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The Problems of Inflation Targeting Originate in the Monetary Theory of Knut Wicksell

Lars Jonung

April 2022



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The problems of inflation targeting originate in the monetary theory of Knut Wicksell

2021 Felix Neubergh Lecture November 25, 2021

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Lars Jonung

Abstract

The theoretical foundation of inflation targeting was laid out by the Swedish economist Knut Wicksell (1851-1926) in his groundbreaking treatise, *Interest and Prices*, published originally in German in 1898. Here he proposed price stability as the rule for monetary policy. Today, inflation targeting is considered the best-practice approach to monetary policy across the world. It has contributed to stable and low consumer price inflation since the 1990s in many countries. However, inflation targeting has recently been the subject of several objections. Most prominently, the focus on consumer price stability has fostered financial instability, as reflected in the global financial crisis of 2008-09. In addition, the sharp rise in asset prices has led to growing wealth inequality.

Why have these problems emerged? This paper provides an answer by comparing Wicksell's theory of price level determination in a pure credit economy, the "cumulative process", to the neo-Wicksellian world of today, characterized by inconvertible fiat money, floating exchange rates, advanced financial systems, unregulated interest rates and well-developed asset markets. In this way, it becomes apparent that the neglect of asset markets and asset prices is the source of the flaws of the present Wicksellian regime of unlimited finance. The shortcomings of the neo-Wicksellian approach can be remedied while remaining within a Wicksellian framework. The key is to combine the nominal anchor of price stability with a reformed financial system that maintains credit stability. The paper uses empirical evidence from Sweden and the United States.

Key words: Inflation targeting, price level targeting, natural rate, Knut Wicksell, Milton Friedman, financial crises, credit, asset inflation, central banking.

JEL Code: B10, B22, E10, E31, E40, E5, G01 and G2.

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List of contents

- 1. Introduction**
- 2. Recent problems with inflation targeting**
- 3. Wicksell's cumulative process**
- 4. Why did it take so long for Wicksell's rule to be adopted as practical policy?**
- 5. The neo-Wicksellian view**
- 6. Asset markets – the missing element in the Wicksellian approach**
- 7. The present Wicksellian monetary regime of unlimited finance**
- 8. Reforming the present monetary regime of inflation targeting**
- 9. The future**
- 10. Concluding discussion**

References

Table

Figures

The problems of inflation targeting originate in the monetary theory of Knut Wicksell

“No finer intellect and no higher character have ever graced our field. If the depth and originality of his thought do not stand out more clearly than they do, this is only owing to his lovable modesty,”. Schumpeter (1954, p. 862) on Wicksell.

1. Introduction¹

Since the early 1990s, inflation targeting has been adopted by a growing number of countries. Presently, it is considered the best-practice approach to monetary policy. Initially, inflation targeting appeared quite successful in reducing the rate of inflation and keeping it at a low and stable level. However, in the years following the global financial crisis of 2008, it has been criticized for causing excessive growth of credit and debt, in this way fostering financial risks and instability. Inflation targeting as implemented in the United States contributed to the global financial crisis of 2008. The extremely expansionary monetary policies adopted after this crisis and during the coronavirus pandemic have raised asset prices sharply and thus made new financial crises in the future more likely. In addition, rapid asset prices have made the distribution of wealth more unequal.

Why have these problems emerged? The purpose of this paper is to provide an answer by going back to the monetary theory underlying present inflation targeting as it was laid out by the Swedish economist Knut Wicksell (1851-1926). His groundbreaking work on monetary theory, originally published in 1898, whose leading element is commonly labelled the “cumulative process”, serves today as the theoretical core of inflation targeting, although his work was long ignored or forgotten.

The neo-Wicksellian contributions made *after* the adoption of inflation targeting have not altered the fundamental theory originating with Wicksell. In short, Wicksell’s approach defines modern central banking. For this reason, his monetary theory, based on the interest

¹ I have benefitted from comments and conversations with many, including Ronald Albers, Mauro Boianovsky, Benny Carlson, Emil Ems, Charles Goodhart, Björn Hansson, Axel Leijonhufvud, Claes-Henric Siven, Ulf Söderström, John B. Taylor and Hans-Michael Trautwein. I am especially indebted to Fredrik N. G. Andersson, Roger Backhouse, Michael D. Bordo, David Laidler, Kurt Schuler, Geoffrey Wood and Michael Woodford for decisive suggestions. Fredrik N. G. Andersson has generously helped me with the figures. Daniel Waldenström and Michael D. Bordo have kindly supplied me with data. The usual disclaimer holds.

rate gap, his price stability rule, and his view of the proper monetary system represents an appropriate starting point to analyze the shortcomings facing present-day inflation targeting.

This paper is based on the following roadmap. To organize the search for missing elements in the cumulative process, a child of the late 19th century, section 2 offers a critique of inflation targeting. Section 3 describes the crucial features of Wicksell's theory of price level determination and the monetary system he envisioned. Although Wicksell expressed his rule of price stability in 1898, it took roughly one hundred years for it to be applied as the guide for monetary policy under the label of inflation targeting. Section 4 explains why. Section 5 compares Wicksell's model to the neo-Wicksellian contributions that have emerged *since* the gradual introduction of inflation targeting. Against this background, Section 6 evaluates the missing elements in the cumulative process. The focus is on the role of asset markets and the financial system, neglected by Wicksell. Section 7 describes the characteristics of the present Wicksellian monetary regime of limitless finance. Section 8 presents proposals for reforming this regime in order to ensure a better performance, schemes that are consistent with the Wicksellian rule of price stability. Section 9 concerns the future. Section 10 concludes.

The empirical evidence is primarily taken from Sweden and the United States. Sweden is a logical choice, as Wicksell lived in Sweden and as his monetary theory has had a major impact on Swedish economic thought as well as on its monetary policy. In the early 1930s, Sweden became the first – and so far the only – country to adopt Wicksell's rule of price level stabilization. The United States is included because U.S. monetary policy and monetary thinking have exerted a predominant influence on the monetary policies of the rest of the world after World War II. In addition, comparing the Swedish and the U.S. record has the benefit of bringing out the challenges meeting inflation targeting in a small open economy such as Sweden compared to a large, less open economy such as the United States.

2. Recent problems with inflation targeting

The strategy of inflation targeting may be summarized in the following way. The goal of monetary policy is price stability, defined by a preannounced number, commonly set at 2 per cent annual inflation, or a range for the rate of consumer price inflation. The main policy instrument is the short-term central bank rate, commonly termed the policy rate. Inflation targeting is based on a monetary system of fiat money, of floating exchange rates and of

independent central banks where the central bank is accountable to the political system for its performance.

An implicit assumption behind inflation targeting is that the framing of monetary policy can and should be separated from fiscal policy. Parallel to the move to inflation targeting, fiscal policy has been restrained by fiscal frameworks in several countries, reducing the role of discretionary fiscal measures. Instead, reliance is put on automatic stabilizers.

In 1990, the Reserve Bank of New Zealand became the first central bank to embrace inflation targeting as a consequence of the 1989 Reserve Bank Act. Shortly thereafter, several central banks followed suit, including the Bank of Canada in 1991, the Bank of England in 1992 and the Riksbank, the Bank of Sweden, in 1993. Present-day central banking is based on inflation targeting. All the major central banks except the People's Bank of China are explicit inflation targeters. More than 30 central banks have adopted this approach. So far, no serious alternative strategy to this type of a rule-based monetary regime has emerged.²

Inflation targeting appears quite successful as a monetary policy regime, judging from its rapid global acceptance as well as from the actual behavior of inflation. It has contributed to stable and low consumer price inflation for about three decades starting in the early 1990s, as demonstrated in Figure 1, which shows the rate of consumer price inflation in Sweden and the United States from 1970-2020.³

Inflation was high and variable in the 1970s and 1980s, turning to a lower and a less volatile pattern with the advent of inflation targeting. Swedish inflation has remained low after the financial crisis that hit Sweden in 1992-93 as part of the crisis of the European Monetary System. The Great Moderation, defined as low business cycle volatility and low inflation in the United States from the end of the 1980s to the global financial crisis of 2008, was regarded as caused by a more independent Federal Reserve that adopted a rule-bound monetary policy focused on price stability.⁴

² Many countries have pegged exchange rates under central banking, fixed rates under currency boards, or currency unification under dollarization or membership in a regional central bank. The anchor currencies in almost all these cases are based on inflation targeting.

³ Other factors besides inflation targeting, like the entry of China into the world market, contributed to low inflation in the world economy.

⁴ The Federal Reserve did not officially target inflation until 2012, but it focused on price stability (without a numerical specification) as the main goal of monetary policy. It can be

The decline of consumer price inflation was accompanied by falling interest rates, as seen in Figure 2, which shows the policy rate of the Riksbank and the Federal Reserve from 1970-2020. As a small and financially open economy, Sweden tracked the international development headed by the United States.

Prior to the global financial crisis of 2008, inflation targeting was commonly regarded as a promising approach, although not one yet fully tested as a policy framework. The literature on the inflation targeting was initially cautiously optimistic.⁵ Summarizing the international experience of the first decade, Bernanke et al. (1999, p. 308) wrote:

We conclude that inflation targeting is a highly promising strategy for monetary policy, and we predict that it will become the standard approach as more and more central banks and governments come to appreciate its usefulness.

The financial crisis of 2008 severely damaged the success story of inflation targeting, opening the way for a critique.⁶ Critics argued that falling interest rates in the years before the crash of 2008 had contributed to a rapid rise in the volume of credit and a concomitant rise in stocks and especially in house prices (see Figures 3 and 4). They viewed the crisis as the outcome of an excessively expansionary monetary policy that focused on consumer price inflation and ignored financial market developments and asset prices.

This assessment had many advocates. Even before the crisis, Leijonhufvud (2007a) warned about the “perils of inflation targeting”. In his opinion, the expansionary policy of the Federal Reserve had led to asset price inflation and a riskier allocation of credit, with no or little impact on domestic consumer price inflation. U.S. consumer price inflation was being held down by global competition, as central banks outside the United States maintained their exchange rates roughly constant to the dollar. In this way, expansionary Federal Reserve policy contributed to asset price inflation across the world with no discernible effect on consumer price inflation.⁷

described as an implicit inflation targeting central bank or an inflation targeter in disguise before adopting an official inflation target.

⁵ See for example the introduction to Leiderman and Svensson (1995), a survey of the early experience of inflation targeting.

⁶ See for example the contributions in Cobham et al. (2010) dealing with the first 20 years of inflation targeting. Optimism about inflation targeting remained strong, although the crisis of 2008 was viewed as a challenge for the future of inflation targeting.

⁷ See also Leijonhufvud (2007b).

Later, Leijonhufvud (2014, 2015) returned with the same message. In his opinion, the crisis of 2008 had undermined the belief in the prevailing central bank doctrine of inflation targeting. This doctrine has led to “an exclusive concentration on keeping consumer prices within a narrow range with no attention to asset prices, exchange rates, credit quality or (of course) unemployment”, in this way contributing to the crisis.

Some critics went further. Frankel (2012) announced the death of inflation targeting. In his obituary, this monetary regime “passed away in September 2009”. The main cause of its death was “the lack of response to asset market bubbles”, as witnessed by the financial crisis of 2008. Other commentators held a more nuanced but still critical view. For example, Taylor (2014) argued that U.S. monetary policy was too expansionary due to low policy rates before the crisis.

In a volume edited by Reichlin and Baldwin (2013) with the telling title *Is Inflation Targeting Dead? Central Banking after the Crisis*, 14 economists offered their views. There was general agreement that inflation targeting failed to prevent the financial crisis and that inflation targeting did not contribute to rapid recovery after the crisis. Still, there was no consensus on any alternative monetary regime that might replace inflation targeting. Similar objections from a British perspective are presented in Turner (2016); in short, a warning against the dangers of excessive debt and credit creation.

After the financial crisis of 2008, monetary policy turned still more expansionary to meet the subsequent depression. The euro crisis forced the European Central Bank (ECB) to take action to stabilize the financial system in the euro area. Lack of backing from fiscal policy put pressure on central banks to carry out expansionary policies to support the recovery.

In response to these developments, central banks reduced their policy rates further; some of them moved them into the negative range. The Riksbank was the first central bank to do so, for a short time during the financial crisis of 2009.⁸ Negative policy rates were adopted in the period 2014-2019 by the Riksbank while the Federal Reserve has remained in the positive range, but close to zero. See Figure 2.

Central banks added quantitative easing to their inventory of instruments when they purchased government debt instruments, private bonds and stocks at an unprecedented scale

⁸ Sweden was the first inflation targeting country with a floating exchange rate to introduce a negative policy rate as a standard instrument of monetary policy; see Andersson and Jonung (2019).

to reduce the long-term interest rate and support the financial system. Consequently, their balance sheets, measured as a share of GDP, displayed a stunning expansion (Figure 5).

Expansionary monetary policies contributed to rapid growth in the volume of credit, to rising asset prices, and in this way to growing risk of future financial instability and crises. Most recently, in 2020-2021, the threats to the stability of the financial system created by the coronavirus pandemic induced far-reaching monetary measures (Figures 3 and 4). Low short-term and long-term interest rates have facilitated a sharp growth in public debt on a global scale, blurring the separation of monetary policy from fiscal policy.

Economists have condemned these developments along the same line as the critique of inflation targeting immediately following the crisis of 2008.⁹ Even central bankers like Mark Carney (2020), governor of the Bank of England, have warned of the shortcomings of inflation targeting:

The crisis exposed the limits of inflation targeting itself, notably how a healthy focus on price stability could become a dangerous distraction. Central banks had won the war against inflation only to lose the peace as financial vulnerabilities built remorselessly during the Great Moderation. Price stability clearly is not a guarantee of financial stability.

To summarize, inflation targeting, once a promising regime, has run into major problems. The central objection is that the focus on consumer price stability contributed to the global financial crisis of 2008 and to growing financial imbalances after this crisis. Economic growth has been sluggish following the 2008 crisis and during the corona crisis of 2020-21, casting doubt about the potency of monetary policy. Instead, politicians and economists have looked to fiscal policy measures. In addition, the rapid rise in asset prices has contributed to growing wealth inequality, fostering requests that the framers of monetary policy should pay attention to its distributional effects, an aspect that was lacking initially from the discussion of inflation targeting.¹⁰

⁹ See for example Buiter (2021) and Rajan (2021) for recent views.

¹⁰ See for example Domanski et al. (2016) on the effects of asset inflation on inequality and Bridges et al. (2021) on the impact of recent financial crises on income inequality *after* crises.

Other types of objections have been raised. Inflation targeting consistently undershot the targeted inflation rate in many countries after the financial crisis of 2008. Inflation targeting has also had problems in dealing with supply-side and terms-of-trade shocks.¹¹

Why have these problems with inflation targeting emerged? How can they best be understood? To answer these questions, I find it constructive to start with the original theory behind inflation targeting, that is, with the contribution by Knut Wicksell. I am well aware that the work by Wicksell has not been the focal point for economists writing about inflation targeting in recent decades. Instead, their work has a strong Anglo-American bias, neglecting the Swedish development of the theory and the policy of price stabilization.

