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Wicksell at the Bank of Canada

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The views in the paper are mine alone. Although I worked at the bank for many years, the paper has no insider revelations; the discussion relies entirely on published material.

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ABSTRACT

Wicksell, writing around the start of the 20th century, outlined an approach to monetary policy strikingly similar to the modern approach, of which the Bank of Canada has been a pioneer. Its features include: the overriding objective of price stability (or low inflation); an interest rate instrument controlled by the rates on settlement balances at the central bank; and a policy rule under which the instrument varies in response to deviations from the objective. Wicksell's natural rate of interest has resurfaced as the neutral rate in mainstream macroeconomic models; and his description of the inflation process has parallels in the modern Phillips curve. Moreover, in a mandate for price stability, one can find a logical basis for the independence and accountability of central banks. The paper tries to explain why Wicksell's ideas fell by the wayside for a century, and describes how the Bank of Canada, by pragmatic steps in the 1990s, helped reinvent Wicksell, and install a neo-Wicksellian monetary policy.

The ideas of economists and political philosophers, both when they are right and when they are wrong, are more powerful than is commonly supposed. Indeed the world is ruled by little else ... Not indeed immediately, but after a certain interval.

John Maynard Keynes, 1936

The General Theory of Employment Interest and Money

1. Introduction

This paper highlights striking similarities between modern monetary policy and the writings of Knut Wicksell, 100 years ago.¹ It relates, in particular, how the Bank of Canada adopted a neo-Wicksellian approach to monetary policy. Since the bank led the way for many other central banks, and since the approach has had wide success, the story has broad, international relevance.

Anyone following monetary policy will be familiar with the main features of the modern regime. The remarkable parallels with Wicksell are indicated in the following table.

¹ Woodford (2003) also draws out these similarities. Woodford takes the theory much further, using inter-temporal optimization and rational expectations.

Monetary policy parallels		
Conduct	Wicksell	Modern or neo-Wicksellian
Objective	stable price level	low inflation or price stability Canada: 2% target
Instrument	commercial bank interest rate	short-term interbank rate Canada: overnight rate
Implementation keystone	central bank discount and deposit rates	central bank discount rate and deposit rate Canada: bank rate and deposit rate
Policy rule	adjust interest rate in response to actual deviations from objective	adjust interest rate in response to actual and anticipated deviations from objective
System		
Banking	pure credit system—no bank reserves	zero reserve requirement
Axis of monetary transmission mechanism	commercial bank rate relative to natural (neutral) interest rate	short-term rate relative to natural (neutral) interest rate
Inflation/deflation gap	unobservable gap between demand and potential output	unobservable gap between demand and potential output

Wicksell published *Interest and Prices*, his most comprehensive statement on monetary policy, in 1898.² With the possible exception of the Swedish Riksbank in the 1930s, no central bank has deliberately used this work to design a policy regime. Yet by pragmatic steps, central bankers adopted a set of measures that they could have found in Wicksell.

At the Bank of Canada, John Crow, then a new Governor, announced a commitment to price stability in 1988. Reserve requirements were phased out in the early 1990s. The bank adopted the overnight interest rate as policy instrument in 1994, and revamped its operating framework for controlling this rate around the rates on settlement accounts in 1999. The stepwise installation of Wicksell was complete by the end of the century. Many other central banks adopted similar measures at about the same time.

The story in the paper starts, in section 2, by trying to explain why the Wicksellian approach, which would have conceivably avoided the disastrous monetary policy mistakes of the 20th century, fell by the wayside for so long. The conclusion is that this was just bad luck—accidents of country, language and of competing monetary doctrines. Section 3 describes the extent to which Wicksell anticipated the broad outline, and many if not all key details, of the current monetary policy model. Advances in economic science may have modified components, but the structure remains intact. Section 4 looks at several issues that preoccupied Wicksell—business cycles, the Quantity Theory of Money, price indexes, countercyclical monetary policy—and which provide a sidelight on the evolution of thinking. Section 5 is about the framework for the conduct of

² The Wicksell items in the table are all from this book, except the third, which is in a 1917 essay.

policy—the definition of central bank responsibility, and of the price stability objective, and the mechanism for interest rate control—focusing on the Bank of Canada in the 1990s. Concluding thoughts are in section 6.

2. One hundred years of solitude

Puzzling loss—and reinvention

The sentences omitted, in the passage from Keynes at the top, famously go: “Practical men, who believe themselves to be quite exempt from any intellectual influences are usually the slaves of some defunct economist ... some academic scribbler of few years back.” These playful lines do not help at all for understanding the disappearance and reinvention of Wicksell’s monetary policy.

First, there are a lot more than a few years to explain. Second, Wicksell was never defunct. He was the founder of the Swedish school of economics, and recognized internationally by peers in his own and following generations for contributions in various fields of economics.³ Nor was he a mere scribbler. He wrote clearly and concisely, and is still readable today. He was among the first to use the term *monetary policy*. He was notorious in Sweden for his radicalism.⁴ Although this may not have helped his credibility in central banking circles, Wicksell’s influence was evident in the Riksbank’s adoption of a price stability goal in the 1930s—which, given the circumstances, went relatively well (Jonung, 1979).

Third, many central bankers acknowledge intellectual influences. Every Governor of the Bank of Canada has had a keen interest in economics; the bank speaks proudly of its intellectual assets; and it has long cultivated academic connections. More to the point, many bank veterans have been aware of Wicksell, and at least one actually read *Interest and Prices*. Despite this familiarity, there was no conscious reference to the original author as the bank groped towards a neo-Wicksellian regime in the 1990s.

