Monetary Equilibrium

by

Claes-Henric Siven

Abstract

The first part of the paper surveys the discussion of monetary equilibrium by Wicksell, Lindahl, Myrdal, Ohlin and Palander. In the second part a number of analytical aspects of monetary equilibrium are discussed: The formulation of the first equilibrium condition in terms of prices instead of in terms of quantities; The interpretation of the second equilibrium condition as equality between saving and investments; What was the exact interpretation of the rate of interest as a monetary phenomenon; The economic interpretation of a gap between the natural and the loan rate of interest; and the use of equilibrium and disequilibrium analysis.

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One interpretation of the term monetary equilibrium is partial equilibrium in the money market. An example of this is that at a certain rate of interest demand for and supply of money are equal (the liquidity preference theory of the rate of interest with the LM-curve as its geometric image).[1] Another interpretation of monetary equilibrium is a general equilibrium with money, that is money has a positive value.[2] However, the term, when introduced by Gunnar Myrdal (1931), had a different meaning. One equilibrium condition concerned the rate of interest, another supply and demand for loans and the last one the price level. Lindahl (1930) distilled the three conditions from various parts of Knut Wicksell's monetary writings.

Lindahl's reason for discussing the equilibrium conditions was to explain why he did not use them in his own analysis. In response to Lindahl, Gunnar Myrdal (1931) argued that Wicksell's equilibrium conditions together did constitute a promising approach to monetary analysis. A few years later Bertil Ohlin ([1933] 1978) entered the discussions. It ended in 1941 when Tord Palander published a penetrating criticism of Myrdal's analysis.[3]

When Shackle (1967) surveyed the main theoretical advances during the period 1926-1939, he did not only discuss imperfect competition, ordinal utility theory and Keynesian economics. He included monetary equilibrium as well. Monetary equilibrium has also been discussed as one aspect of the theories of the Stockholm School, see Thomas (1936), Ohlin (1937a; 1937b), Hansson (1982), Patinkin (1982), Dostaler (1990), Myhrman (1991) and Laidler (1999). Steiger (1987) offers a concise summary. See also Leijonhufvud (1981, chapter 7) and Uhr (1960).

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[1] Alternatively the term may signify that one of the excess demand functions in a general equilibrium system, the one for money, equals zero. See de Jong (1956, 3).

[2] This is the way Grandmont (1983, 4) defines a Walrasian monetary equilibrium. A similar term, monetary steady-state equilibrium is used by Trejos and Wright (1995, 125) for depicting a situation where the value of money is positive.

[3] Hansen (1951) contains material of direct relevance for the problem of monetary equilibrium. However, the greater part of his dissertation is devoted to other problems. Section 6 below contains comments on his discussion.

The purpose of this paper is to give a general overview of the development of the concept of monetary equilibrium by focusing on the theoretical foundations of the discussion. Analytical issues will be more heavily stressed than in the previous literature. The following issues will be taken up:

- What information do the three equilibrium conditions give regarding the development of the economy? Are more equilibrium conditions needed?
- The background to and reason why Wicksell formulated the first equilibrium condition in terms of prices instead of in terms of quantities, that is as equality between the natural and the loan rate of interest (i. e. the rate of interest should be normal) will be discussed.
- The second equilibrium condition was formulated as equality between saving and investments. Did this mean that Wicksell formulated a loanable funds theory of interest rate determination? Moreover, what was the relationship between the loanable funds theory of Wicksell's Swedish followers and the Keynesian theory of liquidity preference?
- Both Myrdal, Palander and Keynes stated that the rate of interest is a monetary phenomenon. What did they exactly mean by this and how was the argument related to the model of interest rate determination?
- In a general equilibrium model the rate of interest operates simultaneously on different margins (for example on investment decisions or financial portfolio decisions). From this perspective the gap between the natural and the loan rate of interest may be due to the fact that markets are not cleared simultaneously (for example sequentially as in one of Wicksell's models). Alternatively, as in Lindahl's (1930) analysis, some markets are cleared by prices and some are not so that rationing restrictions are doing part of the job.
- Temporary equilibrium thus takes two forms; Walrasian temporary equilibrium and temporary equilibrium with rationing. To what extent did Wicksell and his Swedish followers perform their analysis with (generalized) equilibrium theory and to what extent did they perform disequilibrium analysis?

The discussion proceeds in the following order. I first give an outline of the contributions of Wicksell, Lindahl, Myrdal, Ohlin and Palander concerning monetary equilibrium. After that a

number of analytical issues will be discussed. I first discuss the choice of equilibrium conditions and the formulation of these in prices or in terms of quantities. Next I discuss loanable funds versus liquidity preference theory, whether the rate of interest is a monetary phenomenon, different equilibrium models and finally the development of Swedish disequilibrium analysis. The paper ends with a conclusion.

1. Wicksell's development of monetary theory

In the 1890s Wicksell had published a book in microeconomics and capital theory (1893) and a book on public finance (1896). He finally (1898) made a contribution to the theory of money.[4]

The first monetary contribution by Wicksell (1898) was an outline of a theory of demand for real balances.[5] The classical quantity theory of money could then in principle be formulated as an equilibrium condition: At a given quantity of nominal balances, the price level has to adjust so that demand and supply of real balances are equal. This is similar to an ordinary equilibrium condition on a goods market. The equilibrium condition is expressed in quantities and the equilibrating variable is a price.

The discussion of the quantity theory in terms of supply and demand for money is clearer in Marshall's unpublished manuscript from (about) 1871, see Marshall (1975) and Laidler (1991).[6] Wicksell probably did not know of this manuscript but he had indirect knowledge of the reasoning through Marshall's (1926) memoranda and evidence before the Royal Commission on the values of gold and silver 1887-88.[7] In this long evidence, Marshall illuminated the consequences of introducing a bimetal standard based on gold and silver.

[4] The essence of the analysis was probably formulated already in 1889, see Wicksell (2001) and Boianovsky and Trautwein (2001).
[5] See Wicksell ([1898] 1936, 39-40) and Patinkin (1965, 581-582).
[6] However, Marshall did not present the real balance effect as clear as Wicksell. What Marshall did was to present a demand curve for money with a unitary elasticity. In his discussion of the effect of a greater quantity of money on the price level he consequently confused a demand curve for money with a market equilibrium curve, see Bridel (1987, 32) and Patinkin (1965, 605-609).
[7] Wicksell ([1898] 1936, 76) referred to the testimony.

Wicksell's refinement of the classical quantity theory of money in the beginning of *Interest and Prices* was more like a footnote. His main concern was to give a theoretical answer to empirical observations, which seemed to contradict the quantity theory of money.