In the 1930s, Gunnar Myrdal (1939, pp. 8-9) complained about the disregard or ignorance of Wicksell's contributions among English-speaking economists in the following way:

Nevertheless Keynes' work, too, suffers from the attractive Anglo-Saxon kind of unnecessary originality, which has its roots in certain systematic gaps in the knowledge of the German language on the part of the majority of English economists.

Much suggests that Myrdal's remark has a bearing on the present lack of Wicksell's contribution in Anglo-American monetary analysis of inflation targeting. One aim of this paper is to remedy this situation by bringing out the Swedish perspective and linking it to present monetary debate about inflation targeting and monetary policy rules.¹²

3. Wicksell's cumulative process

Knut Wicksell's main contribution to monetary economics was published in 1898 in German as *Geldzins und Güterpreise* (Wicksell 1898a). An English translation was published in 1936 as *Interest and Prices* (Wicksell 1936). The literature on Wicksell's monetary theory and on his profound influence on monetary theory and macroeconomics is immense.¹³

¹¹ For example, a decline in energy prices reduces consumer price inflation and should accordingly be met with a reduction of the policy rate. However, such a policy would be procyclical, adding to the expansionary effect of falling energy prices.

¹² The work by Woodford (2003) is an outstanding exception. He starts with Wicksell in his treatise and develops a neo-Wicksellian approach that has been most influential in recent decades. See section 5.

¹³ See for example chapter X and XI in Uhr (1960), Note E in Patinkin (1965), Leijonhufvud (1981), chapter 5 in Laidler (1991a) and Armon (2011). The cumulative process is

Wicksell was inspired by the British debate on bimetallism and on the secular movements in the price level in the 19th century, specifically by the fall in prices in the 1880s and 1890s.¹⁴ So, he began with a current observation and developed a theory to account for it.¹⁵ His aim was to create a theory to explain the long-run changes in the price level in the 19th century as exemplified by wholesale prices.¹⁶

The cumulative process for a pure credit economy: The starting point for Wicksell was the quantity theory of money, which he considered the only valid scientific basis for monetary theory. In an economy where money is only made up of coins and notes, that is, a *pure cash economy*, the quantity theory is straightforward to apply. However, he observed that the contemporary monetary system was evolving towards a *pure credit economy* where

money does not actually circulate at all, neither in the form of coins (except perhaps as small change) nor in the form of notes, but where all domestic payments are effected by means of the *Giro* system and bookkeeping transfers. (Wicksell 1898a, p. 70).

The actual commercial banking system had not yet reached this stage of a *Giro* system, the opposite case of the pure cash economy with no credit. The monetary system in Wicksell's time combined elements of cash and credit. Wicksell sought to develop a theory of price level determination applicable for "these two extremes", a pure cash economy and a pure credit economy. He focused on the pure credit economy, where all money is *inside money*, that is credit money produced by the banking system.

To arrive at such theory, Wicksell introduced two different interest rates in his model: first, the *natural rate*, defined as the rate of return on new investment, the marginal productivity of

summarized in Brems (1986, chapter 8) and Hansson (1987), among others. Humphrey (1986) traces the intellectual roots of the cumulative process to early British contributions.

¹⁴ Wicksell outlined his monetary theory in several papers prior to the publication of *Geldzins und Güterpreise*, according to Boianovsky and Trautwein (2001). See also Wicksell (1895), where he drafted a plan, hoping to throw some light on the relationship between the value of money and capital – a problem that is "one of the most difficult to solve for economists".

¹⁵ Hicks (1967, p. 156) observed that some of the best work on monetary theory is topical "prompted by particular episodes, by particular experiences of the writer's own time." As examples he mentioned that Ricardo was inspired by the monetary problems facing England after the Napoleonic wars and Keynes by the Versailles peace treaty in the 1920s and by the Great Depression of the 1930s. Ten years later, Hicks (1977, p. 45) extended the list: "I might have added Wicksell, who clearly thought out his monetary theory in relation to the fall in prices in the 1880s and 1890s".

¹⁶ The historical setting of Wicksell's *Geldzins und Güterpreise* is discussed among others by Åkerman (1960) and Hughes (1968).

capital; second, the *bank rate*, also termed the loan or the market rate, the cost of borrowing from the banking system by entrepreneurs.

A difference between these two rates, the “interest rate gap” in modern phrasing, drives movements in the absolute price level in the following way. If the natural rate moves above the bank rate, entrepreneurs find it profitable to borrow to finance new investment activities. The banking system meets this demand by increasing its lending, initially without raising the bank rate. The entrepreneurs use the credit granted them to invest in new capital, paying workers with the loans. The rise in credit leads to a rise in the general price level. On the other hand, when the natural rate is lower than the loan rate, the demand for credit will decline and the price level will fall.

Wicksell made the process cumulative in the sense that it does not stop as long as there is a difference between the bank rate and the natural rate, in this way establishing a theory of monetary dynamics, known as the cumulative process. In the case of a pure credit economy, there is no mechanism that arrests the movement in prices. In Wicksell’s words:

The essential point is that the maintenance of a constant level of prices depends, other things remaining equal, on the maintenance of a certain rate of interest on loans, and that a permanent discrepancy between the actual rate and this rate exerts a *progressive and cumulative* influence on prices. (Wicksell 1898a, pp. 120-121).

Finally, Wicksell proposed a rule for monetary policy based on the cumulative process: the price level should be kept stable. This goal is attained by a monetary policy keeping the bank rate equal to the natural rate; this bank rate is the “normal rate”, in his terminology.

Why did Wicksell settle on price level stabilization as the proper goal for monetary policy? In the introduction to *Interest and Prices*, he stated that “a perfectly invariable and stable” price level will be advantageous “to the overwhelming majority of the various groups of interests” (Wicksell 1898a, p. 4). He explicitly ruled out a positive rate of inflation as a goal with the argument that there will be no “beneficial influence” when such a rate is fully expected, see Wicksell (1898a, pp. 3-4):

Moreover, if a gradual rise in prices, in accordance with an approximately known schedule, could be reckoned on with certainty, it would be taken into account in all current business contracts; with the result that its supposed beneficial influence would necessarily be reduced to a minimum. 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. But to achieve their purpose they must not be conscious or remain conscious of the fact that their watches are fast; otherwise they become accustomed to take the extra few minutes into account and so after all, in spite of their artfulness, arrive too late.

When presenting his cumulative process for the first time for a Swedish audience in the Swedish Economic Association (*Nationalekonomiska föreningen*), Wicksell (1898b) argued in the following way:

There is no need to waste words proving how important it is that the exchange value of money or, what is the same thing seen from the opposite view, the general level of commodity prices, remains as stable and constant as possible. Money is the standard of all values, the basis of all property transactions, and daily becomes more and more so. ... What then can be more important than that what constitutes the standard of everything else should itself retain a constant magnitude?

Wicksell pointed out that standards of weight and measures were kept constant. The same should hold for money, the standard of value. This goal was possible to obtain with a monetary policy aimed at price stabilization.

In the final chapter of *Interest and Prices*, Wicksell envisaged that banks within a single country should cooperate in setting the bank rate to achieve price stability. International cooperation among banks would stabilize the world price level in a similar way. Wicksell suggested “an international commission on the lines of the Metric Commission” assigned the task to inform about “a divergence of the world price level from its normal level”. Banks across the world would then be obliged to change their rates until equilibrium would be restored. Wicksell recommended the introduction of “an international paper standard” by suspending the prevailing gold standard, preferably introducing “a uniform unit of value”, or at least adjust prevailing units “so as to simplify their arithmetic relationships.”¹⁷

Wicksell remained critical of the workings of the gold standard in many of his ensuing contributions. He wanted to replace it by an international paper standard where the monetary authorities would cooperate in setting the policy rate to ensure price stability. In the 1920s, he discussed the proper way to carry out price level stabilization in a global context. According to him, there were two mutually exclusive alternatives. It could be done by single countries

¹⁷ The gold standard has attracted a great interest from economists. For a survey, see Bordo (1984). Wicksell’s critique of the gold standard represents one of many views on the workings of this monetary regime.

with flexible exchange rates among them, or by countries forming a global monetary union with fixed exchange rates among them. He was uncertain which system was the best one.¹⁸

Wicksell's cumulative process contains the essential elements of present-day inflation targeting: price stability as the goal for monetary policy and the policy rate of the central bank as the instrument. The central bank rate should alter its policy rate continuously to eliminate any difference between the loan rate and the natural rate and thus maintain price stabilization. However, Wicksell did not discuss the practical implementation of price level stabilization in any detail, issues that are pertinent to the present design of inflation targeting. For example, he did not consider the proper index to adopt as the guide for monetary policy, the possible use of a tolerance band, measures to increase the credibility of a program of price stabilization and so on.¹⁹ Nor did he discuss how the central bank should respond if the stable price level was undershot or overshot.²⁰ His focus was on the theory for a price level stabilization policy.

Bertil Ohlin (1934) named Knut Wicksell the father of the Swedish experiment of price level stabilization in the early 1930s. Paraphrasing Ohlin, Knut Wicksell is also the father of inflation targeting and thus of the current approach to rule-based central banking. In this way, it is fair to say that Wicksell's influence on the framing of present monetary policy has surpassed that of any other economist.

Crucial assumptions behind the cumulative process: Wicksell's model is based on a few central assumptions that should be recognized, as they have a bearing on the shortcomings of present inflation targeting.

First, his model contains no financial assets such as stocks and real estate. There is no financial sector outside the commercial banking system. "Passive" commercial banks only lend to finance new capital investments at the requests of entrepreneurs. No financing of "old" capital like housing occurs by definition. At the end of the period, specified as one year in the

¹⁸ See Jonung (2002). Wicksell was a proponent of Scandinavian monetary cooperation. Considering the future of Scandinavian monetary policy after World War I, Wicksell (1917, p. 78) recommended that Denmark, Norway and Sweden re-establish the Scandinavian currency union with a new central office located to Gothenburg, mimicking the newly established Federal Reserve System in the United States, avoiding any of the Scandinavian capitals as locations for the common Scandinavian central bank.

¹⁹ These issues emerged in the Swedish debate in the 1920s and 1930s. Lindahl (1930) dealt with most of them.

²⁰ As far as I have seen, there is no argument in Wicksell's works suggesting that the central bank should compensate for deviations from a stable price level.

formal exposition of his theory, entrepreneurs pay back their loans to the banking system.²¹ The loans are thus self-liquidating, not being turned over. Accordingly, only changes in the bank rate have an impact, and a direct one, on consumer prices. As financial assets are excluded, there is no role for asset prices.

These assumptions rule out financial crises driven by excessive lending and credit growth, commonly to finance asset purchases, negative wealth effects and sudden stops.²² Crises, financial as well as other, are outside the framework of the cumulative process.

Second, the cumulative process assumes full employment. In *Interest and Prices*, Wicksell (1898a, p. 143) noted that the “average number of unoccupied workers is relatively small, about 1 per cent”. For this reason, he rules out effects on production and employment from movements in the price level. Wicksell’s vision is that of a smoothly working and stable market economy based on free competition. Unemployment and economic crises are not part of the cumulative process. In this frictionless economy of perfect price flexibility and of no nominal rigidities, monetary policy only impacts the price level; no employment or output effects are considered as caused by inflation or deflation.²³

Third, Wicksell viewed the cumulative process as a theory of secular movements in the price level. *Interest and Prices* is focused on the long-run changes in price level in the 19th century. The cumulative process should thus be kept separate from his analysis of the business cycle.²⁴ By focusing on secular changes and using period analysis, time lags are not explicitly considered by Wicksell.

Fourth, Wicksell assumes an adaptive system, which includes the assumption of stable or static (unitary) expectations concerning price level movements. Expectations are thus not a source of instability.

²¹ The demand for money, defined as hard cash (gold), plays no role in this context. The velocity of hard cash goes to infinity in the case of the pure credit economy; see Jonung (1978a) and chapter 3 in Bordo and Jonung (1987).

²² See, for example, Reinhart and Rogoff (2009).

²³ In a manuscript from 1895, Wicksell used the term “the normal rate of unemployment” in a way analogous to Friedman’s concept of the natural rate of unemployment. Friedman was inspired by Wicksell’s term “natural rate of interest” when he introduced the concept of the natural rate of unemployment, see Friedman (1968), but he was not aware of Wicksell’s use of a similar term for unemployment. See also Jonung (1985, 1989) and Boianovsky and Trautwein (2003) on Wicksell’s analysis of unemployment.

²⁴ Wicksell (1907b) is his main work on the business cycle. See also Wicksell (1935, pp. 209-214).

Fifth, Wicksell's model is a demand-side model. It does not contain any supply-side shocks except via the natural rate, which is determined in the real sector, outside of the monetary system. Such shocks to the natural rate do not impact on the general price level directly, only through the interest rate mechanism.

Finally, the cumulative process has no government sector. Wicksell mentioned taxation but excludes this issue in *Interest and Prices* to focus on a simple exposition. Elsewhere he recommended fiscal measures to dampen downturns in the business cycle.²⁵

In addition, Wicksell assumed relative prices to remain constant in his model of the absolute price level.²⁶ Wicksell also focused on a closed economy in his description of the cumulative process. In his policy discussion, however, he suggested that international cooperation was necessary to stabilize the world price level.

These assumptions, made to bring out the central features of the cumulative process, that is, the role of the interest rate gap, did not prevent Wicksell from consistently using the cumulative process in his many comments on monetary policy issues. His standard response during the high inflation in Sweden during World War I was a plea to the Riksbank for higher interest rates and a reduction of the stock of money. After World War I, Wicksell wanted a return to the pre-war price level of 1914 through a program of monetary contraction based on a high discount rate set by the Riksbank.²⁷ Wicksell remained faithful to the theory of *Interest and Prices* as the guiding star in monetary matters.²⁸

4. Why did it take so long for Wicksell's rule to be adopted as practical policy?

Wicksell was confident about the future of his monetary rule. In 1898, when introducing the analysis of *Interest and Prices* to the Swedish Economic Association, he ended his talk in the following way:

Once a clear insight into the causes of the changes in the value of money and of the present instability thereof has been gained, the men concerned with the

²⁵ Wicksell (1907b).

²⁶ Relative price movements were introduced into the Wicksellian approach by the Austrians in the development of their business cycle theory.

²⁷ See the summary of Wicksell's monetary policy recommendations in Jonung (1979a).

²⁸ This is also seen from Wicksell's numerous unpublished manuscripts on monetary policy issues; see section 1 in Jonung et al. (2001).

practical aspect will surely show themselves equal to the task of availing themselves of this insight to create a completely stable money value to the advantage of world commerce. Once the causes of the evil have been found, the therapy and, above all, the prevention of the disease will prove a comparatively simple matter.

Wicksell's optimism proved unfounded, however. It took about a century for his rule of price stabilization to be adopted on a global scale, except for the brief Swedish experiment with price level stabilization in the early 1930s.