Other central banks, under similar circumstances, followed the same path, at about the same time.⁵ In the 1990s, the practitioners, often borrowing from each other, assembled a new paradigm for monetary policy, unconscious that they were reinventing Wicksell.

Outrageous fortune

³ The Swedish school included Karl Gustav Cassel, Bertil Ohlin and Gunnar Myrdal. Outside Sweden, Lionel Robbins and James Buchanan acknowledged Wicksell’s influence (biographies in *The Concise Encyclopedia of Economics*.) Since the 1960s, David Laidler and Axel Leijonhufvud have been his main torch bearers.

⁴ A Malthusian, his forecasts for the economy and population in the 20th century were as gloomy as they were wrong (Part V, *Selected Essays*). Wicksell worried about sex and alcohol and the working class; he was an advocate of birth control. The latter does not shock any more, but it is startling to read, first, that Sweden was on the verge of overpopulation in the early 1900s, and, second, that the solution was emigration to Siberia, of all places (pp 160-1). In 1910 he spent 2 months in jail for a satire on the Immaculate Conception. Wicksell’s foibles in no way diminish the man; rather they reflect his intellectual honesty and courage.

⁵ For example, Alan Blinder, former Vice-Chairman of the Federal Reserve Board, cites Wicksell once, for the idea of a neutral interest rate (Blinder, 1998).

What accounts for the loss of Wicksell's monetary policy for so long?

A large part of the explanation—there may be no other—lies in intertwined accidents of geography, language, and intellectual history. The successful experiment in Sweden in the 1930s did not make the waves that an application in a large economy might have done. Wicksell wrote mainly in German and Swedish. He published only a couple of articles in English, which may be the necessary language to establish a big new idea in political economy.

As for intellectual history, Wicksell's ideas had to compete with 2 potent alternatives, Keynesianism and monetarism, as well as their extraordinarily persuasive advocates. The English translation of *Interest and Prices* appeared—10 years after the author's death—in 1936. Could timing be worse? Keynes was grabbing all the attention—and did so for decades to come.

The post-World War II consensus, among economists and central bankers alike, downgraded the effectiveness of monetary policy, and assumed that it should share responsibility (as a junior partner) with fiscal policy, for a comprehensive list of macroeconomic goals. Its view of monetary policy instruments was just as diffuse—in addition to regular bank reserve management, there were variable reserve requirements and liquidity ratios, direct credit controls, interest rate controls and other actions to affect the entire term structure of interest rates, debt management, and so on—with much emphasis on institutional particulars.⁶ By the early 1960s conventional ideas about monetary policy were as blurred as they would ever get. This vagueness created an intellectual appetite for something more solid, and Harry Johnson (1971) describes how Friedman's monetarist counter-revolution hit the spot for many young academics.

In the 1970s, the loose thinking was exposed in practical terms, as inflation accelerated and economic performance in general deteriorated, and monetary policy seemed to have no answer. Major central banks, including the Bank of Canada, turned to money supply targets for backbone.

Wicksell lost opportunities here—he had no Milton Friedman to promote his distinctive approach to policy. (David Laidler and Axel Leijonhufvud, the pre-eminent authorities on Wicksell, focused more on the theory than the policy.) Until Woodford (2003), there was no clear recognition from economists that Wicksell offered a complete package. Keynesians had doubts about the very effectiveness of monetary policy—and did not in any case want a single, price stability, objective. Modern Quantity Theorists favoured the price stability objective, but not the rest of the Wicksellian regime, e.g. discretionary

⁶ For conventional views see the Report of the Commission on Money and Credit (1961) in the United States, and the Radcliffe Report (1959) in the United Kingdom. Harry Johnson (1962) surveyed the field. Although renowned for lucid syntheses, Johnson could not distil a clear message as to what monetary policy was about. In Canada, the Porter Commission Report (1964) was more concrete. However, in its submissions to Porter, the Bank of Canada, declining invitations to be specific, stuck to the mantra “appropriate credit conditions.”

management of an interest rate instrument, to say nothing of the shadowy role of the money supply.⁷

Monetarist/rational expectations theorists reinforced the antipathy towards the interest rate as an instrument. Who could judge what interest rate level was appropriate? Are actual rate movements real, or just nominal, or some combination? An influential attack, by Sargent and Wallace (1975), proved that whereas their money supply rules were consistent with stable rational expectations equilibrium, their interest rate rules were not. A small difficulty was that their rules excluded feedback from the price level, or any other endogenous variable (Woodford, 2002). This was easily overlooked, and the Sargent-Wallace argument dominated respectable monetary theory for a couple of decades.

Central banks nevertheless persisted with the interest rate, for many years so ineffectively that it looked as though Sargent-Wallace might be right. However, they got better at it, and eventually, in the 1990s, showed that the interest rate instrument could work. Theory bends to facts: before the end of the decade the interest rate staged a friendly takeover of policy rules in mainstream models.

If the academics were otherwise preoccupied all these years, what excuses central bank neglect of Wicksell? Central bankers should have been attentive from the outset. Wicksell's arguments provide a logical justification for delegating monetary policy to an independent central bank. Neither Keynesianism nor monetarism is capable of doing so. The former would coordinate monetary and fiscal policy, which might be done better inside the ministry of finance, while the latter would program a computer to keep M growing at a constant rate, and remove all discretion from the central bank. Central bank silence on Wicksell is probably explained by reluctance, until the 1990s, to assume responsibility for anything so transparent.⁸

So it was that nobody who counted on the big stage—no heavyweight academic or central banker—went to bat for Wicksell. After Keynes, he was neither for the *avant garde*, nor for practical men. It did not have to be that way. His policy ideas had rigour and timeliness, and a directness that makes them easy to explain at any level; and they were operational. At various crucial moments, a charismatic advocate, in America or the United Kingdom, might have made all the difference. Personalities have always had a huge influence on monetary policy.