Ricardo ([1810], 1994) explained high prices by excess emission of bank notes by the Bank of England. Moreover he predicted a low rate of interest in connection with price increases. Evidently Ricardo did not only analyze the direct effect on the demand for goods of increased money balances, but also the indirect effects via the loan market:

> I do not dispute, that if the Bank were to bring a large additional sum of notes into the market, and offer them on loan, but that they would for a time affect the rate of interest. The same effects would follow from the discovery of a hidden treasure of gold or silver coin. If the amount were large, the Bank, or the owner of the treasure, might not be able to lend the notes or the money at four, nor perhaps, above three per cent.; but having done so, neither the notes, nor the money, would be retained unemployed by the borrowers; they would be sent into every market, and would every where raise the prices of commodities, till they were absorbed in the general circulation. It is only during the interval of the issues of the Bank, and their effect on prices, that we should be sensible of an abundance of money, interest would, during that interval, be under its natural level; but as soon as the additional sum of notes or of money became absorbed in the general circulation, the rate of interest would be as high, and new loans would be demanded with as much eagerness as before the additional issues. Ricardo ([1810] 1994, Vol. II, 211-12)

However, the empirical tests of the prediction indicated the opposite relationship. Based on a rich statistical material, Tooke (1844) draw the conclusion that changes of the price level lead changes of the quantity of money.[8] This is in contrast to the causal direction according to the quantity theory of money. In addition the empirical material indicated that periods of price increases coincided rather with a high than with a low loan rate of interest.

[8] "Equipped with an infinite amount of practical experience and unhampered by any very great theoretical ballast, Tooke set out to fight the Ricardian theories and to prove that their conclusions in many cases did not tally with reality", Wicksell ([1899] 1958, 69).

To tackle this problem, Wicksell assumed money partly in the form of deposits in the banks. This was not only in conformity with the development of the payments system during the 19th century. It also meant an endogenous nominal quantity of money.

In chapter 9, section B of *Interest and Prices* Wicksell presented a simple model illustrating the central mechanisms for the case the quantity of money[9] is identical to deposits in the banking system. He assumed that production is time demanding and takes exactly one "year". This means that supply of goods is determined by production during the previous year. In the beginning of the period the firms borrow to be able to pay the original factors of production labor and land. Factor prices are determined in the beginning of the period. The income of workers and landowners is used for buying consumer goods. Goods prices are consequently determined in the next step. After that the production process goes on during the period. The same events are repeated period by period. If the natural rate of interest (in this case the rate of profits[10]) equals the loan rate of interest, the system will be in stationary equilibrium.[11]

Now assume that at a constant loan rate of interest the natural rate of interest increases due to increased productivity.[12] At given factor inputs and goods prices, profits will then increase. This induces firms to attract factors of production and consequently factor prices will increase. If the natural rate of interest increases by one percent, factor prices must increase by the same percent in order for factor markets to equilibrate again. However, in the next moment pricing in the goods markets takes place. Since incomes have increased by one percent and since marginal propensity to save is zero, goods prices will increase by one percent as well. This is an equilibrium analysis since there is a successive equilibration of factor and goods markets in each period. However, it is not the question of a stationary equilibrium or even temporary equilibrium since in the latter

[9] Note that Wicksell himself did not include deposits in his definition of money. The matter is discussed below.
[10] Profits including interest payments as a percentage of wage and rent payments.
[11] This is not a complete description. Wicksell further assumed that capitalists partly deposit money in the banks; partly in the end of the period buy the results of the production process from the entrepreneurs. The capitalists-traders then sell the goods to the laborers and land-owners in the beginning of the next period, just after the factor markets are equilibrated. It is consequently a rather complicated set-up, but it is needed for the model to function in an appropriate way. Small changes of the set-up will produce big differences in the working of the model, see Laidler (1991, 130-133).
[12] Consequently he studied changes in the relationship between the loan rate of interest in comparison to profit possibilities when investing the borrowed money. Thornton ([1802] 1994) had already discussed this. But when Wicksell wrote his book he did not yet know of Thornton's analysis. It was probably not until 1916 that Wicksell via David Davidson got knowledge of Thornton's analysis, see Davidson (1916) and Uhr (1960, 200).

case all markets would simultaneously be in equilibrium. For a further discussion, see Siven (1997).

Prices will increase as long as the gap between the natural and the loan rate of interest is positive. The reason why price level increases in each period equal the gap between the two rates of interest has to do with assumptions concerning expectations - entrepreneurs expect the same price level as during the previous period. If price increases during a series of periods create expectations of further price increases the process will accelerate. Moreover, deposits (=means of payments) will increase at the same rate as prices do. Abstracting from possible distributional effects between entrepreneurs-borrowers and capitalists-lenders, there will be no counteracting real balance effect.[13]

If the natural rate instead is lower than the loan rate of interest, the price level will fall. The model is symmetrical in its working.

By money Wicksell only meant coins[14], the quantity of which is exogenously determined by the central bank. Consequently we can say that there is no money in Wicksell's basic model. There are only substitutes for money. These substitutes tend to increase the virtual elasticity of money. If the quantity of money in the limit case studied by Wicksell tends to zero, the velocity of transactions tends to infinity. This is what Patinkin (1965, 295) following Gurley and Shaw (1960) called the case of "pure inside money". The other extreme case, the starting point of the quantity theory of money, can correspondingly be called "pure outside money".[15]

Wicksell's simple model for the case of pure inside money is not capable of explaining Tooke's observation that the loan rate of interest depends positively on the price level. The are two

[13] This seems to contradict Patinkin's (1965, 295-98) conclusion that the real balance effect may operate in a system of pure inside money. However, note Wicksell's assumption that the loan rate of interest is for this case fixed by convention and that the supply of loans (and demand for deposits) is infinitely elastic whereas Patinkin (p. 295) assumed inside money to be exogenous. Another way of deriving a determinate price level with pure inside money is by assuming that the banks hold exogenously determined reserves, see Patinkin (1965, 302-6) and Boianovsky (1998, 596).

[14] "In reality a banknote is nothing but a cheque", Wicksell ([1906] 1935b, 88). See also Stadermann and Steiger (2001, 268).

possible avenues. The first is to incorporate inflationary expectations, c. f. Fisher (1896). If expectations are adaptive, price increases during one period induces expectations of a continuing inflation and consequently the nominal rate loan of interest will increase.[16] Wicksell ([1898] 1936, 166) was not negative to this argument, but he thought it was insufficient to explain inflation processes since it did not explain what originally generates inflation.

The second possibility, which was the one chosen by Wicksell, was to drop the assumption of pure inside money and further to assume that the banks try to keep a fraction of their lending in reserves.[17]

A mechanism that explains why the banks set a higher loan rate of interest the higher the price level is that the public needs certain cash balances to effect their petty payments. The higher the price level, the bigger amount of cash balances is needed and the greater the leakage of bank reserves (inside drain). The banks then adjust by setting a higher loan rate of interest.

A mix of inside and outside money is thus sufficient to explain the positive relationship between the rate of interest and the price level. But it requires that disturbances most often come from the real, not from the monetary side, that the most frequent disturbances are autonomous changes of the natural rate of interest. If disturbances instead are dominated by monetary impulses, we get the case analyzed by Ricardo.

How are autonomous changes of the natural rate of interest generated? According to Böhm-Bawerk, the natural rate of interest is an endogenous variable. This is even more clearly seen in Wicksell's (1893) generalization of the Austrian theory of capital where he used a small stationary general equilibrium model with two factors of production and two goods.[18] A certain

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[15] Outside money is based on sight-claims on the government or gold whereas inside money is based on claims on private agents. While (abstracting from public choice mechanisms) the quantity of outside money is exogenous this does not hold for inside money. However, note Patinkin's (1965, 295) assumption discussed above.