Why did it take so long for price stability to become the nominal anchor for monetary policy? The answer is simple. Wicksell's rule requires a monetary regime based on a paper standard, on flexible exchange rates and a financial system where interest rates are set by market participants, not by government regulation. It took about one hundred years for the world to arrive at this state of affairs.

When Wicksell published *Geldzins und Güterpreise* in 1898, the classical gold standard prevailed. Gold was the foundation of the international monetary system. Exchange rates were locked at constant levels. Commercial banks were required to convert notes and deposits into gold on demand at a fixed price. In short, there was no policy space for Wicksell's rule.

In addition, Wicksell published primarily in German and Swedish, while central banking was developed in the United Kingdom and the United States, with the Bank of England and the Federal Reserve as the leading central banks in the world.²⁹ British and U.S. economists were the foremost figures in the debate on practical monetary policy. Wicksell's voice was not heard in the Anglo-American sphere until very late, or more precisely until it was too late. An English translation of *Interest and Prices* did not appear until the same year as Keynes's *General Theory*.

World War I brought about the demise of the gold standard. The United States was an exception by remaining on gold. After the war, the gold standard was gradually restored. Sweden was *de facto* the first country in Europe to return to gold in 1922. Wicksell was opposed to this move. He wanted a return to the price level of 1914, not to gold.

²⁹ Only one article by Wicksell (1907a) on the cumulative process appeared in English before World War I. He corresponded with several English-speaking economists, however. He met with Keynes in London in 1916 and tried to convince him of the benefits of price stabilization. Reporting back to the Bank of Sweden, Wicksell noted that Keynes was not familiar with the idea of price level stabilization as a rule for monetary policy, although he found Keynes very intelligent (Gårdlund 1956, p. 326).

At the age of 73, he gave the introductory talk to a session of the Swedish Economic Association on the organization of the international monetary system (Wicksell 1925). His message was the same as in his talk of 1898: the world price level should be stabilized. His earlier optimism about the adoption of his price stability rule had disappeared, though. He noted that the gold standard had returned, although in a modified version, after the experience of paper standards during and after the war.

Actually, Wicksell (1925, p. 87) was rather pessimistic about the future of price stabilization:

The principal fight of a paper standard based a constant value *versus* the gold standard is terminated, at least for the moment. This fight has also been a very uneven one. On one side, only a few pedants of theory, if not to say freaks, on the other the compact majority of sensible people, who have never for a moment faltered in their belief in the gold standard as the only true and sound system, a viewpoint that they have been able to maintain so much stronger as they, as a rule, never have bothered with giving or taking the arguments for or against this system.

Still, Wicksell proposed international monetary cooperation to maintain a constant world price index. He hoped for such cooperation under and despite the gold standard. This was his last appearance for the Association; he died in the spring of 1926. He did not live to see his policy rule being adopted officially in Sweden in September 1931.

The gold standard of the interwar period proved short-lived, however. A week after the United Kingdom was forced off gold in September 1931, Sweden took the same step. Under the influence of Gustav Cassel, at that time the most prominent monetary economist in Sweden and advisor to the government, the minister of finance declared that Swedish monetary policy would aim at keeping the domestic purchasing power of the Swedish krona constant.³⁰ In short, Wicksell's rule was adopted as a policy space for a paper standard with flexible exchange rates and the absence of controls of the flow credit opened up as a consequence of the fall of the international gold standard.³¹

This was a major innovation in the history of monetary policy: the Riksbank became the first – and so far – the only central bank to have adopted Wicksell's rule of a stable price level. Immediately, the Riksbank prepared for the new policy rule by constructing and publishing a

³⁰ It is an irony of history that Cassel argued successfully for a policy to stabilize the value of the Swedish krona after the fall of gold, while Cassel and Wicksell were strongly at odds on many issues of theory and policy.

³¹ Most importantly, Sweden did not introduce exchange rate controls or other types of credit controls in the 1930s.

consumer price index as a guide for its policy and by consulting three prominent monetary economists, Gustav Cassel, David Davidson and Eli Heckscher, for advice on the design of the monetary policy based on Wicksell's rule.³²

The Swedish example did not spread internationally. Instead, the Great Depression of the 1930s made unemployment the major issue for economic research and economic policy. John Maynard Keynes's *General Theory* published in 1936 laid the foundation for the subject of macroeconomics and macroeconomic policies. The Keynesian message developed from Keynes's work made full employment the main goal of stabilization policy. Fiscal policy was assigned the prime role in stabilization policy, pushing monetary policy into the background. In this intellectual tradition, price stabilization and the cumulative process were ignored or dismissed.

After World War II, the world returned to a modified gold standard of fixed exchange rates through the Bretton Woods system. Financial repression based on internal and external credit controls and regulation of interest rates was part of this system. Fiscal and monetary policy was geared toward full employment given the pegged exchange rate regimes and capital controls restricting cross-border financial flows. Central banks were under strong political control in many countries. The Riksbank was *de facto* an office under the ministry of finance. The ministry of finance decided the allocation of credit, the rates of interest and the growth of credit in the Swedish economy through a system of far-reaching financial regulations; in short it controlled the balance sheet of every financial institution.³³

The Bretton Woods regime collapsed in the early 1970s. Exchange rates among the major currencies became more flexible. The stagflation of the 1970s, that is, the contemporaneous occurrence of high inflation and high unemployment, undermined the dominance of Keynesianism and the role assigned to fiscal policy to deliver full employment. Milton Friedman's brand of monetarism and Robert Lucas's theory of rational expectations allowed for a comeback of monetary policy, replacing Keynesianism and its stress on fiscal policy as the dominant view in macroeconomics.

³² On Swedish experience of price level targeting, see Jonung (1979a) and Berg and Jonung (1999). On the Riksbank's preparations for price level stabilization, see Jonung (2008).

³³ The Swedish system of centralized credit allocation was a unique one. Every month, the top management of the Riksbank met with the heads of the commercial banks. At these meetings, based on the most recent balance sheets of the individual commercial banks, the Riksbank gave its view on credit market developments. In short, it checked that every commercial bank followed the guidelines of the Riksbank. See Jonung (2017).

Friedman had a major influence on monetary policy, starting in the 1960s and 1970s. First, according to him, inflation was primarily a monetary phenomenon. The message promised a solution to the problem of the high inflation of the 1970s. However, Friedman (1960) explicitly rejected price level stability as the goal of monetary policy due to long and variable lags, instead proposing that the central bank should target the growth of the money supply.³⁴ As a consequence of Friedman's influence, money-growth targeting was tried in countries like the United States, Canada, United Kingdom, Switzerland and Germany. However, it did not prove effective and was abandoned after a short period in most cases.

Second, Friedman's idea of a vertical Phillips curve, based on the concept of the natural rate of unemployment, implied that monetary policy affected unemployment in the short run, but that the effect disappeared in the long run (Friedman 1968). The implication was that monetary policy should have a long-run perspective and it should focus on nominal, not real, magnitudes. This view also implied that fiscal policy lost its predominance over monetary policy.

Other developments in the 1970s and 1980s contributed to the move towards inflation targeting. Work on time inconsistency stressed the potential role of an independent central bank. A credible and independent central bank might be more efficient in reducing inflation than a government-controlled central bank. Financial markets were gradually deregulated following the collapse of the Bretton Woods regime, allowing for free movement of capital across borders and undermining pegged exchange rate regimes.³⁵

The policy space for a Wicksellian rule of price stability emerged step by step, paving the way for inflation targeting, starting in 1990 in New Zealand. The breakdown of pegged exchange rates in the early 1990s in the European Monetary System contributed to the adoption of inflation targets in countries like the United Kingdom and Sweden. From there it spread around the world.

This very brief account of the history of monetary regimes in the 20th century suggests that Wicksell's rule was adopted after all other regimes had proved unsustainable: the classical

³⁴ Concerning price stabilization, Friedman (1960, p. 87) argued “the key difficulty is that the link between price changes and monetary changes over short periods is too loose and too imperfectly known to make price level stability an objective and reasonably unambiguous guide to policy.”

³⁵ See for example Whelan (2020) for a survey of the developments leading up to inflation targeting.

gold standard, the Bretton Woods gold/dollar standard, money supply targeting, full employment targeting, and regimes based on pegged exchange rates under fiat money. Indeed, Wicksell was a pioneer in monetary policy with *Interest and Prices*, but he was too far ahead of his time.³⁶ His theory was relevant for a pure credit economy with rates of interest set on unregulated financial markets – a regime that did come into existence until about a century after the publication of *Interest and Prices*.

The fact that it took so long for Wicksell's rule to be adopted as the guide for practical central bank policy should not hide that Wicksell's monetary theory had a profound impact on the development of macroeconomic theory in the 20th century. Although Wicksell developed the cumulative process to account for the long-run behavior of the price level, his approach inspired economists dealing with the business cycle. Wicksell heavily influenced the Austrian trade cycle theory of Hayek and Mises and the dynamic approach of the Stockholm School in the interwar period.³⁷ John Maynard Keynes's *A Treatise on Money* reflects the influence from Wicksell as well. This impact vanished in Keynes's *General Theory*, however.³⁸

After World War II, the concept of a pure credit economy has entered into various fields, including the theory of finance.³⁹ Gunnar Myrdal used the idea of the cumulative process to analyze social and historical developments.⁴⁰ The natural rate concept became crucial in the monetarism of Milton Friedman as well as in present-day rational expectations and New Keynesian approaches. It is fair to argue that Wicksell laid the foundation of macroeconomics by expounding the dynamics of the cumulative process.⁴¹

³⁶ When Wicksell presented in 1898 his cumulative process to a meeting of the Swedish Economic Association in Stockholm for the first time, he got no comments from the audience. Most likely, nobody was able to grasp his message and respond to it. Indeed, he complained that he failed to explain the cumulative process even to his friend Theodor Frölander, a prominent banker (Gårdlund 1956, p. 310).

³⁷ See Laidler (1991b).

³⁸ See Hicks (1977, pp. 72-86) on Wicksell's impact on Keynes's *A Treatise* of 1930 and the disappearance of Wicksell's theory in *General Theory* of 1936.

³⁹ For surveys of the pure credit economy, see Trautwein (1997) and Hernandez-Aramburo (1996), among others.

⁴⁰ Lundahl (2021) demonstrates the deep influence of Wicksell on Myrdal. Myrdal's *American Dilemma*, a treatise on the race situation in the United States, and *Asian Drama*, a study of the development of Southeast Asia, are applications of a cumulative process to broad political and economic processes.

⁴¹ On the influence of Wicksell's theory on macroeconomics, see Arnon (2011) and Leijonhufvud (1981, 1999). His influence on Swedish economics was profound; see Ohlin's introduction to Wicksell (1936), Myrdal (1939) and Siven (1998, 2006).

5. The neo-Wicksellian view

Inflation targeting came into existence by default. In the 1990s, there was no common theory of inflation targeting that supported its adoption, unlike the case in 1931 when Gustav Cassel convinced the Swedish government to accept Wicksell's rule as the guide for monetary policy, taking the Riksbank by surprise.

New Zealand's pioneering adoption of inflation targeting was part of the reforms to the policy-making framework launched by the New Zealand government that came to office in 1987. The minister of finance wanted to give managers in the public sector clear goals and make them accountable to the government, the parliament and the public. As part of this program, the central bank agreed to a target range of 0-2 percent for inflation. This inflation target was selected for the framework without recourse to monetary theory.⁴² New Zealand's choice of a numerical target then served as a source of inspiration for other countries. It is now copied worldwide with 2 percent as the most common target.⁴³

Wicksell's original theory did not serve as a guide in the 1990s; it was neglected or unknown to policymakers and most macroeconomists alike. However, the practical turn to inflation targeting inspired economists to develop the theory of inflation targeting in various ways. As a result, a neo-Wicksellian approach has emerged, built on the legacy of Wicksell.

The most prominent contribution of the neo-Wicksellian school is the work by Michael Woodford (2003). He pays tribute to Wicksell by giving his treatise the title *Interest and Prices*, the same title as the English translation of Wicksell's *Geldzins und Güterpreise*.

Woodford (2003) builds a microeconomic foundation for Wicksell's cumulative process where firms are profit-maximizing and consumers are utility-maximizing in the context of a complete intertemporal general equilibrium model. He studies a cashless economy, similar to Wicksell's pure credit economy. Expectations are assumed to be rational, making his model mathematically consistent, contrary to Wicksell who assumed static expectations. Woodford

⁴² On this point, see Wood (1994).

⁴³ Via the Bank of Canada, the goal for monetary policy of 2 percent annual inflation spread to the Bank of Sweden when it adopted inflation targeting in 1993. Thus, there was no direct influence by Wicksell's policy proposal on the central bank in his home country. About 15 years before this event, Jonung (1978) recommended in the Swedish policy debate the introduction of a price stabilization rule defined within the range of 0-2 per cent rate of annual inflation. At that time, Sweden maintained a pegged exchange rate. By pure coincidence, Swedish inflation has been within the 0-2 percent range in the past 25 years of inflation targeting.

works with models within a New Keynesian framework, at present the dominant approach in modern macroeconomics. In this way, price stability enters the DSGE models currently used by many central banks when framing and evaluating monetary policy.

Although the microeconomic analysis adds a new dimension, the macroeconomic implications are similar to those of Wicksell. In Woodford's model, monetary policy is based on an interest rate rule, as in Wicksell's cumulative process. The dynamics stem from the distinction between the natural and the bank rate, as in Wicksell. The banking system and the financial sector are assumed to respond passively to the interest rate. Asset markets are not dealt with explicitly. Financial markets are assumed to be frictionless in the basic neo-Wicksellian model in Woodford's book of 2003; just as in Wicksell's book of 1898.⁴⁴ In subsequent contributions, Woodford has included financial frictions, represented by credit spreads, into a neo-Wicksellian framework. Still, the neo-Wicksellian view on the monetary transmission mechanism remains essentially intact.⁴⁵

Inflation expectations are not a source of instability in Wicksell, nor does Wicksell present a detailed analysis of the determinants of price level expectations. Here, Woodford has a different approach, stressing that the endogeneity of inflation expectations can serve as a source of instability in a badly functioning monetary regime. Actually, an argument for a well-designed inflation targeting rule is that it will anchor inflation expectations at the proper level, in this way contributing to stability.

A striking similarity between Wicksell's and Woodford's models of the pure credit economy is the conclusion that monetary aggregates like the money supply and central bank reserves have no role to play and can thus be disregarded. Both models are based on inside money, that is money created by the banking system against debt, excluding by assumption outside money.

⁴⁴ Here Woodford (2003, p. 64) assumes "*complete financial markets*, that is, that available financial assets completely span the relevant uncertainty faced by households about future income, prices, taste shocks, and so on"

⁴⁵ See for example Cúrdia and Woodford (2015, p. 51), "our results suggest that the basic view of the way in which monetary policy influences aggregate expenditure and inflation presented in New Keynesian models need not be modified in any fundamental way as a consequence of the observation that substantial spreads exist on average between different interest rates in the economy, or that these spreads are not always constant over time."