Although, to this day, Wicksell's fame remains limited, his ideas have come back by wearing well. Keynesianism ran into trouble in an economy operating near full-

⁷ Laidler (1972) presents a Wicksellian model, in which the price level is anchored by an interest rate feedback rule, which in turn derives from commercial bank cash reserve management. The latter, although endogenous, is not explicit, and no cash reserve, or other monetary quantity, appears in the model. The feedback rule could just as well be interpreted as an interest rate policy rule.

⁸ In part this was due to the confused state of monetary policy described above, and in part by a penchant for secrecy (Acheson and Chant, 1972). Since 1990, the shift towards openness—with respect to the instrument, the objective, and everything in between—is remarkable.

employment, and with rising inflation. Monetarism rested on an assortment of propositions, which may have had plausibility at the outset, but which soon came undone. High substitutability among financial assets, and financial innovation, made the link between money stocks and nominal objectives much looser than monetarists had estimated. In the end the effectiveness in practical terms of the neo-Wicksellian approach, or what Bernanke et al (1998) call *constrained discretion*, completely undermined the monetarist critique of discretionary policy. Its success in maintaining low inflation, with vibrant growth of output and employment, in the face considerable economic shocks, and in widely varying economies, has finally put to rest the notion that some predetermined growth rate of money supply would do the job better.

3. Theory of monetary policy—a comparison

3.1 Overview

To confront problems that can be sidestepped in the open-economy case Wicksell deliberately chose a closed-economy setting,⁹ (e.g. pp 111-3).¹⁰ Today's core model has 3 equations, often written in terms of deviations from long-run equilibrium values:

- *aggregate demand function*, which in the short run determines the output gap as a function of the deviation between the actual interest rate and the neutral rate (Wicksell's natural rate)
- *Phillips curve*, which in the short run, determines deviations of inflation from the policy target as a function of the output gap¹¹ (augmenting for inflation expectations is not necessary if the price stability objective is credible—as seems to be the case both now and then)
- *policy rule*, which sets the actual interest rate relative to the equilibrium rate, as a function of the deviation of inflation from target (e.g. a Taylor rule or, in the bank's Quarterly Projection Model, QPM, an inflation-forecast rule—Armour et al, 2002)

Long-run equilibrium is defined by these conditions:

- the inflation rate is equal to the target rate (the policy rule is thus the nominal anchor for the system)
- the output gap is zero
- the interest rate is equal to the natural rate, which in turn is the rate at which demand is equal to full-employment output

⁹ Under a fixed exchange rate, both the rate of inflation and the domestic interest rate are for all intents and purposes exogenous. Wicksell saw that the fundamental monetary questions lie in the “degree of freedom” (his expression) for monetary policy in the *n*-country system as a whole, not in the *n-1* fixed exchange rates (p 27, *Selected Essays*). The small-country model also evades basic issues in floating exchange rate mode. For example, currency depreciation may offer a way out of a deflation trap for one country, but not for all countries together: at least one has to solve the problem at home.

¹⁰ Page references are to *Interest and Prices* (1898) unless otherwise noted.

¹¹ This is an accepted modern definition even though Phillips' original work was on the relationship between *wage* changes and *unemployment*.

This model is astonishingly close to Wicksell, following the revolutions and counter-revolutions, and syntheses and innovations, of the intervening years.

3.2 Natural interest rate and aggregate demand function

The rate of interest which would be determined by supply and demand if no use were made of money and all lending were effected in the form of real capital goods. p 102.

This is the first of 2 definitions of the natural interest rate provided by Wicksell in 1898.¹² Since this one is in terms of aggregate demand and supply, it can be pictured as the rate at the intersection of the down-sloping IS curve and the vertical representing potential output (Blinder, 1998).

Wicksell called the actual rate, at which banks lend and businesses borrow, the *bank interest rate* or the *money interest rate*. The former may be more convenient, since bank rate conveys the idea of a short-term rate managed by a visible hand, and since today *money rate* usually means *nominal rate*, as opposed to *real rate*. There is no distinction between nominal and interest rates in this discussion as expected inflation is constant.

The bank rate (r) enters the aggregate demand function:

$$y = f(r), \quad (1)$$

where y is the natural logarithm of output. The bank rate is not in general equal to the natural rate. Commercial banks administer bank rate. According to Wicksell, the influence of “routine and experience” leads them to adjust their lending rates too slowly (pp 118-9). The market achieves equality between the bank rate and the natural rate only over time.

Wicksell does not make a distinction between *actual* and *potential* levels of output. A possible interpretation is that Wicksellian demand is unobservable, and that actual output is at potential. In modern macroeconomics, in contrast, observed output reflects demand, and potential output is unobservable.

In either case, long-run equilibrium is given by

$$y^{pot} = f(r^n), \quad (2)$$

which implicitly determines the natural rate r^n , since y^{pot} is determined by factors outside the model.

Writing the model in terms of deviations from equilibrium, the output gap (actual *minus* potential) is a decreasing function of the interest rate deviation (actual *minus* natural):

$$y - y^{pot} = f(r - r^n). \quad (3)$$

¹² Laidler (1991) points out that he later added a third: the marginal product of capital (Wicksell, 1907).