[16] In this case the nominal loan rate of interest is no longer exogenous, but this may be the case for the real loan rate of interest.

[17] However, in contrast to his analysis of pure inside money, Wicksell never modeled the more complex case of mixed inside and outside money. This may be the reason why he did not arrive in a formulation that fully satisfied him and consequently changed his mind several times regarding the proper formulation of the theory of money. For an account of Wicksell's various positions in this regard, see Ohlin (1936).

[18] For a survey of how Wicksell developed the theory of capital, see Sandelin (1998).

change of the natural rate of interest may thus have different causes. Theses causes may affect other endogenous variables in different ways. Consequently we cannot speak about unique effects of a change of an endogenous variable.

Wicksell (1898, chapter 9 B) solved the problem in his pure model by making the natural rate of interest exogenous. A higher natural rate of interest is identified with higher total productivity. That this can still represent an increased natural rate of interest is due to the distance in time between inputs and outputs. Wicksell assumed this distance to be constant, equal to one "year". But it is then impossible to determine the natural rate of interest.[19] In other places in his monetary writings such as Wicksell (1898, chapter 9 A), he evidently thought of the natural rate of interest as determined within the framework of Austrian theory of capital.

Up to now I have described Wicksell's monetary theory as it was presented in *Interest and Prices*. In 1906 the second volume of Wicksell's *Lectures* appeared. Here he made two changes in comparison to his earlier presentation. Firstly he substituted the concept of normal rate for the natural rate of interest. The normal rate of interest is according to Wicksell (1906 [1935b, p.193]) "the rate of interest at which *the demand for loan capital and the supply of savings* exactly agree, and which more or less corresponds to the expected yield on the newly created capital, will then be the normal or natural real rate." The first part of the citation implies that the capital or loans market is equilibrated. Secondly, Wicksell changed his mind regarding the role of the natural and the normal rate of interest as the key mechanism for generating changes of the price level. He now thought that increases of the quantity of gold (and consequently the quantity of money) could lead to price increases even without a positive gap between the normal (or natural) and the loan rate of interest.[20]

[19] "Actually the period of production is not only very different in different branches of production, but in any given branch it is variable. It is, as we have seen, this very circumstance, combined with the possibility of transferring capital from one business to another, that is responsible for the determination under the conditions of free competition of the relative levels of real wages, or rents, and of the [natural] rate of interest itself." Wicksell 1898, 136-137.

[20] Wicksell's change of mind concerning the decisive role of the interest rate gap arouse a debate with Gustav Åkerman who thought that Wicksell's original position was more accurate than his present, see Hammarskjöld (1955) and Siven (1998). The debate did not result in a conclusion.

In addition to the question of the proper condition(s) for monetary equilibrium there was also the question of whether there could be a gap (for example between the two rates of interest) or if the equilibrium condition was always fulfilled. Both questions relate to the choice of model representing the economy. Wicksell's follower Erik Lindahl investigated these questions.

2. Lindahl's critique of Wicksell's equilibrium concept

During the 1920's Lindahl wrote two books on monetary issues, *Ends of Monetary Policy* and *Means of Monetary Policy*. His approach to monetary theory in these two books was heavily influenced by Wicksell. Like Wicksell[21] and contrary to mechanical presentations of the quantity theory of money, Lindahl (1930, 121 [1939, 245]) stressed that "changes of the price level as well as of relative prices should be explained by the relationship between demand and supply of goods." This means that the same sort of mechanisms should be used to explain monetary and "real" phenomena. Similar to Wicksell, Lindahl focused on inside money. Moreover both Wicksell and Lindahl to some extent based the real part of their monetary analyses on microeconomic foundations in the form of capital theory formulated within general equilibrium models, see Wicksell ([1893] 1954) and Lindahl ([1929] 1939).[22]

Wicksell's gap between the natural rate and the loan rate of interest could be used as a simple indicator of the presence of monetary equilibrium. At zero expected rate of inflation a positive gap would mean inflation, a negative gap deflation. However Lindahl neither utilized the interest gap nor did he use the normal rate of interest as analytical instruments. Consequently it was necessary for Lindahl, who built his monetary theory on the Wicksellian tradition, to explain why he did not utilize Wicksell's equilibrium conditions for monetary equilibrium. Lindahl identified three such equilibrium conditions:[23]

1. A normal loan rate of interest corresponds to the natural rate of interest

[21] Note for example that in Wicksell([1898] 1936 chapter 9 B) excess demand in the aggregate goods market is eliminated by an increase of the general price level.

[22] However, Wicksell and Lindahl reached different conclusions as to monetary policy. Wicksell thougt that the goal should be a constant price level whereas Lindahl thought that the price level should vary in inverse proportion to productivity changes. In this respect Lindahl had the same opinion as Davidson and Hayek. For a discussion see Hammarskjöld (1955), Fregert (1991) and Siven (1998; 2002).

[23] This is not Wicksell's own taxonomy. The three equilibrium conditions were put together by Lindahl ([1930] 1939, 246) from citations of *Interest and Prices* and *Lectures II*.

2. The normal rate of interest is characterized by equilibrium between the supply of and the demand for saving (S=I)
3. The normal rate of interest implies a constant price level

A problem with the first condition for monetary equilibrium (equality between the natural and the loan rate of interest) is according to Lindahl (1930) the lack of uniqueness of the two interest rates. First the natural rate of interest will generally not be a unique number.

The natural rate of interest is one of the endogenous variables in the model describing a stationary economy. Since relative prices then are constant over time the own rate of interest will be the same for all goods. In intertemporal and temporary equilibrium relative prices may change period by period. This means that the own rate of interest may be different for different goods:[24]

> If, however, the situation is such that the real rate of interest in one branch of production is greater than in another, a stationary equilibrium is not conceivable. It must then be supposed, that the price of the former commodity gradually declines in relation to that of the latter until the real return in both lines of investment becomes equal. But we can then no longer speak of a real rate of interest, determined by purely technical conditions.
>
> Lindahl ([1930] 1939, 247n)

In addition to the problem of identifying a unique natural rate of interest, differentiated loan rates of interest imply a further problem of defining the normal rate of interest.[25] The same effect on aggregate demand could be achieved with different interest rates, for example a higher short-term rate could be balanced with a lower long-term rate.[26]

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[24] In temporary equilibrium, unlike the case of intertemporal equilibrium, expectations about (future) own rates of interest and relative price changes are not necessarily correct.

[25] Lindahl's critizism of Wicksell thus concerns the level of aggregation. There is a parallel in von Mises' ([1912] 1971) discussion of pricing in *different* production stages. A lower loan rate of interest would for example lead to wrong relative prices in different stages of the production process and thus generate a cycle. According to von Mises, Wicksell did not catch these effects since he did not analyze the production process in enough detail. For a comment see Wicksell ([1914] 1999). The discussion of von Mises was further developed by von Hayek ([1929] 1933; 1935). See also Bellofiore (1998).

[26] For a discussion, see Lindahl ([1930] 1939, 257-59)].