One difference concerns the treatment of time lags. Wicksell did not pay any specific attention to lags in monetary policy in his analysis of secular movements in the price level.⁴⁶ In Woodford's approach, focused on the cyclical perspective, time lags appear in the study of impulse propagation. Still, Woodford arrives at the same general view as Wicksell: central banks can and should determine the rate of inflation through the short-term policy rate.⁴⁷

The theory of inflation targeting has been influenced by other innovations as well. Basically, they concern the design of the response or reaction function of the central bank. In Wicksell's cumulative process, the response function for the policy rate of the central bank has only one variable, the change in the price level, caused by the gap between the policy rate and the natural rate of interest. In a seminal study, Taylor (1993) added output (income) as a second determinant to Wicksell's rule, thus making the policy rate of the central bank depending on both inflation and output, giving rise to the Taylor rule.⁴⁸ In several studies, Svensson proposed flexible inflation targeting, defined as a strategy allowing central banks to aim at influencing the business cycle in the short run as long as they reach the targeted rate of inflation in the intermediate run. The response function of the central bank includes here forecasts of the future rate of inflation, see for example Svensson (1997), leading to the concept of inflation forecasting targeting.⁴⁹ Still, these contributions should be viewed as elements within the Wicksellian approach, although Wicksell's work is commonly not referred to.⁵⁰

Since the global financial crisis of 2008, central banks have introduced new techniques to make monetary policy more expansionary, including forward guidance, quantitative easing (that is, large asset purchases), and negative policy rates. The aim has been to raise the rate of consumer price inflation to the target level. However, the attempt has failed in most countries

⁴⁶ In Swedish economics, time lags emerged in the 1930s as an issue in the debate about the use of fiscal policy, not of monetary policy.

⁴⁷ Woodford's book has attracted a considerable interest from economists specializing in the history of economic thought; see here Boianovsky and Trautwein (2006) and Laidler (2006) as well as the response by Woodford (2006) in a special issue of *Journal of History of Economic Thought*. See also chapter 1 in Barbaroux (2013) for a comparison between Wicksell's and Woodford's approach.

⁴⁸ At that time, Taylor was not aware that he specified a policy rule that included Wicksell's monetary rule.

⁴⁹ Inflation forecast targeting has been adopted by many central banks. See the survey by Adrian et al. (2018).

⁵⁰ Several additional interest rate rules, giving weight to factors like nominal GDP, exchange rates and financial conditions, have been suggested. In my opinion, as a rule they fit into the neo-Wicksellian approach.

prior to the current post-pandemic surge in inflation. Price stability continued to be the goal, but the prime instrument, the short-term policy rate, seems to be insufficient for accomplishing it. These developments should be seen as being within the Wicksellian approach, more precisely as attempts to reach price stability with the use of instruments other than the short-term policy rate.

The Swedish experience of these unconventional measures is a disappointing one. Forward guidance based on the DSGE model of the Riksbank and the judgments of its board has so far proved a failure. Quantitative easing, introduced during a period of high business activity, fostered asset price inflation with no discernable effects on consumer price inflation and output, while making the Riksbank the biggest holder of Swedish public debt, according to Andersson and Jonung (2019). The Riksbank was the first inflation targeting central bank with flexible exchange rates to introduce and abolish negative interest rates. This experiment of 2014-19 failed in raising consumer price inflation, instead sharply fostering asset price inflation; see Andersson and Jonung (2020a).

Much recent work and debate on inflation targeting has dealt with Wicksell's concept of the natural rate of interest, also termed the real rate, the neutral rate or r^* . This rate has emerged as the centerpiece in the present framework of monetary policy.⁵¹ The challenge for policymakers is that the natural rate is unobservable. Still, many attempts have been made to measure the rate, with no empirical success so far.⁵²

Table 1 summarizes in a stylized way the differences and similarities between Wicksell's original approach and the neo-Wicksellian view. The table leads to the basic conclusion that there are no major differences between the Wicksell of 1898 and the neo-Wicksellians of today. The neo-Wicksellians have not added any basic changes to the cumulative model that can address the problems facing inflation targeting today. Still, they have introduced a high degree of mathematical sophistication into the cumulative process. They have also shortened the time horizon. Wicksell used his model to explain secular inflation and deflation. The neo-Wicksellians have a shorter perspective focusing on the business cycle or the intermediate

⁵¹ See for example Graph 1 in Borio (2021), displaying the number of central bank speeches citing the natural or neutral interest rate from 1999 to 2021.

⁵² On the role of the natural rate in inflation targeting, see for example Amato (2005) and Borio (2021).

run. This leads to a discussion of the role of time lags in the framing of monetary policy absent in Wicksell.

6. Asset markets – the missing element in the Wicksellian approach

Earlier, I outlined the problems that inflation targeting has faced in the past decades. In my view, they arise from some missing elements in Wicksell's original framework, elements that have been transferred without any decisive modification into the present neo-Wicksellian approach or developed without reference to Wicksell's work. These elements represent the shortcomings that today are undermining the sustainability of the regime of inflation targeting. The most important ones concern the exclusion of asset markets and thus the problems that may arise on financial markets.

No asset markets. Let me start with the most important missing element, the absence of a financial system where assets such as equity and real estate are traded with the support of credit. To repeat, in Wicksell's model all credit created goes to new capital investments (liquid capital), in the process paying the workers for their consumption. Capitalists furnish the banking system with their savings. In this way, capitalists only support investments in real capital. Wicksell's model is thus a model for determining the absolute level of commodity prices, in this case the price index for the consumption basket of workers. Changes in interest rates can only impact consumer prices. With commodity price stability, or consumer price stability, the model generates macroeconomic stability.

Because asset markets are excluded, credit cannot flow into the financial system and into financial markets. Asset price inflation and deflation, a most striking feature during recent decades of inflation targeting, are not to be seen in the Wicksellian approach. The financial system has no independent role to play.

No financial crises and no wealth effects. By excluding a financial system with asset markets, Wicksell implicitly assumes the existence of financial stability as well as a smoothly working economic system. His banking system is a stable one; it passively meets the demands of the entrepreneurs for credit to be spent on investments employing workers. As a consequence, financial crises are not incorporated into the framework of inflation targeting today. The

transmission mechanism goes from the interest rate gap to the consumer price level, with no financial repercussions.⁵³

Excluding asset markets implies the exclusion of wealth effects or balance sheet effects that play a central role in the account of recent financial crises.⁵⁴ These effects arise when indebted households and firms become over-indebted due to a sharp fall in the value of their holdings of real assets while their nominal debt remains unchanged, starting a self-enforcing cumulative process of selloffs. Their net wealth declines and may even become negative, threatening the liquidity and solvency of the financial system. In the process, consumption and investment decline and unemployment rise dramatically. Recent financial crises can thus be described as balance-sheet crises.

These balance-sheet effects, first analyzed by Irving Fisher (1933), are not included in the neo-Wicksellian approach despite its micro-economic foundation. The reason is that it is based on an intertemporal general equilibrium framework with well-functioning financial markets.⁵⁵ Wealth cannot disappear here in a “black hole”. Instead, a loss in wealth for one economic agent must appear as the gain for someone else. It is basically an issue of redistribution between creditors and debtors given that all budget constraints will hold.

No distributional effects. In the Wicksellian approach, money is neutral. A policy aimed at price stability benefits society at large, according to Wicksell and the neo-Wicksellians. The policy rate is assumed to oscillate around the natural rate; periods of low rates are followed by periods of high rates and so on. Today, one reason why central banks are given political independence is that monetary policy aimed at price stability is viewed as leaving the distribution of income and wealth unchanged.

Once the effects of monetary policy on asset markets are brought into the picture, it is obvious that inflation targeting during recent decades has had considerable effects on the distribution of wealth. These effects have been long-lasting. Asset holders are the big winners, leaving non-asset holders behind. In addition, financial crises such as the global crisis of 2008 have

⁵³ This conclusion also holds after taking account of financial frictions in neo-Wicksellian models.

⁵⁴ The financial crisis in Sweden in the early 1990s is a prime example of a balance-sheet crisis. See chapter 2 in Jonung et al. (2009).

⁵⁵ See Leijonhufvud (2001, p. 4) on the problems that are assumed away using models of intertemporal general equilibrium in the study of central bank policy.

had huge distributional effects. The unemployed have suffered the most. These distributional effects have significant social and political consequences as well.

The result of these missing elements in the theory behind inflation targeting is that central banks today tend to ignore the effects of monetary policy on asset markets. Commonly, they argue that asset market developments are an issue for other authorities than the central banks. Many commentators have noted this neglect of asset markets, although they have not traced its doctrinal roots. One exception is Leijonhufvud (2014, p. 168), discussing Federal Reserve policy in this way:

the volume of bank credit issued on mortgages expanded at a great rate fueling a great boom in both commercial and residential real estate. This was a development that Wicksell or Mises or Hayek would not have anticipated. In their day, it was taken for granted that bank credit was always of short term and created against “real bills” which would be “self-liquidating.” If too much credit was flowing into the market, rising consumer prices would quickly signal the central bank that policy had to be tightened.

To sum up, the exclusion of asset markets in the Wicksellian approach contributes to a serious bias towards excessive credit growth. The failure to push up consumer price inflation to the target level through ultralow interest rates has contributed to rampant asset price inflation as seen from Figures 3 and 4.

A doom loop for inflation targeting: Highly expansionary central bank policies, now known as unconventional monetary policies, run the risk of creating a dangerous feedback loop, a doom loop for central banks, in the following way. In the Wicksellian approach, the real rate of interest is determined in the real sector, reflecting the expected return on new capital. However, in my interpretation, the real rate is in fact not determined in the real sector under present inflation targeting. It is to a large extent driven by central banks through expansionary monetary policies. In their attempt to raise consumer price inflation through expansionary monetary policy, they push down market interest rates across the whole yield curve. The decline in market rates is then taken as a sign of declining real rates, which induces further reductions in the policy rate, moving the policy rate even into negative territory.

Rogoff (2016, 2017) carries this thinking into the extreme suggesting that cash should be prohibited by law for two reasons: first to reduce criminal activities that use cash, and second, to make it possible for central banks to move their policy rates into negative territory, in this way making monetary policy still more expansionary. From a history of thought perspective,

Rogoff's proposal amounts to establishing Wicksell's pure credit economy using legal restrictions that completely eliminate cash.⁵⁶

To a large extent, the expansionary monetary impulse in the past decades has been transferred into the markets for financial and real assets, pushing up asset prices, not inducing any significant rise in consumption and real investments. In the extreme case of this process, consumer prices may remain unchanged by monetary policy, determined by global forces, not by domestic monetary forces, while asset inflation turns rampant.⁵⁷ This suggests that the Wicksellian regime of limitless finance is associated with a monetary transmission mechanism, different from those found in the Keynesian and monetarist theories.⁵⁸

To sum up: The lack of asset markets in the Wicksellian approach gives rise to a dangerous tunnel vision. To exaggerate slightly, inside the Wicksellian tunnel, central banks observe only two variables: consumer price inflation and the policy rate. They ignore what is going on outside the Wicksellian tunnel, at least as long as any imminent crisis does not force them to respond. Factors like excessive growth of credit, asset price inflation, the expansion of the financial system and rising inequality are outside the Wicksellian tunnel but inside the current agenda of debate on monetary policy.⁵⁹ This tunnel vision ignores the workings of the Wicksellian monetary regime – an issue I will move to next.

⁵⁶ Rogoff makes no mention of Wicksell's work, however. He is apparently unaware of Wicksell's analysis of the cash-free economy (the pure credit economy). For a humorous proposal to abolish cash by law to make it possible for the tax authority to control every transaction, thus eliminating tax evasion, see Ståhl (2020), with an afterword by Jonung. Ståhl wanted to establish an advanced welfare state in Sweden by eliminating the underground economy. He was partially inspired by Wicksell's work on the cashless economy.

⁵⁷ For a similar interpretation based on Austrian economic theory, see Mayer and Schnabl (2021). They argue that interest rates have been pushed down by central bank policy, not by structural factors like secular stagnation. However, they do not base their analysis on Wicksell, but on the work by Mises and Hayek, although Wicksell's analysis was the foundation for Austrian macroeconomic thought.

⁵⁸ Concerning the case of regime contingent transmission mechanisms, see Leijonhufvud (2001, pp. 15-18).

⁵⁹ Borrowing from Leijonhufvud's (1981) "corridor" concept: as long as no crisis occurs in the financial system, the economic system remains inside the corridor of apparent systemic stability. When a financial crisis erupts, the economic system is pushed out of the corridor into a region of systemic instability at large costs to society.

7. The present Wicksellian monetary regime of unlimited finance⁶⁰

Inflation targeting was adopted as a response to the high and variable inflation rate in the 1970s and 1980s. Inflation targeting has emerged as the central policy rule of a monetary regime based on inconvertible fiat money, flexible exchange rates and advanced financial markets with no government controls of commercial bank rates. This almost pure credit economy may properly be termed a Wicksellian monetary regime.⁶¹ By now, electronic money represents roughly 99 per cent of the M3 Swedish money supply measure. “Physical money”, that is notes and coins, constitutes the remaining 1 percent of the money stock.⁶²

The present monetary system of Sweden has thus moved very close to the Giro bank system envisaged in Wicksell’s *Interest and Prices*, perhaps closer than that of any other country. He described such a system as “a pure credit economy” or as “a completely developed credit system”.⁶³ To Wicksell, this was the *ideal state*:

in our ideal state every payment, and consequently every loan, is accomplished by means of cheques or *giro* facilities. It is then no longer possible to refer to the supply of money as an independent magnitude, differing from the demand for money. No matter what amount of money may be demanded from the banks, that is the amount of which they are in a position to lend (so long as the security of the borrower is adequate. Wicksell (1898a, p. 110).

Wicksell (1935, p. 197) described such an institutional framework for banking as “a monetary system of unlimited elasticity”. Here I have classified it as a system of unlimited finance.⁶⁴

⁶⁰ This section draws on Jonung (2019).

⁶¹ Woodford (2003, pp. 74-85) adopts the concept of a “Wicksellian policy regime” to describe an equilibrium model specified in the spirit of Wicksell’s approach. My definition of a Wicksellian regime concerns the actual monetary system of rules and expectations in a country like Sweden for the moment.

⁶² These numbers are taken from the November 2021 issue of *Financial market statistics* from Statistics Sweden. See <https://www.scb.se/en/finding-statistics/statistics-by-subject-area/financial-markets/financial-market-statistics/financial-market-statistics/pong/statistical-news/financial-market-statistics-november-2021/>.

⁶³ Wicksell (1898a, p. 80) and Wicksell (1898a, p. 135).