This is the simplest description of the interest rate mechanism that Wicksell thought drove swings in business activity.¹³

Term spread as Wicksell interest rate deviation

In the early 1990s, findings that the slope of the yield curve was a good predictor of short-run changes in GDP attracted the bank's attention. As a result, the *differential* between a long-term and a short-term interest rate was the monetary policy variable in the bank's workhorse model, QPM, and in bank exchange rate models as well.

Clinton (1994) used Wicksell to explain empirical results from Cozier and Tkacz (1994), which strongly confirmed the predictive power of the long-short differential.¹⁴ The expected future short-term rate, beyond some horizon, would rationally be equal to the natural rate. The consensus estimate of the lag effect of monetary policy suggests that this horizon is about one year. The expectations theory would predict, from this, that the impact of a shock to the short rate on the long-term bond yield should be quite small (e.g. the coefficient of the short rate in an equation for the 20-year rate should be about 1/20 or 0.05). Estimated impulse-response functions confirmed this. As the converse of the low weight on the short rate, the natural rate must have a high weight in the bond yield. Therefore *the long-short rate spread gauges the natural-actual rate deviation*. The predictive power of the spread can be attributed to Wicksell's interest rate mechanism.

Wicksell had neither the expectations theory nor yield curve data to work with, so he could not test his theory in this way. His only comment on the term structure was that the long rate would be higher than the short rate, and follow the short rate (pp 75, 91-93). This is not satisfactory analysis from a modern perspective, as it ignores expectations, and hence the implications of the natural rate for the expected future short-term rate.

3.3 Price level or inflation and output gap

There is a certain rate of interest which is neutral in respect to commodity prices, and tends neither to raise nor to lower them. p 102.

The immediate precondition and reason for every change of price, of any kind whatsoever, and no matter what its ultimate causes might be, is always a disproportion that has come into being between the money rate of interest and the natural or real rate of interest on capital. 1908, p 35.

The second definition of the natural interest rate is in terms of the price level. The two are equivalent, because inflation or deflation results from an imbalance of aggregate demand and supply.

¹³ At one point Wicksell argues that in long-run equilibrium bank and natural rates do not have to be equal (p 120), but for theoretical purposes one might as well define equilibrium in terms of equality of the 2 rates. Interest differentials can be introduced through risk premiums, and a range of longer-term maturities.

¹⁴ Some bank economists adhered to a real-business-cycle explanation, in terms of inter-temporal reallocations of output and consumption. This does not, however, stand up to scrutiny (Clinton, 1994).

“Easier credit sets up a *tendency* for production to expand; but [not] ... if the available means of production, labour and so on, are almost fully occupied.... the excess of demand (brought about by easier credit) *over supply* ... is the decisive fact in forcing up prices...” (p 90). This thought may be conventional today, but in 1898 the emphasis was on the stock of money rather than the flow of spending (Ohlin, 1936).

In the light of the behaviour of prices in the 19th century, Wicksell understandably focuses on long swings, over decades, around a constant long-run average. His careful discrete-period analysis is confined to static price expectations. Even within this framework, he is able to describe how a prolonged divergence of the actual interest rate from the natural rate leads to a cumulatively *rising* and eventually an *accelerating* price level (pp 95-8). “The upward movement of prices will in some measure ‘create its own draught’.” Informally, he does envisage expectations adjusting upwards, with speculative buying: “as prices continue to soar and profits are easily earned the movement may rapidly reach fever point. There is almost no limit to the rise in price.”

This accelerationist view finds an echo in the vertical long-run Phillips curve, an integral part of the bank’s thinking since the 1970s (Fortin, 2003). Wicksell, however, has no Phillips curve, and goes directly from interest rate to price level. We can get an equation like that, by substituting the output gap out of the standard modern model. Where p is the natural logarithm of the price level, the Phillips curve is

$$\Delta p = g (y - y^{p^0 t}).$$

Substituting from equation 3 for the output gap yields:

$$\Delta p = h (r - r^n). \tag{4}$$

On the surface, equation 4 corresponds to Wicksell’s statements of the inflation process. Some qualification, however, is in order. Since the output gap fluctuates at *business cycle* frequency, equation 4 does not describe the *lower* frequency inflation/deflation cycles that intrigued Wicksell. To update his concerns, we should be explaining the low inflation of the 1950s and 60s, the stagflation of the 1970s and 80s, and the low inflation of the 1990s and 2000s. Output gaps help in this context only for transition phases. Today we point to shifts in expectations to explain lasting changes in the price level or inflation environment, and we have various tractable hypotheses within mainstream theory. In contrast, techniques 100 years ago were not up to endogenous evolution of price expectations.

3.4 Policy rules

So long as prices remain unaltered the banks’ rate of interest is to remain unaltered. If prices rise, the rate of interest is to be raised; and if prices fall, the rate of interest is to be lowered; and the rate of interest is henceforth to be maintained at its new level until a further movement of prices calls for a further change in one direction or the other.

p 189.

Although discretion and judgment are intrinsic to the conduct of monetary policy, central bank economists have been avid students of policy rules (e.g. Armour et al, 2002). Wicksell’s rule was the first; it may be written:

$$\Delta r = \gamma \Delta p. \tag{5}$$

We may compare equation 5 to the famous Taylor rule:

$$r - r^n = \gamma(\Delta p - 0.02) + \phi (y - y^{po t}). \tag{6}$$

Taylor thought the numerical approximation $\gamma = \phi = 0.5$ described actual Fed policy in the 1980s and 90s quite well. For modeling purposes the target may be set at an arbitrary level. For practical purposes, 2% is obviously relevant—whether it is the right level is a question taken up in section 5.

