having ever to form an independent thought about the fundamental determinants of profitability. And those charged with managing others' fortunes who make mistakes are least likely to be punished when they have been following "best practice." No one is more charged with such social responsibility than a central banker. From this point of view what is surprising is that they are not even more alike, that some central banks, such as those of Canada in 1975 and New Zealand in 1990 have taken the lead and initiated new untried policies.

There is another feature of this herd behaviour that is easy to understand from the point of view of this essay, and that is its rough coincidence with developments in monetary theory. In the 1960s, central bankers were guided largely by Keynesian ideas. In the 1970s and 1980s, they seemed to take their inspiration from the monetarism that had then become so popular in academic writings on macroeconomics. In the 1990s the proliferation of inflation-targeting can be seen as a direct extension of the Kydland-Prescott game-theoretic analysis, for one solution to the conundrum of time inconsistency, as indicated above, is to delegate monetary policy to a central bank with a "contract" mandating the pursuit of a specific range of inflation. In all these cases, the globalization of monetary theory has implied that what can best be rationalized in terms of conventional wisdom in one country is the same as in another, at least in so far as conventional wisdom accords with academic fashion.

As another example of something more easily explained by the adaptive view of monetary policy than by the game-theoretic view, consider the fact that economists have been proffering policy advice to central bankers over the years. The rational expectations assumed in the game-theoretic approach would make such advice redundant. For as several observers have noted, the assumption of rational expectations implies that monetary theories cannot

at the same time be new and correct, since correct theories are already assumed to be in use. The game theoretic view gives no role for advocacy other than perhaps providing more precise estimates of the slope of the expectations-augmented Phillips curve. If everyone is behaving optimally then what are the economists maximizing?[27] Under the adaptive view however, policy makers should continually be seeking and even paying for advice as to how the economy works, if not for improving their performance then at least for acquiring a stamp of academic approval.

5 Who is ahead of whom?

When the Bank of Canada and the Department of Finance announced the Bank's new policy of inflation targeting in 1991, Canada was introducing a new goods and services tax. The new tax was clearly going to create a problem for the Bank by causing an upward blip in the price level. Even if the Bank could prevent this blip from turning into an inertial inflationary spiral, the immediate rise in inflation that would accompany the blip threatened to undermine the Bank's credibility. Inflation targets were seen at first as a means for dealing with this problem. More specifically, the Bank estimated the first-round effect of the new tax on the price level, under the assumption that the path of wages would not be affected, and the policy was designed to limit the price blip to that estimated amount. Inflation targets were announced after the blip had had its first-round effect, rising to about six percent, and the announcement promised to halt this rise and to bring inflation gradually down to within a one to three percent band over the coming three years.

When I first heard this announcement, and for some times afterwards, I was very skeptical. Along with many other academic economists I thought it was foolish for the Bank to announce that it was going to control something like inflation, which it can only affect through a long and variable lag, with such a high degree of precision. To me the idea reeked of fine-tuning, and I thought the Bank was setting itself up for a fall. I should add that

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[27]On this point, see Rymes (1979).

although David Laidler also had qualms, he was much more supportive than I was (see Laidler, 1991). As usual, he showed better judgement than I did, because in the end the Bank managed to contain the price blip just as planned. The price level stopped rising and then inflation quickly came down to within the target range, where it has been almost continuously ever since.

This is just one example of how central banks seem to have learned a lot during the past half century without the support of academic economists. In the United States, for example, economists often poked fun at the Greenspan method of sifting through all sorts of data with no apparently coherent guidance from economic theory. But there is no disputing his success in maintaining a low course of inflation, even in circumstances (with unemployment dipping below 4%) where established theory was predicting that inflation was going to accelerate.

When the most successful central bankers appear to pay little attention to economic theory, and the economic theory which seems to rationalize the success of inflation targeting is riddled with empirical contradictions, it is reasonable to infer that something is wrong with theory, not practice. It suggests that in the social process of adaptation in which both practitioners and students of monetary policy play a role, the students now have more to learn from the practitioners than the other way round. Now such a situation would not appear anomalous to anyone familiar with the historical relationship between science and technology, where fundamental scientific breakthroughs have been the result rather than the cause of successful innovations made by practical people solving mundane problems, often with little or no understanding of why the innovation works.[28] Inflation targeting seems to work, and we are still waiting for a full blown monetary theory that can provide an empirically successful explanation of this practical experience.

Monetary theory has fallen behind practical experience partly because instead of taking money seriously as a critical part of an economy's coordination mechanism it has been

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[28] See Rosenberg and Birdzell (1986). Laidler (1999a, esp. pp.323 ff.) makes a case that textbook IS-LM analysis is another example of theory following practice. What others have called the Keynesian "revolution" is in Laidler's analysis a theoretical synthesis of various ideas and proposals that had sprung up in the decades preceding Keynes's General Theory, many of them in response to urgent policy concerns.

mesmerized by a priori ideas like rational expectations. This hypothesis does more to hide than to illuminate the process of learning and adaptation that lies at the heart of monetary policy and of much else in economic life. For it asserts that there is only one correct theory of how the economy works, and central banks know it as well as anyone else.[29] The fact that this assumption has appealed equally to new classicals and new Keynesians, whose views of how the economy works are in fundamental contradiction with one another, has not apparently reduced its popularity in either camp. But it has put modern monetary economics out of touch with the reality of monetary economies.

As central bankers continue to improve their methods they will find less and less need to continue to pay lip service to academically fashionable economic theory that cannot account for that success. But there are plenty of problems remaining with inflation-targeting. One is the vexing question of how to deal with asset-price bubbles, about which much has been written. Another is the problem of the loss of early warning signs of inflation in an environment where inflation expectations have become entrenched. Specifically, with inflation having become 2% plus white noise, all leading indicators of inflation have lost their predictive power, including measures of inflation expectations, monetary aggregates, core inflation and the output gap. The best predictor is just 2%. Moreover, as inflation becomes more entrenched private forecasters have less and less incentive to spend resources trying to predict something so predictable, and as a result asset prices and expectational surveys no longer reflect much information coming from peoples' forecasting activities. But as we have emphasized above, given the intertial nature of inflation, the policy of inflation targeting depends very much on early warning signs. Latent inflationary pressure can build up for a long time before its symptoms become apparent, and once they do become apparent they are very costly to reverse. So the more our leading indicators continue to deteriorate the more danger we face of waking up one morning and finding that we have been unknowingly fostering a vigorous inflation that can only be eliminated by a prolonged economic slowdown. In that

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[29]On the same point, see Laidler (1999a, xi-xiii)

sense, conducting monetary policy is becoming more and more like trying to fly an airplane blindfolded without crashing, and central bankers are facing the very difficult problem of finding a way to operate without feedback, a problem that inflation targeting has done more to create than to solve.

So, adaptive central banks will still be looking to academia for answers for some time, even as they continue to look for answers on their own. Moreover there is a growing literature on learning in macroeconomics[30] that takes the adaptive view of economic life, some of it devoted explicitly to questions of monetary policy. So economic theory still has a chance to catch up with the practical lessons being learned by central banks. If it does catch up this will be because of people that follow the path that David Laidler has always been on, constructing and judging theories according to their explanatory power rather than according to conventional *a priori* beliefs, and taking seriously the role of money as a central institution of economic life.

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[30]See for example, Evans and Honkapohja (2001).

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