⁶⁴ It is fair to ask if “monetary” is a proper term for a regime with no outside money, only inside money. A better term may be a Wicksellian stabilization policy regime, in this way bringing fiscal policy into the framework as well. However, I will not pay attention here to the role of fiscal policy in a Wicksellian world of credit money. Suffice to say that the fiscal space should be designed to insure that in case of a major financial crisis government expenditures can be increased without a sharp rise in interest rates. This view is developed in

So far, the Wicksellian monetary regime has lasted for roughly three decades. This is a remarkably long period for a flexible exchange rate regime. Monetary regimes in the past have commonly been based on a metallic anchor giving rise to fixed exchange rates internationally, where domestic money has been convertible into the currency metal at a fixed rate. The gold standard is the most prominent case of such a monetary regime. The gold standard was eventually replaced by various types of pegged exchange rate regimes. War or other extreme crises have commonly forced the breakdown of pegged exchange rate and opened the door for fiat money regimes with flexible exchange rates. However, before the present regime, such regimes were short-lived as policymakers returned to fixed exchange rate regimes as soon as allowed by circumstances.⁶⁵

The pendulum swings between fixed and flexible exchange rate regimes seem to have been arrested by the rise of the Wicksellian regime, creating a clear break with the historical pattern. The present regime represents a long-lasting paper standard with low and stable inflation with flexible exchange rates, in stark contrast to the short-lived paper regimes of the past. In addition, today few economists or policymakers recommend a return to a system of fixed or pegged exchange rates. Instead, by contributing to rapid expansion of the financial system and to the accumulation of debt, private as well as public, the prevailing Wicksellian regime makes a return less likely.

The rapid rise of the financial system after the deregulation in the 1970s and 1980s represents a fundamental change in the economic landscape. Figures 3-4 and Figure 6 illustrate the financial revolution from a Swedish and a U.S. perspective. Figure 3 shows the ratio between private debt to disposable income and real property prices in Sweden from 1970-2020, while Figure 4 shows total private debt to GDP and the real property prices in the United States for the same period. Figure 6 displays the stock market capitalization measured as a ratio to GDP for Sweden and the United States during the past 120 years.

The overall patterns of these three figures are strikingly similar: the time series remain roughly constant up until the mid-1980s. Concerning stock market capitalization, while there are fluctuations reflecting the influence of the two World Wars and the depression of the

Andersson and Jonung (2021) for the Swedish context, recommending a public debt anchor between 20 and 30 percent in relation to GDP.

⁶⁵ For a description of this long-run global pattern, see Bordo and Jonung (2001). Fregert and Jonung (1996) examined the Swedish record 1668-1931 of switches between metallic and paper standards, showing that long periods of fixed rates are interrupted by short periods of flexible rates due to war activities.

1930s, no dramatic changes occur prior to the financial deregulation of the 1980s. Following deregulation, the credit volume suddenly soars, as do house and stock prices. House prices increased sharply, but the shift is especially clear for the stock market. These time series also started to fluctuate more violently than before.

This pattern is found on a global scale as well. Jordà et al. (2015) introduced the term *the financial hockey stick* when they discussed how the ratio between the volume of credit and GDP increased sharply in the 1980s in many countries. The pattern of a hockey stick that emerges in Figure 3-4 and Figure 6 invites some conclusions concerning the Wicksellian regime.

First, the figures indicate that monetary policy has lost the steady nominal anchor once supplied by the gold standard and other types of pegged exchange rates. This anchor kept the growth rate of the money stock and the credit volume in check, thus holding asset prices at bay. The present Wicksellian regime has not, at least not yet, been able to serve as a nominal anchor arresting the high growth rate of the supply of credit compared to the growth of the real economy. The new regime lacks the firm connection between the credit volume and an asset such as the stock of gold, once provided by the gold standard. Therefore, as it grows, the financial system becomes more elastic and consequently more difficult to control by the authorities.

A second conclusion from the figures concerns the volatility of the time series. It has increased under inflation targeting, being closely related to the financial crises that hit Sweden and the United States in past decades: the financial crisis of the early 1990s in Sweden and the 2008 financial crash in the United States. This pattern illustrates the role of credit as a central factor behind financial crises as well as the growing incidence of financial crises under inflation targeting.^{66 67}

This pattern invites questions about the real effects of the rapid expansion of the financial system as well. The high growth rate of credit after financial deregulation is not linked to an apparently higher growth in the real economy. The present debate about secular stagnation is

⁶⁶ See Reinhart and Rogoff (2009) for an historical exposition of this view.

⁶⁷ See Bordo and Meissner (2016) on the evidence of financial crises in recent decades.

an illustration of the disappointing rate of real economic growth, despite abundantly available credit and low real interest rates.⁶⁸

A characteristic feature of the present Wicksellian monetary regime is a high level of international financial integration after the elimination of interest rate controls, credit controls and exchange rate regulations. This has severely reduced the monetary autonomy of small open economies like Sweden, limiting the Riksbank's ability to control the rate of inflation, domestic interest rates and the credit volume.⁶⁹ In practice, domestic financial conditions are determined by the monetary policy of the Federal Reserve and the ECB through the strong position of the dollar and the euro in the global financial system, despite floating exchange rates and inflation targeting, which initially were supposed to guarantee national policy autonomy.⁷⁰

Because of high international financial integration, credit growth and changes in interest rates are strongly correlated across national borders. Many countries outside the US and the euro area, being financially integrated with the dollar and the euro, tend to keep a relatively stable exchange rate against these anchor currencies. Sweden is an example of this global pattern. Swedish commercial banks finance a large part of their domestic lending by borrowing on the international financial markets. Thereby, the Swedish interest rate is determined by the international rate.⁷¹

Figures 3-4 and Figure 6 illustrate the major challenges emerging for the present Wicksellian regime. It has solved the problems experienced in the past, specifically the high rate of inflation of the 1970s and 1980s. At the same time, this regime has contributed to new problems. Extremely expansionary monetary policies have fueled growing financial

⁶⁸ Arcand et al. (2012) raise the question if there is a threshold value for financial depth beyond which finance reduces growth. Commonly, economists have argued that finance contributes to growth. For the Swedish evidence, see Hansson and Jonung (1997).

⁶⁹ According to Rey (2015), exchange controls might be necessary to create monetary autonomy for a small open economy like Sweden in a financially integrated world. See also Obstfeld and Taylor (2017) on the impact of international financial integration on monetary policy and monetary institutions.

⁷⁰ The monetary and financial crisis experience of Iceland, often viewed as the smallest independent currency area in the world, is a striking illustration of the impossibility to combine a flexible exchange rate and capital mobility with inflation targeting. See Andersson and Jonung (2020b) for the argument that a currency board would be the preferred solution for an extremely small open economy like Iceland.

⁷¹ The Bank of Sweden's policy rate has very closely followed the key interest rate of the ECB, see Andersson and Jonung (2020a). Any attempt by the Riksbank to deviate from the policy rate of the ECB has so far been short-lived.

imbalances creating a clear conflict between price stability, on the one hand, and financial stability and macroeconomic stability, on the other hand. In short, consumer price stabilization through inflation targeting does not work as a successful nominal anchor for the macroeconomy within the existing monetary regime. Let me now turn to a discussion of how the present Wicksellian monetary framework can be reformed.

8. Reforming the present monetary regime of inflation targeting

The acceptance of inflation stabilization as the nominal anchor of the monetary system is a great intellectual victory for the Wicksellian approach. However, it has not been accompanied by much discussion about the proper design of the financial system necessary to avoid credit-fuelled imbalances and crises. Borrowing from the conclusion by Leijonhufvud (2001, p. 3) that "the theory of monetary policy has had two main preoccupations: nominal anchoring and the stability of credit", it is fair to say that the Wicksellians have failed to connect these two issues, rather keeping them separate, instead of acknowledging their interdependence.

Let me turn to a discussion of the reforms of the institutional framework that would make inflation targeting a better serving nominal anchor than it is at the moment. In short, I want to embed inflation targeting in a financial system that prevents rapid growth of credit, asset price inflation and growing financial imbalances, reducing the risk of future financial disruptions and crisis.

My discussion will be brief. I will just indicate a few possible measures. Some can be implemented within the existing system, while others are more far-reaching and would require a change in the institutional framework. The list of reform proposals can be extended. Let me first focus on the domestic context, ignoring open economy considerations.

The basic step to improve inflation targeting is to obtain improved control of the growth of the volume of credit, in this way fostering financial stability. Today inflation targeting lacks a firm anchor for the supply of credit. As argued above, the metallic regimes of the past provided such an anchor. However, going back to a metallic standard like gold is not a step forward. Nor is a return to the credit, foreign exchange and interest rate controls of the Bretton Woods system a promising route to adopt, although claims have been made for the advantages of a new system of financial repression. The costs in terms of allocative inefficiencies of this type of financial regulation are most likely too high. The development of

financial technologies may be so advanced that attempts to regulate the volume of credit by quantity controls will be evaded successfully. Instead, a number of measures can be introduced to dampen the growth of credit while still maintaining price stability as the guide for monetary policy.⁷²

Higher interest rates. The most central step for a central bank to control the supply of credit is to raise the nominal rate of interest significantly. When the price of credit, the loan rate, is increased, the demand for credit will fall. Such a step would amount to a break with the policy of ultralow and negative central bank policy rates that have fueled credit growth and asset price inflation in recent decades. Credit should grow at a slower pace than the case has been in the past. Unfortunately, as far as I have found, there is no “optimal” growth rate to recommend. It must be an issue of careful judgement by central banks. Preferably, the volume of credit should follow roughly the trend in real income.⁷³

An obvious objection to such a change of the present interest rate rule is that it would not be consistent with inflation targeting. It would give rise to higher interest rates than presently and make consumer price inflation lower than the announced rate or range. I see two answers to this argument.

First, inflation targeting can only prevail in a society making steady economic progress without major interruptions caused by monetary policy. If the public and politicians in power and in opposition would view inflation targeting as the main cause of financial crises, it will not survive in the political process. Central bank independence will be rejected, and new goals, instruments and institutions will replace the present monetary framework.

Second, a policy of higher interest rates to reduce the growth of credit will still be associated with price stability, but most likely at a lower rate of consumer price inflation than the common target of 2 percent. Still, zero inflation, as in Wicksell’s rule, or deflation should not

⁷² In my reading of the historical record, financial stability was easier to establish after a financial crisis under the gold standard or under pegged exchange rate regimes than under the present Wicksellian regime. After a crisis under the gold standard, there was a return to roughly the “normal” conditions prevailing before the crisis. Today there is no similar “normal” state of affair or equilibrium situation for the financial system. For the historical relationship between monetary and financial stability, see the survey by Bordo (2018).

⁷³ The process of moving from the present low rates of interest to higher rates may be a risky one. For this reason, there should be a gradual rise in interest rates, not an abrupt one, to give the private as well as the public sector time to adjust.

cause macroeconomic problems as long as the rate of price level change is expected by the public.

In short, the proposal for raising the interest rate would make financial stability the primary objective of central bank policy; price stability would be subordinate. Such an arrangement makes sense: financial stability is a prerequisite for inflation targeting as well as for a well-functioning democratic society. The economic and political costs of financial crises are extremely high, as shown by the global financial crisis of 2008.

Including asset prices in the inflation measure: In Wicksell's cumulative process, consumer prices are the target variable for central bank policy. This choice is embedded in the adoption of the consumer price index as the prime index for inflation targeting. A reform, proposed by many economists, gives asset prices a greater role in the price index used by central banks. From a theoretical point of view, there are strong arguments for such a step.⁷⁴ Empirically, however, asset prices are highly volatile which makes it difficult to use such an index for policy framing. There are two ways to go here. First, asset prices, in particular house prices, could be included in the guiding price index by a weighting scheme where they have more influence than presently.⁷⁵ Second, central banks can openly declare that they follow asset price inflation developments with greater attention than presently, and adjust their policies accordingly.

Explicit and broad tolerance bands: Another promising reform of the inflation targeting framework concerns the use of tolerance bands for the range for acceptable inflation. Explicit and broad bands could be introduced by central banks, making it easier to move away from the common numerical target of 2 percent. A target range of 0-4 percent rate of inflation might be a suitable start.⁷⁶ Central banks would then face less pressure to raise consumer price inflation by expansionary measures than presently.

Higher capital requirements for commercial banks: A technique to reduce the risk-taking activities of the commercial banking system would be to introduce higher capital

⁷⁴ See Fisher (1922, chapter X) and Alchian and Klein (1973).

⁷⁵ See for example Goodhart (2001).

⁷⁶ See Andersson and Jonung (2017) for the case of a broad and explicit tolerance range. Wicksell did not consider a range for price-level targeting. Apparently, he believed that it was possible to keep the price level constant. In the 1920s, Erik Lindahl (1930) became the first economist to develop the arguments for an explicit range for a price-level targeting central bank, suggesting that the central bank should accept a "margin of errors" of a few per cent.

requirements, in this way reducing the size of the credit multiplier. They should not be based on the Basel approach, in which capital requirements are risk-weighted. Instead, a single capital to asset ratio should apply, where capital is defined as equity of the commercial banks. This procedure would keep the system simple and avoid the arbitrariness and complexity associated with risk-weighting. In my view, a ratio in the range of 20-30 percent would be much preferable to current ratios in the range around 5-10 percent. The movement from the present levels to higher ratios should occur gradually to allow banks to adjust without major complications.⁷⁷

Before the financial deregulation of the 1980s and 1990s, reserve requirements, with reserves defined as commercial banks holding of base money, were part of the regulatory framework. Central banks controlled one price, the policy rate, and one quantity, the base money reserves of the commercial banks. However, such reserve requirements are not likely to be effective today, because commercial banks have free access to base money. The monetary base is endogenously determined under inflation targeting; instead the credit multiplier should be reduced by appropriate measures.

Reform of the incentive structure of the financial system: Presently most financial institutions operate under limited liability. This implies that they are more prone to make risky investments compared to arrangements where the management and the owners of financial institutions are directly liable for losses of their business. Various schemes can be introduced for this purpose. History gives some suggestions. Partnerships are more careful in extending and managing credit than institutions based on limited liability. Note-issuing private banks in Sweden in the 19th century were based on the principle of unlimited liability of stockholders. They backed up the notes of private banks with their private fortunes. The system worked in an efficient way with no financial crises.⁷⁸

During recent financial crises, the losses of banks and other financial institutions have been socialized. The “too big to fail” argument gives big banks a license to extend credit. Instead, losses should be privatized by a larger element of private liability. This liability can also be transferred to the holders of stocks in financial institutions.⁷⁹

⁷⁷ See Dagher et al. (2016) for a survey of the benefits and costs of capital requirements for commercial banks.

⁷⁸ See Jonung (2020).

⁷⁹ See Goodhart (2020) for a discussion of such a proposal.

Reforms of the tax system: The political system in many countries is geared toward subsidizing the housing sector through favorable tax treatment of mortgages and home ownership. One way to reduce the demand for housing is to increase the taxation of housing. In this way, property price inflation will be reduced and demand for new credit will fall.

International central bank cooperation: In *Interest and Prices*, Wicksell recommended international monetary cooperation to set interest rates at a proper level to maintain global price stability. He repeated this recommendation in subsequent contributions. Indeed, central bank cooperation to raise interest rates would be most desirable, because central banks do not cooperate for the moment. Instead, they compete through depreciation of their currencies to support exports. Japan is a prime case here. Depreciation is driven by lowering the domestic policy rate compared to the rates of other central banks.