The above quotation and the equation say that policy should target just the inflation rate going forward, such that any errors have a permanent effect on the price level. On the face of it, the Wicksell rule seems designed to stabilize the *inflation rate* rather than the *price level*. Going forward, the price level would not have finite variance. Thus while the rule may be appropriate for *inflation targeting*, it does not seem consistent with an objective of *price stability*.

Woodford (2003), however, argues that for shocks to the natural rate, the Wicksell policy rule would constrain the price level to finite variance, because the natural rate itself is bounded. But even in this case, Wicksell’s rule would behave for all intents and purposes like an inflation rule. Consider a single shock to the natural rate: prices change; following the Wicksell rule, the actual interest rate homes onto the natural rate. Once at the new equilibrium, prices stay constant until the next shock to the natural rate. Given the long-swings that Wicksell envisaged, prices could be displaced for decades before a shock to the natural rate sends them back towards the original level. In the very long run, repeated disturbances of this kind would average out, and the rule would ensure that prices would fluctuate around a given level. But in real time it would not look as though the central bank was stabilizing prices around any particular level.

To put the point another way, the adaptive rule in equation 5 would not be an efficient one, for either an inflation target or price stability.¹⁵ If the central bank has any information about the natural rate, about the output gap, or about the Phillips curve, it can design a more effective rule.

Wicksell’s rule “does not mean that banks ought actually to *ascertain* the natural rate. That would, of course be impractical, and would also be quite unnecessary. For the current level of commodity prices provides a reliable test of the agreement or diversion of

¹⁵ Humphrey (2002) suggests a simple mechanical improvement to the Wicksell rule, based on control theory.

the two rates.” (p 189). Economists today, however, are prepared to take a stab at the natural rate. There is more confidence in measurement, which reflects improvements in theory, quantitative technique, and data. Blinder (1998) describes 2 methods employed at the Fed: solving a complete macroeconomic model; and computing long-run averages of actual rates. Other measures may be derived from the growth rate of potential output, or from long-term bond yields.

Bank of Canada modelers have investigated inflation-targeting rules in numerous variants. They have focused particularly on *inflation-forecast-based* rules. Econometric findings on the lag effect have had a detectable impact here. For example, the QPM reaction function set the short-term interest rate so as to eliminate any current or potential deviation of inflation from target over a horizon of 6-8 quarters (Armour et al, 2002).

In practical terms, the background documents for the 1991 announcement of inflation targets refer to a forward-looking approach (Freedman, 1996); and the 6-8 quarter horizon is explicit in the bank’s routine explanations of interest rate decisions.

The theoretical pay-off from refinements to the policy rule is a reduction in the variance of inflation or output. But the substantial margins of error in measurements of unobservables, in models, and in coefficient estimates, mean that such a gain is not guaranteed. Moreover, the Bank of Canada uses the core inflation rate to calibrate its estimate of potential output; an unexpected change in the rate of any significance would soon lead to a revised estimate of potential. This iterative feedback means that inflation itself in the end dominates the policy rule, and in effect brings us back to something very close to Wicksell.

4. Sidelights

4.1 Business cycles

All these difficulties and complications at once disappear when it is changes, brought about by independent factors, in the natural rate of interest on capital, that are regarded as the essential cause of such movements. p 167.

Wicksell explains his theory of business and price fluctuations by considering how a variety of shocks might affect the economy. These include exogenous changes to productivity, to the supply of credit or the bank rate, the money supply, and the wage level. He examines his theory against all the cases. Much debate with his contemporaries involved consideration of a novel hypothetical disturbance.¹⁶ Wicksell argued about hypothetical shocks of all shapes and colours.

Even so, “The main cause of the business cycle, and a sufficient cause, seems to be the fact that technical and commercial progress cannot by its very nature give rise to a series which proceeds as evenly as the growth in time of human needs.” (Cited by Ohlin, p ix.) Movements in the natural rate of interest are, then, the prime mover.

¹⁶ Professor David Davidson would often set Wicksell off.

This may read like late-20th century real-business cycle theory—but just until Wicksell brings lagged adjustment of the interest rate into the picture. In new classical theory you do not find this: “There is nothing *so far* to bring the rate of interest on money into coincidence with the rate which would be determined if capital goods were lent in kind ” (p xxvi, Wicksell’s italics)—or this: “... there is no reason for any *rapid* movement of the money rate into line with the natural rate, and a deviation between the two rates, with its dues effect on prices, can persist for a considerable time” (p xxvii).

His insistence on slow adjustment of the interest rate is all the more significant in the light of the decades-long swings on which he focused. Wicksellian cycles are of a distinctly lower frequency than those in modern business cycle theory.

Another difference is that Wicksell’s particular emphasis on natural rate shocks has not been taken up. Modern macroeconomic models are routinely subjected to an array of experimental disturbances. Shocks to investment demand, or to potential output, could in principle lead to changes in the neutral interest rate in these models, but typically the modelers do not centre their analysis on this.¹⁷

4.2 Moderating cycles

[Measures] that are apt to ensure that money retains a constant value are likely to be, at the same time, a means of stabilizing, not disturbing the steady course of business life. 1908 p 36.

The Bank of Canada has also repeatedly made this argument. For example, Freedman (1996) argues that the policy response to persistent demand shocks under a symmetric inflation target is countercyclical. In more general terms, recent bank governors have underlined this attribute of the regime (e.g. Dodge 2002).

On this argument, which Blanchard and Gali (2005) label the “divine coincidence,” inflation control is useful not just in itself but as a means to a more stable economy. In the consensus macro model, an inflation-control target requires discretionary management to stabilize the cycle.