Even if we abstract from the problem of uniqueness of the natural and the loan rate of interest, respectively, there are further problems of speaking of a gap between the two rates. Can a gap exist?

When Lindahl ([1930] 1939, 247-49) discussed the first condition for monetary equilibrium, he pointed out that (abstracting from the differentiation of loan interest rates) the loan rate and the real rate of interest[27] would be equal in equilibrium. The argument is that if the real rate is defined as profitability, the price system will always adjust so that the two rates are equal. The same can be said if the real rate is uniquely determined by technical conditions.

The argument is built on the assumption of temporary equilibrium (of which intertemporal and stationary equilibrium are special cases). Then there will be simultaneous equilibrium in all markets and the result will follow if in addition we assume perfect competition. Note that whereas Lindahl (1930) used the temporary equilibrium method, Wicksell (1898, chapter 9 B) used sequential clearing of the factor and goods markets, not simultaneous clearing as in temporary equilibrium. In this case there may very well exist a gap between the natural and the loan rate of interest. The existence of a gap thus depends on the model. In other parts of his monetary works (for example chapter 8 of Wicksell 1898) he might have thought of simultaneous clearing of all markets in the same period, but his exposition makes it impossible to be sure.

As to the second condition for monetary equilibrium, Lindahl ([1930] 1939, 249-51) in principle agreed with Wicksell, but Lindahl's interpretation of saving and investment in the equilibrium condition was different from that of Wicksell. Lindahl ([1930] 1939, 249-50) stated that "The net demand for saving from producers during a certain period can be measured by that part of total net output which consists of an increase in capital equipment. Again, the net supply of saving in a certain period is the amount by which incomes of consumers exceed their consumption. [...]

[27] In the terminology of Wicksell and his contemporaries the real rate here does not mean the nominal rate of interest minus the (expected) rate of inflation. It rather means the rate of interest of the real sector of the economy, for example the rate of interest in a stationary economy without money (the natural rate of interest) as in Wicksell (1893).

Equilibrium between the demand for and supply of saving evidently implies equilibrium in respect to the demand and supply of consumption goods during the period."

However, neutrality of the loan rate of interest (i. e. the normal rate of interest) does not necessarily mean a constant price level. The third condition for monetary equilibrium should according to Lindahl ([1930] 1939, 252-57) be formulated so that the normal rate of interest should be neutral with respect to expected changes of the price level. If expected inflation increases by 2%, the normal rate of interest would increase by the same percentage.

It seems that the main difference between Wicksell and Lindahl is that they used different types of equilibrium analysis, not whether aggregation was permissible. Lindahl's main argument against the possibility of speaking about an interest gap was that he used the temporary equilibrium method. It is precisely at this point that Myrdal (1931) was critical of Lindahl's discussion. Myrdal instead tried to accept Wicksell's starting points. Myrdal consequently aimed at an immanent criticism of Wicksell's analysis of monetary equilibrium.

3. Myrdal's discussion of monetary equilibrium

The reason for Lindahl (1930) to discuss Wicksell's three conditions for monetary equilibrium was to motivate why he did not use the concept of the normal rate of interest. Lindahl's treatment thus only constituted a minor part of his work on the means of monetary policy. In contrast, Myrdal's paper of 1931 and the following two versions of 1933 and 1939 were focused on the problem of monetary equilibrium. In the following I will start from Myrdal (1931), and also comment on the revisions in the two later versions.

Contrary to Lindahl, Myrdal thought it was possible to use Wicksell's first condition for monetary equilibrium in the analysis. Myrdal (1931, 193) was critical of Lindahl who "tries to escape the whole conception of monetary equilibrium, that Wicksell tried to construct through his theory or the 'natural' or 'normal' rate of interest". Myrdal also thought that it would have been possible for Lindahl to dig deeper if he had preserved Wicksell's equilibrium construction.[28]

[28] As a matter of fact Lindahl did use equilibrium analysis when studying monetary problems, but he did not utilize the equilibrium rate of interest (equality between the loan and the natural or normal rate of interest) as an analytical instrument, for reasons discussed in section 2.

Myrdal (1931, 195) on the other hand stressed that monetary equilibrium should be viewed as an instrument for studying pricing situations which themselves do not need to represent equilibria: "it is clear that the determination of monetary equilibrium mainly is of indirect significance since it poses the problem of adjustment between [equilibrium] states and gives structure to this dynamic problem." Furthermore, adjustment could not be studied through Lindahl's temporary equilibrium method.[29] Instead a succession of non-equilibrium states should according to Myrdal be studied. These situations should be characterized by the values of the variables included in the conditions for monetary equilibrium.[30]

Furthermore and in contrast to Lindahl (1930) Myrdal (1931) did not think it was necessary to assume that the rest of the economy is in equilibrium when analyzing monetary equilibrium. So monetary equilibrium is characterized by its equilibrium conditions, not any other equilibrium conditions. Monetary equilibrium should according to Myrdal be seen as a reference situation. The absence of monetary equilibrium would create changes of the economy. These changes could be analyzed as tendencies in a point of time, that is the change of the economy in a very short time interval. Moreover Myrdal suggested that these tendencies were not only valid for a short interval, but in addition gave a projection for the further development of the system.[31]

Myrdal (1931, 196) stated the main problem of his paper in the following way: "which conditions should under non-stationary conditions a pricing situation fulfill in order to be characterized a

[29] Both Lindahl and Myrdal assumed that the equations describing the economic system were homogenous of degree zero in all prices. This means that if monetary equilibrium is disturbed, it will not be regained via a change of the price level. Price level changes will instead be boundless. To get finite price level changes, Lindahl (1930) assumed that relative prices change. He assumed wages to be sticky in comparison to other prices. The income distribution will thus change and this will restore monetary equilibrium. For example, a fall of the loan rate of interest will increase the price level more than the wage level so that real wages will fall. Since the marginal propensity to consume is higher among wage earners than among entrepreneurs, demand for consumer goods will fall and monetary equilibrium will thus be reinstalled. However, relative prices will now be "wrong" so that there will not be a (Walrasian) temporary equilibrium any more. Consequently, the adjustment from one temporary equilibrium to another cannot be studied with the temporary equilibrium method. However, note the possibility of temporary equilibrium with rationing, see Grandmont (1982). But even temporary equilibrium with rationing assumes extensive coordination via the expectations of the agents. It seems that Myrdal (1931) demanded analyses of situations where there was not even temporary equilibrium with rationing.

[30] Myrdal (1931) did not to any appreciable extent live up to his promise to study disequilibrium situations. However, in the German edition of 1933 (pp. 427-431) and in the English edition of 1939 (pp. 116-122) there is some discussion of how discrepancies *ex ante* are resolved in equalities *ex post*.