In my opinion, this process of depreciating the currency through currency competition is a major explanation of the global fall in interest rates in recent decades. Although the world lacks a global superpower or central body that can set interest rates, it is important to understand that constructive central bank cooperation would facilitate a move towards financial stability.

To sum up, the present framework for inflation targeting can be improved by several measures, preferably through a combination of reforms. International cooperation would facilitate a stronger financial architecture. A single country can still take steps to strengthen its financial system and its financial resilience despite far-reaching international dependency caused by cross-border financial integration.

9. The future

Suppose no changes are made to improve the present Wicksellian monetary regime based on inflation targeting; what will be the likely outcome? Allow me to speculate about two responses. The first says; don't worry about a new boom-bust cycle. In case of a new financial crisis, central banks will step in and make monetary policy as expansionary as needed. They did so after the global financial crisis in 2008 and after the corona crisis of 2020. In the short run, central banks will act as protectors and rescuers of the financial sector and the economy.

In the long run, however, they act as serial bubble-blowers. The Greenspan put was followed by the Bernanke put, the Yellen put and for the moment the Powell put. This pattern serves as an example for other central banks. Fed puts may continue well into the future. But can it continue forever? Perhaps it is time to pay attention to the possibility of the mother of all bubbles? In short, the financial system may not display long-run stability if the short-run behavior of central banks is to conduct continuous rescue operations.

The second answer is more pessimistic: it is too late to expect any action by now. Central banks and governments do not want to take away the punch bowl. It would be too risky from a political as well as an economic and financial perspective. It might cause a financial crisis that they do not want to initiate. The world economy is now on the steroids of low interest rates and high debt. Ultralow interest rates and the rapid rise in private and public debt have created a case of no return.

In the process, central banks are turning into prisoners of fiscal policy. The ultralow interest rate policies of the Federal Reserve and the ECB have supported unprecedented growth in public debt. Any major increase in interest rates may set off a public debt crisis, forcing major fiscal restraint at the same time as higher interest rates are reducing aggregate demand. This would be a most challenging situation for central banks, which want to be politically independent.

This would be a truly ironic twist of history, given that central banks were made independent as a way of separating monetary and fiscal policy. Now central banks may have used their independence to make fiscal policy dependent on monetary policy. So far, as long as interest rates have been low, governments have appreciated this support from monetary policy.

Which course will the future take: continuous monetary puts or a major deep crisis? Of course, we do not know, except that we should be convinced that new crises will occur. We do not know when, where and how. The chances are high that the next global crisis will be a financial crisis, barring new major wars. Such a crisis will lead to reforms of the financial system after the crisis, judging from the historical pattern.

10. Concluding discussion

The idea underlying this paper is that history of economic thought provides us with a rewarding perspective to understand current economic problems. I have argued that it is possible to identify the shortcomings associated with inflation targeting as implemented today by examining the crucial features of Wicksell's cumulative process as presented in his *Interest and Prices* of 1898.

Wicksell laid the foundation of inflation targeting with his *Interest and Prices*. He developed a theory for monetary policy for a pure credit economy based on the concept of the natural rate of interest. He recommended a monetary rule where the policy rate should be set equal to the natural rate. In this way, the general price level could be stabilized by central bank policy. He also introduced the notion of a normal rate of unemployment, suggesting that employment would be stable at this level, unaffected by price level movements.

Today, the interest rate gap, the natural rate of interest and the natural rate of unemployment are central features of the theory of inflation targeting although the work by Wicksell was neglected or forgotten for a long period. It is tempting to cite Schumpeter (1954, p. 863) on Wicksell's influence:

in the late 1920's and the early 1930s, it began to dawn upon the professional world that he [Wicksell] had anticipated, to a very large extent, all that was most valuable in the modern work on money and interest.

Wicksell's influence was arrested first by the rise of Keynes and of Keynesianism starting in the 1930s and then by the upswing of monetarism in the 1970s. But Wicksell has made a come-back in recent decades. With the advent of inflation targeting, his contributions are once in the center of the theory and policy of central banking. In my opinion, it is fair to say that the work by Wicksell forms the foundation of current monetary policy, being more central than the contributions by Keynes, Friedman or any other economists, living or dead.

Wicksell presented his cumulative process at the end of the 19th century when the classical gold standard prevailed as the dominant monetary regime. His rule of price level targeting could not be applied until gold had lost its role as the nominal anchor for the world monetary system. This transition took place following the demise of the Bretton Woods system and the spread of financial deregulation. Today, the world monetary system has moved close to a pure credit system. This has contributed to the acceptance of Wicksell's monetary theory through

the neo-Wicksellian contributions as the theory behind inflation targeting, although many economists are not aware of the Wicksellian roots of inflation targeting.

As I have argued here, the problems with inflation targeting today can be traced to Knut Wicksell as well. He excluded the financial system and asset markets in his model of the cumulative process, in this way ignoring the occurrence of financial crisis caused by excessive credit growth and balance sheet effects. The same exclusion holds for the neo-Wicksellian approach and thus for inflation targeting central banks today. They suffer from a Wicksellian tunnel vision that focuses on consumer price inflation and the policy rate, ignoring the rapid growth of credit and the rise in asset prices outside the tunnel during recent decades of inflation targeting.

The Wicksellians have successfully managed to get inflation targeting accepted as the rule of central banking. Now, the task remains to reform the design of the financial system such that it supports the Wicksell rule without giving rise to excessive credit. Within such a monetary regime, the cumulative process can serve as the foundation for a Wicksellian monetary regime based on a pure credit economy with independent central banks assigned the task of stabilizing the price level with less risk of credit induced financial instability.

Table 1. A stylized comparison of the institutional framework, the monetary policy strategy and the treatment of employment and expectations in Wicksell's model of the cumulative process and in the neo-Wicksellian approach.

	Wicksell's cumulative process of 1898	The neo-Wicksellians 1990–2021
<i>Institutional framework</i>		
Monetary system	A pure credit economy (a closed economy)	A pure credit economy (a closed economy)
The regulatory system of the financial sector	No restrictions on interest rates and credit flows, no reserve requirements for the banking system	No restrictions on interest rates and credit flows, no reserve requirements for the banking system
Central banks	State-owned, international monetary cooperation through an international commission ¹⁾	State-owned, independent from the government
<i>Monetary policy strategy</i>		
The goal of monetary policy	Price stability – defined as price level stability. Zero rate of inflation	Price stability – defined as a targeted rate of CPI inflation, commonly around 2 per cent
Prime policy instrument	Only the (short-term) central bank rate, viewed as positive	The central bank rate before the global financial crisis of 2008, unconventional measures like quantitative easing, negative policy rates and forward guidance after the global financial crisis of 2008
Policy rule	The policy rate of the central bank should be kept close to the natural rate to maintain price stability	The policy rate of the central bank should be kept close to the natural rate to maintain price stability
Time horizon	The very long run (no explicit time lags)	The cyclical perspective (explicit time lags)
<i>Expectations</i>		
	Static (constant) expectations	Rational expectations that should be well anchored in a proper monetary policy regime
<i>Employment</i>		
	Full employment (normal rate of unemployment) ²⁾	Employment oscillates around the natural rate of unemployment ³⁾

Comments: The table is inspired by a similar presentation by Clinton (2006).

1) Wicksell (1917, p. 78) explicitly ruled out private ownership of central banks.

2) Wicksell assumed full employment in the cumulative process. He used the term of the normal rate of employment when discussing employment in a way comparable to the concept of the natural rate of unemployment introduced by Friedman (1968). See Jonung (1985), which includes a comment by Friedman.

3) In the neo-Wicksellian approach, actual employment may deviate from the natural rate in the short run according to an expectations-augmented Phillips curve.

References

Adrian, Tobias, Douglas Laxton and Maurice Obstfeld, eds. (2018), *Advancing the Frontiers of Monetary Policy*, International Monetary Fund, Washington, DC.

Åkerman, Johan (1960), "The Cumulative Process", pp. 393- 412 in *25 Economic Essays in Honour of Erik Lindahl*, Svenska Tryckeriaktiebolaget, Stockholm.

Alchian, Armen and Benjamin Klein (1973), "On a Correct Measure of Inflation", *Journal of Money, Credit and Banking*, vol. 5, no. 1, pp. 173-191.

Amato, Jeffery (2005), "The Role of the Natural Rate of Interest in Monetary Policy", BIS working papers, no. 171. <https://www.bis.org/publ/work171.htm>

Andersson, Fredrik N.G. and Lars Jonung (2017), "Inflation Targets and the Benefits of an Explicit Tolerance Band", VOXeu, May 8, [Inflation targets and the benefits of an explicit tolerance band | VOX, CEPR Policy Portal \(voxeu.org\)](https://www.voxeu.org/article/inflation-targets-and-the-benefits-of-an-explicit-tolerance-band)

Andersson, Fredrik N.G. and Lars Jonung (2019), "The Tyranny of the Tenths. The Rise and Gradual Fall of Forward Guidance in Sweden 2007-2018", working paper 2019:14, Department of Economics, Lund University. https://project.nek.lu.se/publications/workpap/papers/wp19_14.pdf

Andersson, Fredrik N.G. and Lars Jonung (2020a), "Lessons from the Swedish Experience with Negative Central Bank Rates", *Cato Journal*, vol. 40, no. 3, Fall, pp. 595-612. <https://www.cato.org/sites/cato.org/files/2020-09/cj-v40n3-2.pdf>

Andersson, Fredrik N.G. and Lars Jonung (2020b), "Iceland Should Replace its Central Bank with a Currency Board", chapter 18 in Robert Aliber and Gylfi Zoega, eds. *The 2008 Global Financial Crisis in Retrospect*, Palgrave MacMillan, Cham.

Andersson, Fredrik N.G. and Lars Jonung (2022), "Preparing for the Next Crisis: Lessons from the Successful Swedish Fiscal Framework", chapter 3 in Barry W. Poulson, John Merrifield and Steve Hanke, eds. *Public Debt Sustainability: International Perspectives* Lexington Books, Lanham and London.

Arcand, Jean-Louis, Enrico Berkes and Ugo Panizza (2012), "Too Much Finance?", IMF working paper no. 12/161, IMF. <https://www.imf.org/external/pubs/ft/wp/2012/wp12161.pdf>

Arnon, Arie (2011), *Monetary Theory and Policy from Hume and Smith to Wicksell*, Cambridge University Press, Cambridge.

Barbaroux, Nicolas (2013), *Monetary Policy Rule in Theory and Practice*, Routledge, London and New York.

Berg, Claes and Lars Jonung (1999), "Pioneering Price Level Targeting: The Swedish Experience 1931-37", *Journal of Monetary Economics*, June, 1999.

Bernanke, Ben, Thomas Laubach, Frederic Mishkin and Adam Posen (1999), *Inflation Targeting. Lessons from the International Experience*, Princeton University Press, Princeton.

Boianovsky, Mauro and Hans-Michael Trautwein (2001), “An Early Manuscript by Knut Wicksell on the Bank Rate of Interest as the Regulator of Prices”, *History of Political Economy*, vol. 33, no. 3, pp. 485-507.

Boianovsky, Mauro and Hans-Michael Trautwein (2003), “Wicksell, Cassel, and the Idea of Involuntary Unemployment”, *History of Political Economy*, vol. 35, no. 3, pp. 385-436.
<https://read.dukeupress.edu/hope/article/35/3/385/12126/Wicksell-Cassel-and-the-Idea-of-Involuntary>

Boianovsky, Mauro and Hans-Michael Trautwein (2006), “Wicksell after Woodford”, *Journal of the History of Economic Thought*, vol. 28, no. 2, June, pp. 171-185.

Bordo, Michael (1984), “The Gold Standard. The Traditional Approach”, chapter 1 in Michael D. Bordo and Anna Schwartz, eds. *A Retrospective on the Classical Gold Standard, 1821-1931*, The University of Chicago Press, Chicago and London.

Bordo, Michael (2018), “An Historical Perspective on the Quest for Financial Stability and the Monetary Policy Regime”, *Journal of Economic History*, 78(2), 319-357.

Bordo, Michael and Lars Jonung (1987), *The Long-Run Behaviour of the Velocity of Circulation. The International Evidence*, Cambridge University Press, Cambridge.

Bordo, Michael and Lars Jonung (2001), “A Return to the Convertibility Principle? Monetary and Fiscal Regimes in Historical Perspective: The International Evidence”, chapter 8 in Axel Leijonhufvud, ed., *Monetary Theory and Policy Experience*, Palgrave, Houndsmill and New York.

Bordo, Michael and Chris Meissner (2016), “Fiscal and Financial Crises”, chapter 7 in John Cochrane and John Taylor, eds., *Handbook of Macroeconomics*, vol. 2A, Elsevier.
<http://dx.doi.org/10.1016/>

Borio, Claudio (2021), “Navigating by r^* : Safe or Hazardous?”, BIS working papers, no. 982.
<https://www.bis.org/publ/work982.pdf>

Brems, Hans (1986), *Pioneering Economic Theory, 1630-1980. A Mathematical Restatement*, Johns Hopkins University Press, Baltimore and London.

Bridges, Jonathan, Georgina Green and Mark Joy, (2021), “Credit, Crises and Inequality”, Staff Working Paper no. 949, Bank of England. <https://www.bankofengland.co.uk/working-paper/2021/credit-crises-and-inequality>

Buiter, Willem, (2021), “Central Banks and the Looming Financial Reckoning”, *Project Syndicate*, October 4. <https://www.project-syndicate.org/commentary/central-banks-must-focus-on-financial-stability-by-willem-h-buiter-2021-10>

Carney, Mark (2020), “A Framework for All Seasons?”, Speech given by Mark Carney, Governor of the Bank of England, at Bank of England Research Workshop on *The Future of Inflation Targeting*, 9 January, <https://www.bis.org/review/r200109b.pdf>

Clinton, Kevin, (2006), “Wicksell at the Bank of Canada”, Queen’s Economics Department, working paper no. 1087.
https://www.econ.queensu.ca/sites/econ.queensu.ca/files/qed_wp_1087.pdf

Cobham, David, Öyvind Eithreim, Stefan Gerlach and Jan Qvigstad, eds., (2010), *Twenty Years of Inflation Targeting. Lessons Learned and Future Prospects*, Cambridge University Press, Cambridge.

Cúrdia, Vasco and Michael Woodford, (2015) “Credit Frictions and Optimal Monetary Policy,” NBER working paper 21820.
https://www.nber.org/system/files/working_papers/w21820/w21820.pdf

Dagher, Jihad, Giovanni Dell’Ariccia, Luc Laeven, Lev Ratnovski and Hui Tong (2016), “Benefits and Costs of Bank Capital”, *IMF Staff Discussion Note*, 16/04, March.