4.3 Quantity Theory

The Quantity Theory is theoretically valid so long as the assumption of ceteris paribus is firmly adhered to. But among the “things” that have to be supposed to remain “equal” are some of the flimsiest and most intangible factors in the whole of economics—in particular the velocity of circulation of money. p 42.

¹⁷ Duguay (1994) specifies an aggregate demand function in first differences, which could imply a non-stationary natural rate of interest. The new neoclassical model Goodfriend and King (1998), which could be interpreted as a Wicksellian model, has an endogenous natural rate. But these authors, like other modern authors, do not feature movements in the natural rate as the centrepiece of their analysis.

Classification is not necessary. However, since Wicksell associated himself with the Quantity Theory, it is necessary for clarity to disassociate him from the *Modern* Quantity Theory—as per Friedman’s restatement—and monetarism.¹⁸

For Wicksell the demand for money, or velocity, is not stable or predictable. And the supply of money is not pinned down by exogenous factors. One of his imaginative devices is a pure credit economy, in which the money supply is indefinitely elastic (pp 62-80). It helped him to explain why the supply of money was *not* closely linked empirically to a monetary base. More fundamentally, in the pure credit economy, monetary policy can stabilize the price level using the interest rate. Wicksell had no need to pursue the point, but it is implicit in his theory that policy is set without reference to a monetary quantity. His pure credit system is a good enough description of the 21st century model, with near-zero bank reserves, and central bank control of short-term interest rates.

If it matters, one could argue that Wicksell’s insistence on the interest rate channel transmission mechanism is more Keynesian than monetarist: “... the explanation offered by the Quantity Theory—that rising prices are due to an excess of money, falling prices to a scarcity—does not accord with actually observed movements of the rate of interest ...” (p 167).

Wicksell’s Quantity Theory is surely no more than monetary neutrality: in steady states, if all nominal magnitudes differ by an equal proportional amount, no real variables are affected. Conversely, if you control one nominal magnitude, and all real variables remain constant, you fix the overall price level. The control variable could be money (p 40); it could be something else. These are innocuous thought experiments in a timeless world. They imply no particular causality. The equilibrium price level is a neutral equilibrium: stable in the way of a cylinder on a plane (pp 100-1): it is not unstable, but it can be permanently displaced by many different shocks, real or monetary.¹⁹ To prevent such indeterminacy, the central bank should apply intelligent monetary policy. Wicksell argues for a watchful discretionary management of money, via the interest rate. In contrast, under the Modern Quantity Theory, the money stock anchors the price level well enough; discretionary policy does more harm than good; and the interest rate is best left alone.

Like Wicksell, the Bank of Canada respects the Quantity Theory as statement of principle, and as the explanation for many historically important episodes of price change.²⁰ It encourages research into the role of quantities in monetary transmission, in conferences and so on. The bank itself invests in models where money matters. These

¹⁸ Humphrey (1997) takes a monetarist interpretation of Wicksell, but studiously avoids Wicksell’s denial of all the relevant empirical assertions, as well as his advocacy of a discretionary policy.

¹⁹ Wicksell’s theory allows exogenous changes in money to have effects on prices. The regime he recommended would, however, avoid or counteract them. Laidler (1991) shows how his judgment about the empirical importance of money supply disturbances evolved: in 1898 Wicksell thought such events had been rare, but he later acknowledged that gold discoveries led to “the much higher price level during the decade [*sic*] 1893-1913” (1915, p 125).

²⁰ For a similar Bank of England view see King (1992).

vary over a wide range, from single equations, to dynamic general equilibrium theory and structural VECMs (Longworth, 2002). The bank has unearthed evidence that certain monetary aggregates have predictive power not captured by other variables. This research diversifies the bank's portfolio of models, but it has not penetrated actual policy-making to any depth. Unpredictable shifts repeatedly undermine confidence in the aggregates. Even though the policy-makers receive regular in-depth briefings on money supply, and the *Monetary Policy Report* has a section on money supply, it is notable in the bank's regular interest rate announcements by its absence. If money is there at all, it is to reinforce the message in other data.

After all the water under the bridge, present central bank views on the money supply are not so different from Wicksell's. In a theoretical long-run sense money is neutral, intrinsically linked one-for-one with the price level. Large changes in money stocks have to be watched—there is always the possibility that they might embody a significant shock. In a low inflation environment, however, the money-inflation correlation is quite weak, and no basis for policy formulation.

4.4 Price level measurement

Monetary economists—Irving Fisher and William Stanley Jevons, as well as Wicksell—made seminal contributions to index number theory, as well as to its practical application. Having concluded that general price stability should be the standard, they followed up with research to measure movements in the general price level. In the absence of price indexes, it was difficult to gauge the size of general price fluctuations, and hence to analyze monetary history, a fact which caused Wicksell some frustration.

The Bank of Canada has resumed the monetary tradition of research on price indexes. It has thoroughly examined possible bias in the CPI (Crawford, 1998). Its interest in capturing the underlying trend has stimulated Statistics Canada to produce, in addition to the CPI, a series that omits highly volatile items. The bank's own core inflation rate, which Stat Can publishes, removes the effects of changes in indirect taxes from the preceding (Macklem, 2001). The bank's close, ongoing interest encourages the production of relevant, high quality data.

Wicksell, we can only imagine, would be amazed and delighted at the headlines and analysis in the business pages that follow Stat Can's monthly CPI release, and, above all, at the central bank's prominent role.

5. Framework to conduct monetary policy

5.1 Who's in charge?

Co-operation between the banks of a single country for the regulation of interest rates is, already, of course, a matter of everyday procedure. 1898 p 192.

But all of this presupposes that the banks or the authorities in charge of monetary administration do actually have the power to regulate the general level of prices.