[31] On this last point see the criticism by Palander below.

monetary equilibrium according to Wicksell's theory? Much would be gained if this question could be answered without assuming general equilibrium preceded by stationary conditions. This would not least be important for the application of theory to actual situations which cannot be characterized by how they divert from 'ceteris-paribus-stationary' states."[32]

Similar to Lindahl, Myrdal was critical of defining the natural rate of interest as a physical product. According to Myrdal, this presupposes either an economy with only one good that is also used as input in the production process or alternatively, that the economy is in stationary equilibrium so that all relative prices are constant. It is evident that Myrdal thought that the first case was unrealistic, whereas the second case was an impasse since relative prices then are constant and are simultaneously determined with the real rate of interest. Myrdal did not think that it is possible (or not meaningful) to compare stationary equilibria.[33]

Was it possible to calculate such value productivity without money? Myrdal (1931, 198-9) did not think so, his main argument being that "through borrowing and lending the unit of account will get a real impact on relative prices; pricing will namely then also depend on changes of the exchange value of the monetary unit in comparison to different commodities.[34] However, what Wicksell meant by his hypothesis of freedom from all monetary transactions is evidently to abstract from monetary problems when determining the natural rate of interest."

Myrdal consequently argued that the natural rate of interest should be conceived of as value productivity. This value productivity could be calculated as a rate of return on (new) real

[32] Lindahl's temporary equilibrium implies general equilibrium in the current period (not necessarily intertemporal equilibrium). For convenience, Lindahl assumed that the economy originally was in stationary equilibrium. Lindahl's reason was presumably that the economy otherwise will endogenously change in time. This means that not only the disturbance (for example a change of the loan rate of interest) will affect the development of the endogenous variables, but also the initial conditions.

[33] Myrdal did not discuss the reason for this, but he might have thought that intertemporal equilibrium or some more general equlibrium or disequilibrium process must describe the trajectory from a stationary equilibrium to another. This is the argument used by Lindahl (1929) when he extending his analysis from stationary to intertemporal equilibrium.

[34] Here Myrdal could mean at least two things. First, he could assume goods money so that one of the goods functions as *numeraire* and means of transaction. In this case the value of money will be affected by the relative price. To calculate the natural rate of interest we have to take into account both the "own rate" of interest and the change of the relative price of the commodity money. The other alternative is that Myrdal, similarly to Wicksell and Lindahl, assumed fiat money. Here relative prices could still change. In addition an increased price level means that we have to distinguish between the nominal and the real rate (in Irving Fisher's sense) of interest.

capital.[35] Return net of depreciation should be used in the nominator and reproduction cost of capital in the denominator.[36] The first condition for monetary equilibrium could then be formulated as equality between the natural rate as defined above and the loan rate of interest.[37] Myrdal then assumed the same profitability for all firms.[38]

In his discussion of the second condition for monetary equilibrium, Myrdal was critical of Lindahl's position that investment always equals saving, although the new equilibrium might be approached via a change of the price level. Lindahl consequently did not think that investment and saving were identically equal, but that the economy is always in temporary equilibrium. Disturbances change the values of the endogenous variables so that the different equilibrium conditions are always fulfilled.

Myrdal (1931, 228) actually was critical of Lindahl's assumption of temporary equilibrium. In temporary equilibrium changes of the values of the endogenous variables occur in the transition from one period to another whereas all endogenous variables are constant during a period. At the end of the period the endogenous variables will change anew, in spite of the fact that they were constant during the passed period. Myrdal thought that this discrete approximation of a continuous process was an unrealistic and unfruitful method. He instead suggested that one should study the tendencies in a point of time and the movement from one point of time to another.

Myrdal (1931) moreover tried to prove that the second condition for monetary equilibrium follows from the first, where both conditions were expressed according to Myrdal's formulation. However, his proof was faulty.[39]

[35] Like Lindahl (1930) but unlike Wicksell (1898) Myrdal here started from fixed, not circulating capital.
[36] Both net return and reproduction cost of capital are discounted to the planning moment.
[37] The loan rate of interest could also be written as return net of depreciation divided by the capital value of the existing capital. Both net return and capital value are discounted to the planning moment.
[38] For practical purposes, Myrdal (1931, 258) suggested that the condition could be rewritten as equality between the present value of existing real capital and the reproduction cost of this capital. The correspondence with Tobin's q is evident and has been noted by Andvig (1991).
[39] Lindahl (1939, 262n) and Palander ([1941] 1952, 39-40) noted that Myrdal's proof was not correct. The second equilibrium condition was actually not derived from the first one.

Unlike Wicksell Myrdal did not interpret the equality of saving and investment as equilibrium in the capital market. Instead "[…] investments (or demand for saving) means real investments, that is building of new capital […whereas] saving is merely a part of income, the part which is not demand for consumer goods" (Myrdal (1931, 213-14). In order to be able to discriminate between investment and saving "one must determine saving as a part of income, namely the part which does not constitute demand for consumption goods" (Myrdal 1931, 214). For Myrdal the second equilibrium condition thus means equilibrium in the aggregate goods market, not in the loans market. As pointed out above a similar reasoning can be found in Lindahl ([1930] 1939, 249-50).

Myrdal's (1931, 213) motivation for his definition of saving was that this sometimes is defined as "*released factors of production* from production of consumer goods to production of real capital." According to Myrdal such a real definition of saving is not possible to uphold if we want to separate it from real investment.

As to the third condition for monetary equilibrium, Myrdal first stressed that any development of the price level (but not of relative prices) would be consistent with the fulfillment of the first two conditions. This can be motivated by an assumption of pure inside money and that consequently all behavior equations will be homogenous of degree zero in the price level.[40] Moreover, the nominal rate of interest must constantly adjust to the level of inflation (i. e. expectations adjust momentarily).

In spite of this, there will be a relationship between the first two and the third condition for monetary equilibrium. The reason is that changes of the price level will lead to changes of relative prices since the degree of inertia varies between prices and since outstanding contracts of various duration are fixed in relation to previous price levels.[41] [42]

[40] Note however that the citation above of Myrdal (1931, 198-9) might be interpreted as if he assumed goods money.
[41] Implicitly Myrdal here assumed that expectations at the dates of contract writing were centered on a stable price level.
[42] Myrdal did not explicitly relate this discussion to Lindahl's assumption that wages are less flexible than prices (see section 10 below).

Since the two first conditions for monetary equilibrium presuppose certain relative prices, there is a connection between the first two and the third condition for monetary equilibrium. Myrdal (1931, 238) formulated it in the following way: "The 'price level' which according to the two first equilibrium conditions should be stabilized [...] can be calculated via an index. In this index the individual prices are weighted (1) with respect to their relative importance for the profitability calculations of the firms and after that (2) with respect to their specific inverted velocity of reaction."

Myrdal (1931, 241) pointed out that this principle could be applied to the old controversy between David Davidson and Knut Wicksell. Their concern was whether monetary policy should always try to stabilize the prize level (Wicksell) or if in addition to this rule the price level should vary inversely to productivity changes (Davidson). Myrdal drew the conclusion that Davidson was right only to the extent that wages were rigid in comparison to prices. If prices were less flexible than wages, Wicksell's rule would hold.

Almost parallelly with the Swedish version, Myrdal wrote a longer version, which was to be published in German.[43] Myrdals longer version was translated by his friend Gerhard Mackenroth who formulated the terms *ex ante* and *ex post*[44], which consequently first appeared in Myrdal (1933). However, the thoughts behind these terms are quite explicit in Myrdal (1931). Moreover, Myrdal (1933, 427-431) discussed how differences between *S* and *I ex ante* are resolved *ex post*. This is done (i) via changed of revenues and costs and (ii) via investment gains resulting from differences between anticipated and realized production costs of real capital.