Domanski, Dietrich, Michela Scatigna and Anna Zabai (2016), “Wealth Inequality and Monetary Policy”, *BIS Quarterly Review*, March, pp. 45-64.
https://www.bis.org/publ/qtrpdf/r_qt1603f.pdf

Fisher, Irving (1922), *The Purchasing Power of Money*, Macmillan, New York.

Fisher, Irving (1933), “The Debt-Deflation Theory of Great Depressions”, *Econometrica*, vol. 1, no. 4, pp. 337-357.

Frankel, Jeffrey (2012), “The Death of Inflation Targeting”, VOXeu, June 19.
<https://voxeu.org/article/inflation-targeting-dead-long-live-nominal-gdp-targeting>

Fregert, Klas and Lars Jonung (1996), “Inflation and Switches between Specie and Papers Standards in Sweden 1668-1931: A Public Finance Interpretation”, *Scottish Journal of Political Economy*, vol. 43, no. 4, pp. 444-467.

Friedman, Milton (1960), *A Program for Monetary Stability*, Fordham University Press, New York.

Friedman, Milton (1968), “The Role of Monetary Policy”, *American Economic Review*, vol. 58, pp. 1-17.

Goodhart, Charles (2001), “What Weight should be given to Asset Prices in the Measurement of Inflation?”, *Economic Journal*, vol. 111, pp. 335-356.

Goodhart, Charles (2021), “The Moral Hazard of Limited Liability”, Voxeu, 30 July.
<https://voxeu.org/article/moral-hazard-limited-liability>

Gårdlund, Torsten (1956), *Knut Wicksell. Rebell i det nya riket*, Bonniers, Stockholm.

Hansson, Björn (1987), "Cumulative processes", pp. 736-738 in volume 1 of John Eatwell, Murray Milgate and Peter Newman, eds., *The New Palgrave. A Dictionary of Economics*, Macmillan Press, London and Basingstoke.

Hansson, Pontus and Lars Jonung (1997), "Finance and Economic Growth: The Case of Sweden 1834-1991", *Research in Economics*, pp. 275-301.

Hernandez-Aramburo, Luis (1996), "Financial Innovation and the Price Level: Wicksell and the New Monetary Economics", chapter 10 in Daniel Vaz and Kumaraswamy Velupillai, eds., *Inflation, Institutions and Information: Essays in Honour of Axel Leijonhufvud*, MacMillan, London.

Hicks, John (1967), *Critical Essays in the Monetary Theory*, Clarendon Press, Oxford.

Hicks, John (1977), *Economic Perspectives. Further Essays on Money and Growth*, Clarendon Press, Oxford.

Hughes, J R T (1968), "Wicksell on the Facts", chapter 8 in J. N. Wolfe, ed., *Value, Capital and Growth. Papers in Honour of Sir John Hicks*, Edinburgh University Press, Edinburgh.

Humphrey, Thomas (1986), "Cumulative Process Models from Thornton to Wicksell", *Economic Review, Federal Reserve Bank of Richmond*, May/June, pp. 18-25

Jonung, Lars (1978a), "The Long-Run Demand for Money. A Wicksellian Approach", *Scandinavian Journal of Economics*, no. 2.

Jonung, Lars (1978b), "En stabil stabiliseringspolitik", *Ekonomisk Debatt*, no. 1.
<http://nationalekonomi.se/filer/pdf/6-1-lj.pdf>

Jonung, Lars (1979a), "Knut Wicksell's Norm of Price Stabilization and Swedish Monetary Policy in the 1930s", *Journal of Monetary Economics*, vol. 6, no. 4. pp. 459-496.

Jonung, Lars (1979b), "Knut Wicksell and Gustav Cassel on Secular Movements in Prices", *Journal of Money, Credit and Banking*, vol. 11, no. 2, pp. 165-181.

Jonung, Lars (1985), "Knut Wicksell and Milton Friedman on the Normal or Natural Rate of Unemployment", unpublished manuscript, Department of Economics, Lund University.

Jonung, Lars (1989), "Knut Wicksell on Unemployment", *History of Political Economy*, vol. 21, pp. 27-42.

Jonung, Lars (2002), "National or International Inflation Targeting: The Wicksellian Dilemma of the Euro-Outs", *Journal of Public Policy*, pp. 183-197, vol. 22.

Jonung, Lars (2008), "The First Practical Guide to Price Level Targeting: The Confidential Reports to the Riksbank in 1931 by Gustav Cassel, David Davidson and Eli Heckscher", unpublished manuscript, Department of Economics, Lund University.

Jonung, Lars (2017), “Open mouth operations. Monetary policy by threats and arguments. The monthly meetings between the Riksbank and the commercial banks, 1956-73”, unpublished manuscript, Department of Economics, Lund University.

Jonung, Lars (2019), “In Pursuit of a Stable Stabilization Policy in Sweden: From the Gold Standard to Inflation Targeting and Beyond”, working paper 2019:20, Department of Economics, Lund University.

https://project.nek.lu.se/publications/workpap/papers/wp19_20.pdf

Jonung, Lars (2020), “Afterword to ‘It will soon be 1984 ...’”, *Econ Journal Watch*, vol. 17(1), March, pp. 251–255.

https://econjwatch.org/file_download/1151/CompleteIssueMar2020.pdf?mimetype=pdf

Jonung, Lars (2021), “Free Banking in Sweden: The Case of Private Bank Notes, 1831-1902”, Working paper 2021:6, Department of Economics, Lund University.

https://project.nek.lu.se/publications/workpap/papers/wp21_6.pdf

Jonung, Lars, Torun Hedlund-Nyström and Christina Jonung, eds., (2001), *Att uppfostra det svenska folket. Knut Wicksells opublicerade manuskript*, SNS Förlag, Stockholm.

Jonung, Lars, Jaakko Kiander and Pentti Vartia, eds., (2009), *The Great Financial Crisis in Finland and Sweden. The Nordic Experience of Financial Liberalization*, Edward Elgar, Cheltenham.

Jordà, Oscar, Mauritz Schularick and Alan Taylor (2017), “Macrofinancial History and the New Business Cycle Facts”, chapter 3 in *NBER Macroeconomics Annual Conference*, vol. 31, University of Chicago Press, Chicago.

<https://www.journals.uchicago.edu/doi/10.1086/690241>

Laidler, David (1991a), *The Golden Age of the Quantity Theory. The Development of Neoclassical Monetary Economics 1870-1914*, Harvester, New York.

Laidler, David (1991b), “The Austrians and the Stockholm School: Two Failures in the Development of Modern Macroeconomics?”, chapter 12 in Lars Jonung, ed., *The Stockholm School of Economics Revisited*, Cambridge University Press, Cambridge

Laidler, David (2006), “Woodford and Wicksell on *Interest and Prices*: The Place of the Pure Credit Economy in the Theory of Monetary Policy”, *Journal of the History of Economic Thought*, vol. 28, no. 2, pp. 151-159.

Leiderman, Leonardo and Lars E O Svensson, eds., (1995), *Inflation Targets*, CEPR, London.

Leijonhufvud, Axel (1981), “The Wicksell Connection: Variations on a Theme,” in Axel Leijonhufvud, *Information and Coordination: Essays in Macroeconomic Theory*. New York: Oxford University Press, pp. 129-202.

Leijonhufvud, Axel (2001), “Monetary Theory and Central Banking”, chapter 1 in Axel Leijonhufvud, ed., *Monetary Theory as a Basis for Monetary Policy*, IEA conference volume no. 131, Palgrave, Houndmills and New York.

Leijonhufvud, Axel, (2007a), “The Perils of Inflation Targeting”, VOXeu, June 25.
<https://voxeu.org/article/perils-inflation-targeting>

Leijonhufvud, Axel (2007b), “Monetary and Financial Stability”, *CEPR Policy Insight*, no. 14 October. https://cepr.org/sites/default/files/policy_insights/PolicyInsight14.pdf

Leijonhufvud, Axel (2014), “Economics of the Crisis and the Crisis of Economics,” *European Journal of History of Economic Thought*, vol. 21, no. 5, pp. 760-774.

Leijonhufvud, Axel (2015), “Monetary Muddles,” *Cato Journal*, vol. 35, no. 2, pp. 179-192.
<https://www.cato.org/sites/cato.org/files/serials/files/cato-journal/2015/5/cj-v35n2-1.pdf>

Lindahl, Erik (1930), *Penningpolitikens medel*, Förlagsaktiebolagets i Malmö boktryckeri, Malmö.

Lundahl, Mats (2021), *The Dynamics of Poverty. Circular, Cumulative Causation, Value Judgments, Institutions and Social Engineering in the World of Gunnar Myrdal*, Palgrave Macmillan, Cham, Switzerland.

Mayer, Thomas and Gunther Schnabl (2021), “Covid-19 and the Euthanasia of Interest Rates: A Critical Assessment of Central Bank Policy in Our Times”, *Journal of Policy Modeling*, no. 43, pp. 1241-1258.

Myrdal, Gunnar (1939), *Monetary Equilibrium*, Hodge, London.

Obstfeld, Maurice and Alan M. Taylor (2017), “International Monetary Relations: Taking Finance Seriously”, *The Journal of Economic Perspectives*, vol. 31, no. 3, pp. 3-28.

Ohlin, Bertil (1934), “Knut Wicksell, Father of the Swedish Monetary Experiment”, *Economic Forum*, pp. 159-167.

Patinkin, Don (1965), *Money, Interest, and Prices*, Harper & Row, New York.

Rajan, Raghuram (2021), “The Dangers of Endless Quantitative Easing”, Project Syndicate, August 2. <https://www.project-syndicate.org/commentary/qe-bond-purchases-decrease-government-debt-maturity-by-raghuram-rajn-2021-08?barrier=accesspaylog>

Reichlin, Lucrezia and Richard Baldwin, eds., (2013), *Is Inflation Targeting Dead? Central Banking after the Crisis*, VoxEU.org Book,
[https://voxeu.org/sites/default/files/file/P248%20inflation%20targeting\(2\).pdf](https://voxeu.org/sites/default/files/file/P248%20inflation%20targeting(2).pdf)

Reinhart, Carmen and Kenneth Rogoff (2009), *This Time is Different. Eight Centuries of Financial Folly*, Princeton University Press, Princeton.

- Rey, Helene (2015), “Dilemma not Trilemma: The Global Financial Cycle and Monetary Policy Independence”, NBER working paper, no. 21162, May.
- Rogoff, Kenneth, (2016), *The Curse of Cash*, Princeton University Press, Princeton and Oxford.
- Rogoff, Kenneth, (2017), “Dealing with Monetary Paralysis at the Zero Bound”, *The Journal of Economic Perspectives*, vol. 31, no. 3, pp. 47-66.
- Schumpeter, Joseph (1954), *History of Economic Analysis*, Allen & Unwin, London.
- Siven, Claes-Henric (1998), “Two Early Swedish Debates about Wicksell’s Cumulative Process”, *The European Journal of the History of Economic Thought*, vol. 5, pp. 120-139.
- Siven, Claes-Henric (2006), “Monetary Equilibrium”, *History of Political Economy*, vol. 38, pp. 665-709.
- Ståhl, Ingemar (2020), “It Will Soon Be 1984 ... Ingemar Ståhl’s Pioneering 1979 Proposal to Abolish Cash to Strengthen the Swedish Welfare State”. *Econ Journal Watch*, vol. 17, no. 1, March, pp. 242–251.
https://econjwatch.org/file_download/1151/CompleteIssueMar2020.pdf?mimetype=pdf
- Svensson, Lars E O (1997), “Inflation Forecast Targeting: Implementing and Monitoring Inflation Targets”, *European Economic Review*, vol. 41, pp. 111-146.
- Taylor, John (1993), “Discretion versus Policy Rules in Practice”, *Carnegie-Rochester Conference Series on Public Policy*, no. 39, pp. 195-214.
- Taylor, John (2014), “Causes of the Financial Crisis and the Slow Recovery: A Ten-Year Perspective”, chapter 4 in Martin Baily and John Taylor, eds., *Across the Great Divide. New Perspective on the Financial Crisis*, Hoover Institution Press, Stanford University, Stanford.
- Trautwein, Hans-Michael (1997), “The Uses of the Pure Credit Economy”, chapter 1 in A. Cohen, H. Hageman and J. Smithin, eds., *Money, Financial Institutions and Macroeconomics*, Kluwer Academic Publishers, Boston/Dordrecht/London.
- Trautwein, Hans-Michael (2000), “The Credit View, Old and New.” *Journal of Economic Surveys*, April, vol. 14, no. 2, pp. 155-189.
- Turner, Adair (2016), *Between Debt and the Devil: Money, Credit and Fixing Global Finance*, Princeton University Press, Princeton and Oxford.
- Uhr, Carl (1960), *Economic Doctrines of Knut Wicksell*, University of California Press, Berkeley and Los Angeles.
- Waldenström, Daniel (2014), “Swedish stock and bond returns, 1856–2012”, in Rodney Edvinsson, Tor Jacobson and Daniel Waldenström, eds., *Historical Monetary and Financial*

Statistics for Sweden, vol. 2: House Prices, Stock Returns, National Accounts and the Riksbank balance Sheet, 1860-2012, Stockholm: Sveriges Riksbank and Ekerlids förlag.

Whelan, Karl (2021), “Central Banks and Inflation: Where Do We Stand and How Did We Get Here?”, working paper, Department of Economics, University College Dublin.
<https://researchrepository.ucd.ie/handle/10197/12561>

Wicksell, Knut (1895), ”Myntfrågan”, pp. 59-65 in Lars Jonung, Torun Hedlund-Nyström and Christina Jonung, eds., *Att uppfostra det svenska folket. Knut Wicksells opublicerade manuskript*, SNS Förlag, Stockholm 2001.

Wicksell, Knut (1898a), *Geldzins und Güterpreise*, Fisher Verlag, Jena. Translated into English as Wicksell (1936), *Interest and Prices*.

Wicksell, Knut (1898b), “Penningröntans inflytande på varuprisen”, Lecture to *Nationalekonomiska föreningen*, April 14, pp. 47–70 in *Nationalekonomiska föreningens förhandlingar*, Förra halvåret 1898, Stockholm, Iduns Tryckeriaktiebolag. Translated as “The Influence of the Rate of Interest on Commodity Prices”, pp. 67-89 in Erik Lindahl, ed., *Knut Wicksell. Selected Papers on Economic Theory*, George Allen and Unwin, London, 1958.

Wicksell, Knut (1907a), “The Influence of the Rate of Interest on Prices”, *Economic Journal*, vol. 17, pp. 213-220.

Wicksell, Knut (1907b), “The Enigma of Business Cycles”, pp. 223-239 in Wicksell (1936) as reprinted by Augustus Kelley, New York, 1965. This is a translation of a lecture by Wicksell given in 1907, *Krisernas gåta*.

Wicksell, Knut (1917), “The Scandinavian Monetary System after the [First] World War, chapter 21, pp. 71-80, in Bo Sandelin, ed., *Knut Wicksell. Selected Essays in Economics*, vol. II, Routledge, London and New York. Translation of “Det skandinaviska penningväsendet efter kriget”, published in *Bidrag till frågan om ett ekonomiskt närmande mellan de skandinaviska länderna. Inlägg av skandinaviska ekonomer*.