1908 p 37.

In my opinion [a true central bank] ought, first, to be a purely state institution.
1917 p 78.²¹

Central bank evolution

Wicksell was convinced that the interest rate could and should be managed to provide price stability, and that this would provide an enormous social benefit. But where did—or should—this responsibility rest? The idea that the primary function of the central bank is monetary policy took shape during Wicksell's working life.²² Until the 20th century conventional thinking saw the gold standard as the best basis for monetary stability. In 1900, the notion that intelligent policy should be used to this end was still just an emerging academic view; by the end of the 1920s circumstances forced central banks in this direction, even as they tried to maintain the gold standard.

Wicksell was prominent in, and influenced by, the development of modern central banking: his early writings are vague on the location of responsibility for monetary policy; his later writings pin it down.

Thus, in 1898 Wicksell is after *co-operation between the banks*, and in 1908, *the banks or the authorities in charge of monetary administration*. In 1917, when he settled on the *central bank*—which was to be an institution for government policy, and not the uneasy private/state blend of the day—he was a few years ahead of the crowd. But it took another 70 years to establish price stability, or low inflation, as the overriding objective. In retrospect, this is passing strange, because this objective provides a logical basis for central bank independence.

In the 21st century, most central banks have a price stability mandate, or some facsimile. Modern concerns about central bank governance—mandate, independence, relationship with the government, accountability—reflect further progress in a direction that Wicksell started.

Bank of Canada evolution

In Canada, legislated responsibilities have changed remarkably little since the Bank of Canada was established in 1934. The only reform in this regard came in the wake of the Coyne Affair. Prior to becoming Governor, in 1962, Louis Razminsky insisted on a clarification of the responsibilities of government and central bank, which was put into the revision of the Bank of Canada Act in 1967. The government is ultimately responsible for monetary policy, and in the event of an irreconcilable difference the Minister of Finance may send a public, written, directive to the Governor specifying the

²¹ The context is an argument for a Scandinavian monetary union.

²² The Swedish central bank is a good example. The Riksbank had been primarily a state commercial bank until the late 1890s, when it assumed public responsibilities of the kind the Bank of England had had for decades, e.g. lender of last resort (Riksbank website, history pages). In this sense, the Riksbank became a central bank not far ahead of the Federal Reserve System or, for that matter, the Bank of Canada. If the essence is monetary policy, as we may be inclined to think today, central banks proper first emerged in the 1920s and 1930s.

action the bank must take, and the timing. The directive power, in effect, strengthens the operational independence and accountability of the bank.²³ It ties the government to the Bank of Canada's conduct of monetary policy; ministers cannot criticize when they can command.²⁴ At the same time, it imposes an obligation on the bank to provide information about its actions to the government, for which routine processes have been established. It also implies a less formal, but no less important, requirement for accountability about monetary policy vis-à-vis the general public.

No legislative reform, however, has had nearly as much practical import as the efforts of John Crow, Governor between 1987 and 1994, to strengthen monetary policy and the role of the central bank.

The Governor would have liked a price stability objective in the Bank of Canada Act.²⁵ In its absence, for guidance to the policy mandate, he studied the preamble, a concoction of good intentions, with the provision “so far as may be possible through the scope of monetary action.” The latter was one blade of the dialectic scissors Crow would wield. Furthermore, the Act gives the Bank of Canada considerable independence—to what purpose? Second blade: there has to be an objective that needs shielding from routine politics. The scissors cut away the superfluous from the preamble, to reveal the thing itself, unaccommodated price stability. No other objective made sense.

At first the rhetoric sounded shocking, but in 1991 the objective of price stability was embodied in the inflation-reduction targets, which many economists regard as the beginning of inflation targeting in Canada. The stability objective was defined as a rate of inflation “clearly below 2 percent.” By virtue of John Crow, Wicksell moved into the Bank of Canada in an operational way. Although the objective was soon modified, the focus on a single, price level, objective has remained.

A notable feature of the Canadian targets is their *joint* announcement by the bank and the government, confirming that the Bank of Canada helps set the objective, and is not just an agency to that end.

Central banks are a work in progress. Their monetary policy function is not old. The modalities are not carved in stone. Debate goes on about the mandate, about low inflation versus price stability, and other such subjects. Political events and the local environment embellish the facade and affect the plumbing of every central bank. But underlying all this is a common structure for which Wicksell drew a blueprint.

5.2 Price stability or low inflation

The ideal position, affording common advantage to the overwhelming majority of the various groups of interest would undoubtedly be one in which, without interfering with

²³ Some academics get this wrong, e.g. in calibrating an “index of central bank independence.”

²⁴ Compare the situation in the United States, where Secretaries of the Treasury do not hesitate to urge the Fed to loosen up.

²⁵ For Crow's views we can rely on his lively memoir *Making Money*.

the inevitable variations in the relative price of commodities, the general average level of prices—in so far as this conception can be assigned a definite meaning ...—would be perfectly invariable and stable. 1898 p 4.

This quotation could be from John Crow. The Governor and Wicksell are both price-stability hardliners, and both have an engaging turn of phrase. “Those people who prefer a continually upward moving to a stationary price level forcibly remind one of those who purposely keep their watches a little fast so as to be more certain of catching their trains.” (p 3). Wicksell’s distaste for inflation was reinforced by his view that it created speculative excesses, and hence crises, which would trigger slump and deflation (p 213).

Wicksell expresses dislike of inflation and deflation—that Crow has less to say against the latter you can put down to the difference in environment. To reinforce their case, both men emphasize the ethics as well as the economics of a commitment to price stability.