The German version was later on translated into English and appears as Myrdal (1939). The main difference in comparison to the German edition is that Myrdal now has deleted the "proof" that the first condition for monetary equilibrium implies the second.

[43] It is true that the Swedish version is dated 1931 and the German 1933. But the Swedish version was actually printed in 1932.

[44] The plans and expectations formulated in the beginning of a period are *ex ante* price and quantity values that may not be realized. In contrast, the *ex post* price and quantity values measured in the end of the period are of a book-keping nature. The reason why *ex post* and *ex ante* values may differ is that expectations may not come true and that it may consequently not be possible to fulfill the plans. *Ex ante* and *ex post* values are equal in temporary eqilibrium.

In sum, Myrdal was critical of Lindahl's use of (temporary) equilibrium method and instead suggested disequilibrium analysis. Myrdal furthermore thought that Wicksell's criteria for monetary equilibrium could be reformulated as aggregated conditions. Myrdal's exposition was rich in ideas but not always worked through. Tord Palander pointed this out in his penetrating discussion of Myrdal's analysis. Before discussing Palander (1941), Ohlin's (1933) analysis of the second condition of monetary equilibrium and his comments to Myrdal (1931; 1933) will be discussed.

4. Ohlin on monetary equilibrium

Bertil Ohlin's paper from 1933 (translated into English as Ohlin 1978) was not principally a contribution to the neo-Wicksellian debate about monetary equilibrium. At the time Ohlin wrote his paper the unemployment problem had become increasingly important. The great depression reached Sweden in 1930 and Ohlin participated in the Swedish unemployment commission. Ohlin's paper can be seen as a preparatory study to his grand book of 1934[45] which essentially contains a discussion of monetary policy within the framework of Keynesian analysis of the type studied by undergraduates during the 1950's and 60's.[46] Here Ohlin did not only discuss quantitative reactions (multiplier effects) of the economy to different disturbances but also the accompanying price changes. Ohlin (1933) contains a starting point for such analysis. Ohlin ([1933] 1978, 354) had started from $S=I$. He proceeded by adding consumption as well as inventory changes to both sides of the equation. Via this transformation Ohlin saw the second condition for monetary equilibrium as an equilibrium condition for the aggregate goods market.[47]

In addition to this analysis Ohlin (1933) contains valuable comments to Myrdal's discussion of monetary equilibrium. First of all Ohlin stressed the importance of backward looking expectations. Expectations are generated by the actually experienced development. Secondly, like Lindahl he was skeptical to a study of the normal rate of interest when studying dynamic

[45] Wadensjö (1991) discusses Ohlin's work in the unemployment commission and the relationship between his paper of 1933 and the book of 1934.
[46] In addition Myrdal (1934), part 4, chapters 3-4, contains macroeconomic analysis anticipating the income analysis of the *General Theory*. For further discussion, see Hansen (1981).
[47] The extent to which Ohlin (1933; 1934) anticipated Keynes (1936) is discussed by Landgren (1960), Steiger (1971), Brems (1978), Patinkin (1978), Steiger (1978), Yohe (1978), Hansen (1981) and Patinkin (1982). One of the main questions is whether Ohlin (1933; 1934) assumed national income to clear the gap between investments and saving.

processes. Thirdly Ohlin was skeptic to Myrdal's price index from his discussion of the third condition for monetary equilibrium. Ohlin thought that it would be impossible to get the necessary information for calculating this index. It was not operational.

5. Palander's critique of Myrdal's monetary equilibrium

Palander (1941) contains an extensive analysis of the English translation of Myrdal's exposition of monetary equilibrium in Myrdal (1939). Here Palander discussed Myrdal's period concept, his discussion of the cumulative process and his treatment of the three conditions for monetary equilibrium.

Myrdal concentrated his analysis to "tendencies in a point of time". However, Palander thought that already the flow concepts used by Myrdal such as income or saving demanded a time period of finite length. Planning may be done in a point of time but the process must be followed at least during one period. The length of this period must according to Palander be so short that no plans reach fulfillment and that consequently new planning will be required later in the same period.[48] On the other hand, the period must be long enough so that the results of the plans emerge within the period. Otherwise the development must be followed through several periods. Palander's conclusion was that Myrdal's analysis to be meaningful at least must be seen as a one period analysis, not as an analysis of tendencies in a point of time. Moreover, the process should preferably be studied over a time span covering several periods. This argument can be applied to the cumulative process.

Myrdal did not give a strict definition of the cumulative process. In Wicksell's case it was evident that the development of the price level was studied. In Myrdal's case this was not so clear since at least some prices were assumed to be sticky. Both for the case that Myrdal thought of a process in quantities (which was Palander's interpretation) and for the case of a process in prices the development of the variables had to be monotonous to be of a cumulative character. However, according to Palander, we cannot simply state that a process is cumulative without investigating the process over a series of periods. Certain initial conditions must be fulfilled and a certain form

[48] Wicksell's "year" referred to above evidently does not fulfill Palander's requirements of a period.

of the expectations generating function is required for the process to be cumulative, not for example oscillatory.[49] These requirements were not discussed by Myrdal.

The first equilibrium condition, equality between the natural and the loan rates of interest was Wicksell's original equilibrium condition, already worked out in *Interest and Prices*. Like Myrdal, Palander ([1941] 1953, 22) was critical of comparing the two rates of interest, one being a real and the other a monetary phenomenon:

> A concept which is used for a monetary economy cannot be given a definition which makes it necessary to disregard the existence of money. Neither can the "real" rate be thought of as a simple expression for the current physical marginal productivity in a certain position. This can be determined only in the special case where there is a single factor of production and a single product of the same sort as the factor of production. The yield of an investment must therefore be defined as the ratio of its annual return to the amount invested, both measured in money.

In order to avoid the problem indicated above, Myrdal had worked with transformed variables, the capital value of existing capital and the production cost of new capital, respectively. Both were calculated at current and future (loan) interest rates. The gap between the two, the investment gain, gives, via the investment elasticity, actual investments.[50]

Palander's commentary was that if we are interested in investment behavior, marginal values, not average values, should be used.[51] Furthermore, the introduction of the investment elasticity only gives a circular derivation of investments since this elasticity presupposes that investments are already known. Instead an investment function should be used. Like Ohlin (1933), Palander stressed that the fact that investments are profitable does not necessarily mean that they will be done. There could be a later point of time when investments are even more profitable.[52]

[49] Note for example Lundberg's (1937, chapter 9) discussion of how an economic expansion may be broken.
[50] The first condition for monetary equilibrium could then be stated as equality between production costs of new investments and capital value of existing capital.
[51] The same comment was made by Shackle (1967, 114).
[52] This means that Ohlin in 1933 and Palander in 1941 had a rudimentary discussion of the option value of physical investments. For a modern development of this theory, see Dixit and Pindyck (1994).

In Myrdal (1939) the proof that the first condition for monetary equilibrium implies the second one was abolished. Palander discussed this proof and argued that the first equilibrium condition was not even used in deriving the second one.