Wicksell, Knut (1925), “Det definitiva ordnandet av världens penningväsen” (The Ultimate Organization of the Monetary System of the World), pp. 85-100, *Nationalekonomiska Föreningens Förhandlingar 1925*, Almqvist & Wiksell, Uppsala.

Wicksell, Knut (1935), *Lectures on Political Economy*, vol. 2. Translated by E. Classen. Edited with an introduction by Lionel Robbins. London: Routledge.

Wicksell, Knut (1936), *Interest and Prices: A Study of the Causes Regulating the Value of Money*. Translated by R. F. Kahn. Macmillan, London.
https://cdn.mises.org/Interest%20and%20Prices_2.pdf

Wood, Geoffrey (1994), “A Pioneer Bank in a Pioneer’s Country”, *Central Banking*, vol. 5, no. 1, pp. 59-74.

Woodford, Michael (2003), *Interest and Prices: Foundations of a Theory of Monetary Policy*, Princeton University Press, Princeton and Oxford.

Woodford, Michael (2006), "Comments on the Symposium on *Interest and Prices*", *Journal of the History of Economic Thought*, vol. 28, no. 2, pp. 187-197.

Figure 1. The rate of consumer price inflation in Sweden and the United States, percent, 1970-2020.

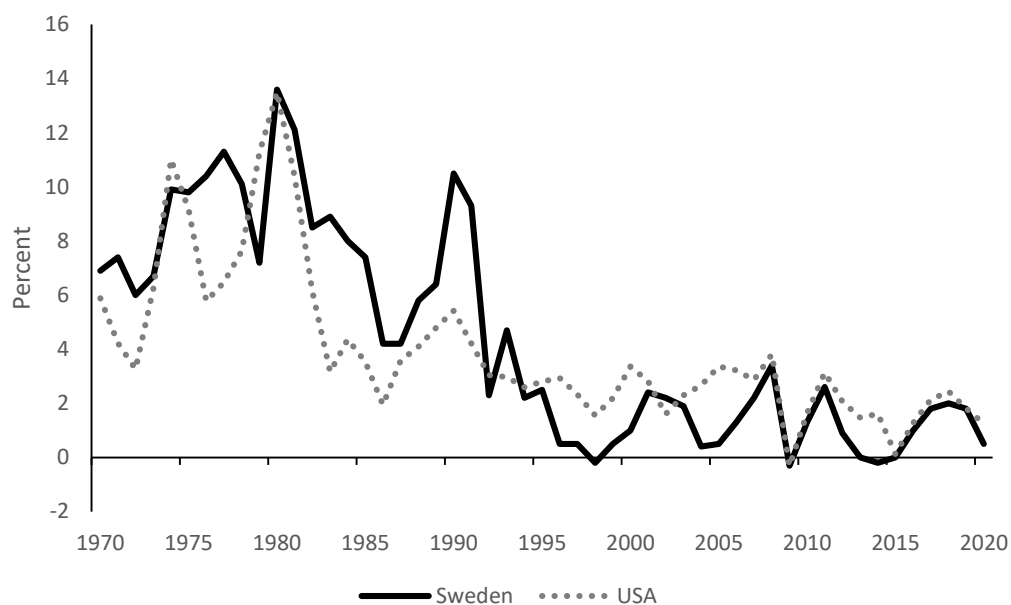


Figure 2. The central bank policy rate in Sweden and the United States, percent, 1970-2020.

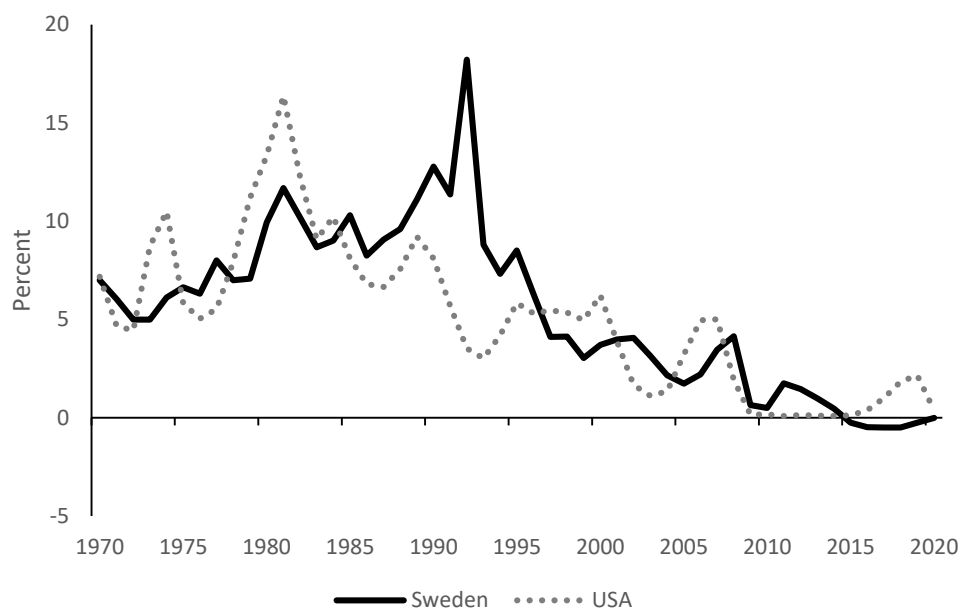
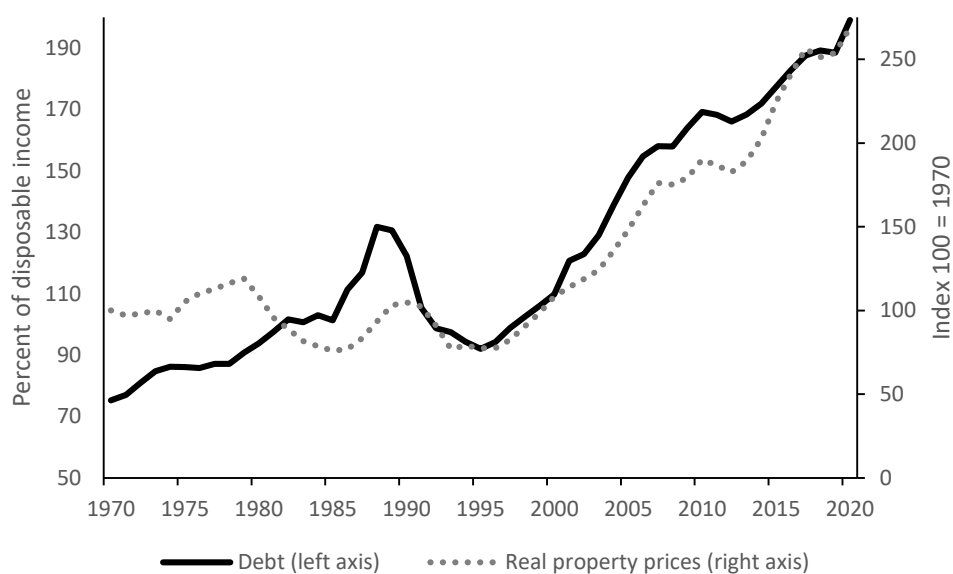


Figure 3. Private debt to disposable income, percent, left-hand axis, and real property prices in Sweden, index=100 for 1970, right-hand axis, 1970-2020



Comment: The rise in the debt to income 1985-1990 and the subsequent fall in 1991-1995 reflect the process of financial deregulation. It opened for a rapid rise in credit growth followed by an exchange rate crisis and depression in the early 1990s. See the contributions in Jonung et al (2009) for an account of the boom-bust pattern created by the financial deregulation process in Sweden.

Figure 4. Private debt to GDP, percent, left-hand axis, and real property prices in the United States, index=100 for 1970, right-hand axis, 1970-2020.

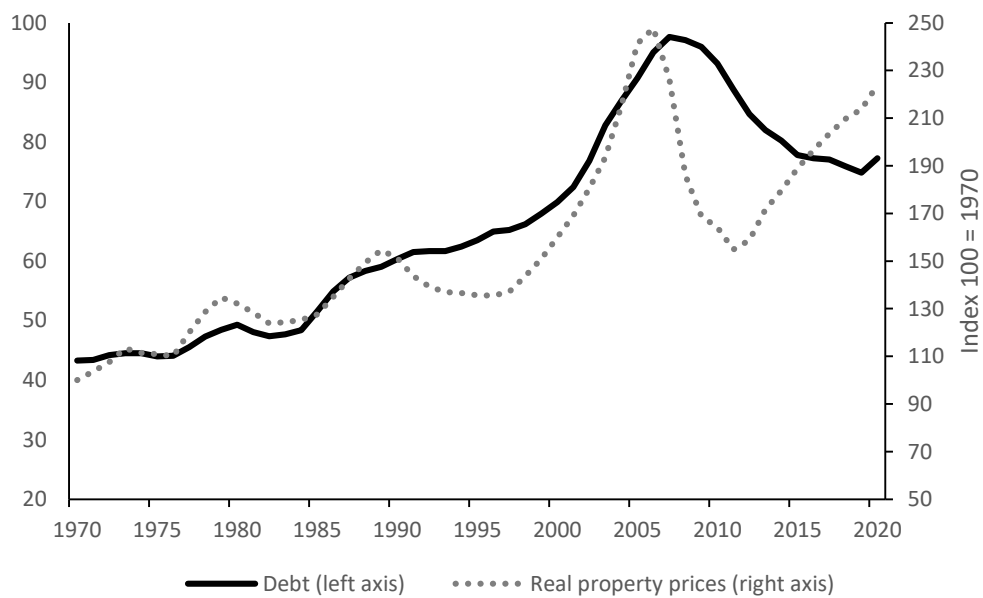
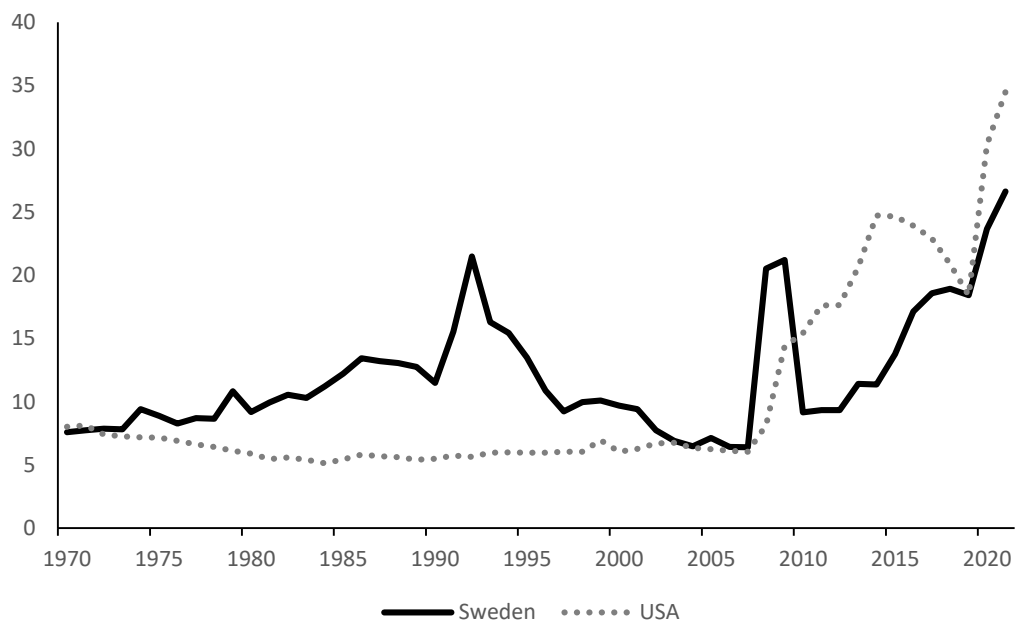
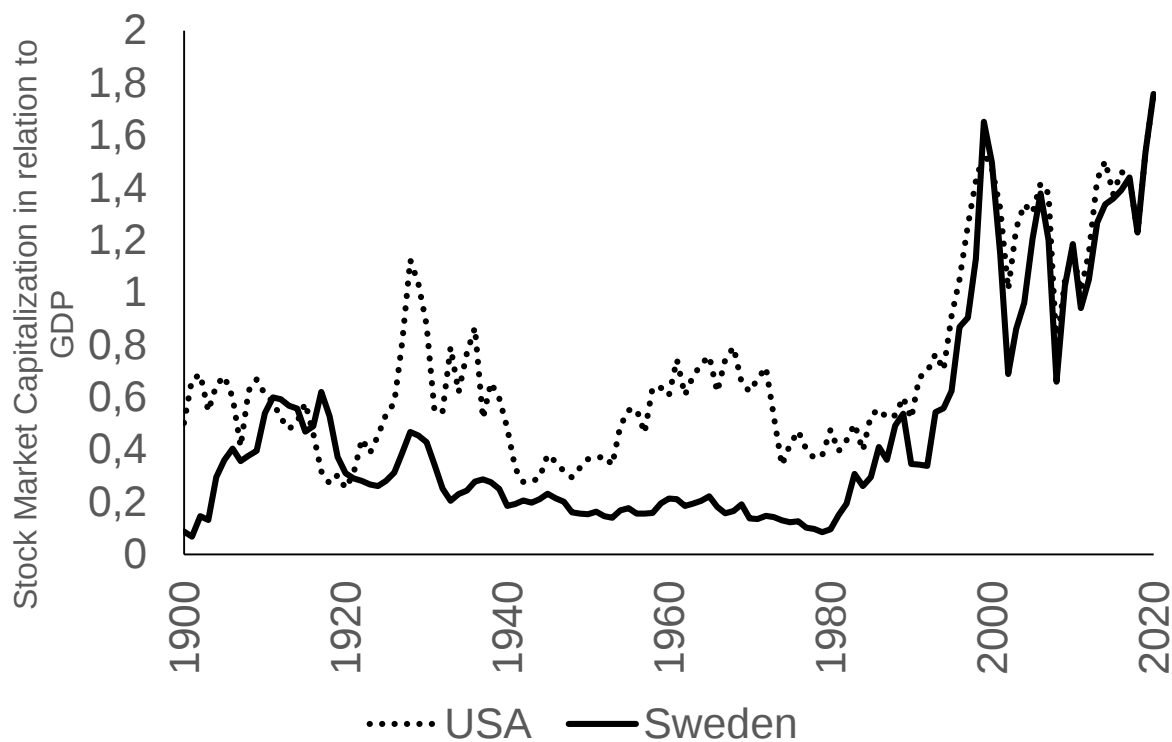


Figure 5. The balance sheet of the central bank in Sweden and in the United States in relation to GDP, percent, 1970-2020.



Source: FRED, St Louis Fed.

Figure 6. The stock market capitalization in relation to GDP for Sweden and the United States, percent, 1990-2020.



Source: Sweden: Waldenström (2014) with extended data. United States: Dmitry Kushinov and Kaspar Zimmerman, "The Big Bang: Stock Market Capitalization in the Long Run", *Journal of Financial Economics*, forthcoming.