At the end of 1993, the new Liberal government wanted to replace the price stability objective with a 1-to-3 percent inflation target of indefinite duration. Crow could not accept this much water in the wine, and so did not seek reappointment to a second term.²⁶ To be precise about the date, inflation targeting in Canada starts in February 1993, with the arrival of Gordon Thiessen as Governor. Since then, Canada has aimed at 2% inflation.²⁷ The most recent restatement of the objective (2001) allows that, after 10 years’ experience with low inflation, the bank does not see clear gains from a lower target. A new statement is due in 2006.

The Bank of Canada, uniquely, has intensively studied and debated the implications of using the *price level* as a policy objective rather than the *inflation rate*.²⁸ Whereas the consensus (e.g. Fischer, 1994) dismisses a price level objective, fearing high output volatility and deflation risk, the bank’s research suggests the case is not closed. A slightly rising target level (it could be 2% p.a.), and an appropriately smooth policy rule (i.e. a longish target horizon), would deal with the main objections.²⁹ Because it has memory, a credible price level objective would be an effective solution to a deflation trap: a price decline would require, and create expectations of, a spurt of inflation.

In any event, the adoption of low inflation as the objective, rather than price stability, stands out as the main difference between Wicksell and neo-Wicksellian monetary policy.

²⁶ Crow also detected a subtle erosion of the authority of the bank, which he thought should be more than an agency pursuing a numerical objective set by the government.

²⁷ This maximizes the probability that the outcome will be in the official 1-3% range.

²⁸ Duguay (1994a) and Coulombe (1997) provide original ideas and excellent discussions.

²⁹ The issue is between a trend-stationary process (finite variance around the trend) and a non-trend-stationary process (unbounded variance). Finite variance in the price level has obvious virtues over unbounded variance if a nominal anchor is important.

5.3 Instrument—framework for interest rate control

[The central bank] ...could set a rate of interest on deposits that was only very slightly lower, or preferably no lower at all than the rate of interest the bank itself asked ... I see no real reason for the traditional state of affairs, in many places fixed by law, according to which central banks ought not to grant any interest on deposits. 1917 p 78.

In keeping with his focus on the interest rate as a policy instrument, and with his pure credit banking model, by 1917 Wicksell came to recommend a method of policy implementation based on the deposit and discount rates of the central bank. He was concerned that the operating framework, rudimentary as it then was, did not allow sufficient policy influence over interest rates.

His recommendation was to ensure closer interest rate control was, again, very far-sighted. For most of the 20th century, central bankers and academics instead highlighted reserve requirements, liquidity ratios, and reserve supply. Legal minimum requirements forced banks to hold zero-interest reserves at the central bank. Changes in the supply of reserves, relative to the requirement, were the instrument. The ability of the central bank to control the level of its liabilities—liquidity provision—was the key operating variable. Interest rates went wherever they had to go, as a consequence of, as John Crow would say, an appropriate pace of monetary expansion.

In the early 1990s, Canada, along with many countries, phased out reserve requirements. The fractional reserve model obviously no longer applies—banking systems are, in the 21st century, pure credit systems.

In 1994 the Bank of Canada first announced a 50-basis point wide operating band for the overnight money market interest rate. In the 1999 re-fit of the operating framework, for the new electronic Large Value Transfer System, the bank started to pay interest on settlement balances. The latter provides a floor for the overnight interest rate in the money market, just as in Wicksell's description. At the top end, the lending rate of the central bank—Bank Rate in Canada, discount rate in Wicksell—provides the ceiling. This arrangement allows the central bank to control the short-term interest rate within fine tolerances (Clinton, 1997; Howard, 1998).

Central banks used to give abstruse signals about monetary policy through the provision of bank reserves, which specialized economist-scribblers would demystify for the masses.³⁰ These quantities no longer have any policy significance at all.

6. Concluding thoughts

So far that it can be ascertained with reasonable certainty if and when changes in the purchasing power of money have occurred in reality, we have acquired an objective basis for attempts to prevent such changes by rational methods. It has to be admitted that even then, it is no easy task that lies before the combined forces of economic science and economic practice; but provided only the theorists are done with their part of the task,

³⁰ For example, Clinton (1991).

the practitioners will surely find ways to apply their teachings—to the extent, that is, that they are forced to do so by necessity. 1902 p 31.

Before Keynes, Wicksell came to the conclusion that the central bank *could* stabilize the value of money, and that it *should* do so. Since money is a social contrivance, it makes little sense to leave its value to the vagaries of gold production and commercial banking, and so on. There has to be a way of managing money that improves on this.

Such thoughts broke open the idea of monetary policy. With uncanny timing, Wicksell worked during the hey-day of the gold standard, and his thinking was ready to apply just before that system ran into terminal trouble. The recommendations—for stabilizing the price level, for the framework of implementation, and for a policy rule—are practical and unambiguous, less open to interpretation than Keynes, and useful with little modification in a wide range of situations.

Wicksell's optimism that policymakers would soon adopt his proposals was reasonable, given their relevance and the quality of his argument. That the major central banks did not appreciate their merit was a huge lost opportunity. Wicksell's approach would have been a vast improvement when it really counted, during the Great Depression of the 1930s, and the Great Inflation of the 1970s and 1980s.

Wicksell's conception of monetary policy—intelligent management of the interest rate for price stability—captures Crow, Thiessen, Dodge, Greenspan, Bernanke, and all. After more than a decade we have enough information to start judging performance. The results so far look good in comparison to the preceding regimes. And, since no alternative is apparent, the neo-Wicksell regime looks set to last. After a century of trial and error, monetary policy may have found its firmest basis yet.

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