Is it always meaningful to speak of *S=I ex ante* as an equilibrium condition (the second equilibrium condition)? Here Palander noted that even if the agents have the same expectations, these expectations may be wrong. An example is that the agents have the same but faulty expectations of the production function. So equality between saving and investments *ex ante* is not a guarantee for temporary equilibrium. It is not even always possible to speak about investments and saving *ex ante* since expectations may be probabilistic.[53] In this case agents must have contingent plans for their actions.[54] Plans contingent on probabilistic realizations of events in turn rule out single-valued *ex ante* values of the planned quantities. If the plans of households and firms are not consistent with each other the flexible contingent plans adjust to the fixed plans. For example, if prices are fixed quantities will adjust.

Palander ([1941] 1953, 36-7) suggested that in order to speak about a determinate saving *ex ante* it is necessary to assume that some facts are fixed in advance. One possibility is that the consumers with certainty correctly expect certain prices to rule during the coming period. According to Palander this means that Myrdal used the same period concept as the one used by Lindahl.[55] However, it does not necessarily mean that Myrdal like Lindahl used the temporary equilibrium method. Surprises may very well occur during the period.

Asssume that we can speak of single-valued saving and investments *ex ante*. What will then happen if the equality condition is not fulfilled? Palander assumed that prices were fixed[56] within

[53] Absence of temporary equilibrium could then be due to probabilistic expectations concerning the current period, subjectively certain expectations that are either different for different agents or finally the same for all agents but inconsistent with external conditions.
[54] See Svennilson (1938) for an extensive treatment of this problem.
[55] Myrdal (1931, 228) criticized Lindahl's method of breaking up periods in two parts. In the first part which has the time measure zero, all decisions are made, for example all prices fixed. In the second part prices are constant and the development proceeds according to the plans made in the beginning of the period.
[56] Palander ([1941] 1953, 41-42) thought that Lindahl and Myrdal made the same assumption. However, it should be noted that Lindahl's assumption of temporary equilibrium means that the agents know the (equilibrium) prices when they plan their actions in the beginning of the period. Prices are then fixed during the period.

the period and that the demand side will determine quantities.[57] Palander thought that the impact effect would be alterations of stocks of consumption goods, raw materials and investment goods and of unexpected changes of incomes.[58]

According to Palander ([1941] 1953, 44) different reasons for an *ex ante* discrepancy between saving and investments can lead to different developments in future periods.[59] The development will also depend on how flexible prices are. Palander thought that the Stockholm School's main assumption was inflexible prices.

Palander ([1941] 1953, 45) discussed what would happen if the plans of the buyers were more pessimistic than the plans of the sellers. This would lead to a cumulative process in the downward direction. However, relatively optimistic plans by the sellers could lead to increased demand for factors of production and thereby have an expansionary effect. This argument points to the necessity of having additional equilibrium conditions concerning other markets than the goods market as has been stressed by Hansen (1951), see section 6 below.

As to the third equilibrium condition, Myrdal thought that the first two equilibrium conditions were the important ones. Myrdal (1939, 132) even thought that the price level had no role in equilibrating the goods market. However, Palander ([1941] 1953, 50n) pointed out that given the nominal rate of interest, an expected change of the price level will affect the real rate of interest[60] and thereby investments. Palander's argument is essentially the same as Lindahl's concerning the third equilibrium condition.

Myrdal thought that due to varying degrees of price inflexibility relative prices would change parallelly to a change of the price level. And relative price changes may have real effects. But in order for monetary policy not to distort relative prices Myrdal suggested that the policy should be adapted to the least flexible prices. More specifically Myrdal suggested that an index should be

[57] This of cause presupposes effective excess supply. His reading of Keynes may in this case have influenced Palander. Palander's interest in the Keynesian theory is witnessed by his extensive survey, see Palander (1942).
[58] In contrast, Myrdal (1939, 39) thought that revenue or investment gains or losses would be the result.
[59] Note the parallel to Hansen's (1955) discussion of why it is impossible to speak about the effects of the budget deficit; we can only talk about the effects of changes of exogenous, not of endogenous variables.

stabilized where prices are first weighted with respect to their respective inflexibility and then with respect to their importance for profitability and consequently on investments.

Palander noted a number of problems with Myrdal's index. How should for example the two weight systems be combined into one unique measure?[61] Palander further observed that no consideration of expectations was taken in spite of the fact that this was one of the main declared tasks for Myrdal's monetary study.

Palander´s critique was foremost directed at Myrdal's suggestions of forming a dynamic analysis. It was constructive, but did not lead to a further discussion in Sweden. One reason was that it was published in 1941 when the Swedish economists had other things in their minds.[62] Another reason was that the Swedish discussion of monetary equilibrium actually was the first step in the development of the Stockholm School. In the second phase Swedish economists studied business cycle theory and stabilization policy within the framework of the Unemployment commission. In the third phase, two young members of the Stockholm School published outstanding analytical theses (Lundberg 1937 and Svennilson 1938, respectively). The problem of monetary equilibrium was consequently not a central issue in the end of the 1930's/beginning of the 1940's. Moreover, by 1940 the Keynesian revolution was already under way.[63]

Palander's contribution consequently ends the chronological survey. Below a number of analytical issues will get a deeper treatment. I start with the choice of equilibrium conditions.

6. The choice of equilibrium conditions

In a Walrasian general equilibrium model we would ordinarily expect one equilibrium condition for each market. The number of independent equilibrium conditions will via Walras' law be one less the total number of markets. Why were there three conditions for monetary equilibrium and why the particular ones?

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[60] Wicksell and members of the Stockholm school often used the real rate of interest as a synonym for the natural rate of interest. Here it is used in Fisher's way, as the nominal rate of interest minus the (expected) rate of inflation.
[61] For a comment, see Hansen (1951, 228n).
[62] World War II was then in its third year and most Swedish economists were engaged in other issues than monetary theory.
[63] For further discussion, see Jonung (1991).

Wicksell thought that the general price level was moved by forces analogous to those affecting relative prices. This means that relative prices respond to excess demands in different markets whereas the general price level moves according to the excess demand in the aggregate goods market. Abstracting from inflationary expectations the third condition for monetary equilibrium would thus reflect an equilibrium condition for the aggregate goods market:

> Every rise or fall in the price of a particular commodity presupposes a disturbance of the equilibrium between the supply of and the demand for that commodity, whether the disturbance has actually taken place or is merely prospective. What is true *in this respect* of each commodity separately must doubtless be true of all commodities collectively. A general rise in prices is therefore only conceivable on the supposition that the general demand has for some reason become, or is expected to become, greater than the supply.
>
> Wicksell ([1906] 1935,159)

The question is then why we need two more equilibrium conditions. One possible answer is that an increasing price level is a mere reflection of forces of a more fundamental nature. For example, inflation might according to the quantity theory be due to a growing money supply or according to Wicksell's cumulative process to a positive gap between the natural and the loan rate of interest. A stable price level (and equilibrium in the aggregate goods market) is consequently an effect of the fulfilment of other equilibrium conditions.

The first equilibrium condition, equality between the natural and the loan rates of interest, is the equilibrium used in *Interest and Prices*. The condition is especially important for the case of pure inside money. If this condition is fulfilled, no cumulative process will be going on.

The second condition for monetary equilibrium implies according to Wicksell clearing of the loans market. This is in contrast to Lindahl, Myrdal and Ohlin who interpreted it as an equilibrium condition for the aggregate goods market.[64]

Neither Lindahl nor Myrdal discussed the possible difference between their and Wicksell's interpretation of the second condition for monetary equilibrium.[65] The reason might be that they did not think that the difference was decisive in Wicksell's theory. For example, if Wicksell thought that the capital market was a mere reflection of the aggregate goods market, equilibrium in one of the markets would by definition imply equilibrium in the other. In a three-market world with money as the third good this would imply Say's law with the excess demand for money identically equal to zero.

However, explicitly or implicitly Wicksell repeatedly denied the validity of Say's law. One example is his discussion in *Interest and Prices* of the real balance effect. Another example is Wicksell's ([1906] 1935b, 159-60) explicit denial of Say's law conceived as an identity. The exception is the case of pure inside money. Here the supply of money in the form of bank deposits[66] passively adjusts to demand. The "money" market is thus always equilibrated in this case. The discussion will be taken up again below in connection with loanable funds versus liquidity preference theory.

Myrdal (1931) thought that the second equilibrium condition could be derived from the first one, but apart from partial equilibrium theory we would not expect equilibrium in a market only to depend on one price, in this case the loan rate of interest.

However, if one price (the loan rate of interest) is exogenous and all other prices do their job to equilibrate the markets the level of this price would be decisive for equilibrium. One example of

[64] Lindahl interpreted it as a clearing condition for the aggregate consumer goods market.
[65] However, see Myrdal (1939, 90) who noticed that Wicksell separated the investment decisions from the saving decisions.
[66] Note that Wicksell himself would call bank deposits substitutes for money. According to his terminology the quantity of money is zero in this case.

this is Lindahl's (1930) temporary equilibrium analysis. Here all markets are equilibrated provided the loan rate of interest[67] is set at the right level.

Myrdal (1931) was critical of the temporary equilibrium method and wanted to use the conditions for monetary equilibrium as an analytical instrument even in situations outside equilibrium. However, this means that we do not have a very well defined situation. For example, what would be the result if the aggregate goods market is in equilibrium while there is excess demand in the aggregate labor market? This was a situation which Wicksell ([1898] 1936, chapter 9 B) analyzed and his conclusion was that this situation could not be permanent. An increased wage rate would in the next moment eliminate excess demand in the labor market but instead create excess demand in the goods market.

A similar situation was treated by Hansen (1951, chapter 7) in his analysis of open (as opposed to repressed) inflation. Hansen used a small macroeconomic model with one aggregate labor market and one aggregate goods market. The two excess demand functions were assumed to be homogenous of degree zero in all prises.[68] The time derivative of the wage level is a positive function of the excess demand for labor and the time derivative of the price level is a positive function of excess demand for goods. In quasi equilibrium there is excess demand for both goods and labor and consequently inflation, but the real wage rate is constant. The rates of wage and price inflation balance. In such a model a removal of the excess demand for goods by shifting the demand curve will not eliminate inflation as long as there is excess demand for labor. The parallel with Wicksell's analysis is evident.

If we as Ohlin (1933) interpret the second condition for monetary equilibrium as zero excess demand in the aggregate goods market it is evident that this will not preclude for example cumulative price increases. What will happen in the future depends on the state in other markets, for example the aggregate labor market. This is an exemplification of a situation where monetary

[67] I disregard differentiation of interest rates.
[68] Hansen (1951, 171) pointed out two possibilities for the demand curve to directly or indirectly depend on the price level. The first was the Pigou effect (the real balance effect). The second possibility works via the rate of interest. An increased price level implies a higher nominal transactions volume. At a given nominal quantity of money the loan rate of interest has to increase in order to preserve equilibrium in the money market. However Hansen abstracted from these effects in his analysis.

equilibrium according to Myrdal (1931) does not preclude the development of a cumulative process.[69]

The conclusion is that except for a dichotomized model we cannot single out a few equilibrium conditions and hope that their fulfilment guarantees stability, for example with respect to the price level. The number of equilibrium conditions of course depends on the model. A highly aggregated model needs only a few equilibrium conditions. In order to precisely discuss the requirements of monetary stability we need an explicit model. This was not provided by Myrdal.

7. Equilibrium conditions in prices and equilibrium conditions in quantities

The first condition for monetary equilibrium is formulated in terms of prices (interest rates) whereas the second is formulated in terms of quantities. In this section, I give a background to why Wicksell formulated the first equilibrium condition in a rather unusual way.

An equilibrium condition can either be formulated in terms of quantities or in terms of prices. Walras analyzed market clearing from the point of view of the quantity demanded and supplied, respectively at a certain price. In contrast Marshall often used the demand price and the supply price at a certain quantity.[70] However, when Marshall ([1871] 1975) discussed the quantity theory of money he formulated the theory in terms of supply and demand for money, that is in terms of quantities. When Wicksell turned from pure outside money to the case of pure inside money he formulated the equilibrium condition in terms of (relative) prices, the natural or normal[71] rate of interest should equal the loan rate of interest.

There is at least one instant when behavior cannot be analyzed in quantities, but must be analyzed in terms of prices: perfect competition with constant returns to scale. In this case the supply of the individual firm is indeterminate and equilibrium is characterized by price being equal to average cost. The market supply curve is then horizontal and the market quantity is given by the demand curve. Wicksell (1893) had himself analyzed this case.

[69] As noted by Hansen (1951, 238), the argument is parallel to Palander's (1941) criticism of Myrdal's notion of monetary equilibrium, see the discussion in section 5 above.
[70] See for example Marshall ([1890] 1961, 142).
[71] A more precise terminology would be to say that the loan rate of interest should be the normal.

In the above microeconomic example the elasticity of the demand curve for the product of the individual firm and that of the marginal cost curve, respectively, are both infinite. The parallel to monetary economics is pure inside money. Here the supply of bank-money (demand for deposits of the banks = supply of loans of the banks) is infinitely elastic at the given loan rate of interest. Moreover the demand for bank-money (supply of deposits by the public = demand for loans by the public) is infinitely elastic at the given natural rate of interest, provided the natural rate is exogenous. The equilibrium condition can consequently not be formulated in terms of quantities but must instead be formulated in terms of prices, that is equality between the natural and the loan rate of interest. In this case the quantity of bank-money and the price level rest in indifferent equilibria provided that the loan rate of interest equals the natural rate, see Wicksell ([1906] 1935b, 197).[72]

If one of the relationships is of infinite elasticity but not the other, the first one determines the price and the second one the quantity. In the case of mixed inside and outside money the loan rate of interest will be a negative function of the quantity of outside money. Alternatively we could instead assume pure inside money but that the natural rate of interest is endogenously determined, for instance by Austrian capital theory.[73]

As soon as either the supply of or the demand for bank-money is no longer of infinite elasticity with respect to the loan rate of interest, the price level is no longer indeterminate. Evidently this condition requires either mixed inside and outside money[74] or that the natural rate of interest is endogenous.

8. Loanable funds versus liquidity preference theory

As discussed above, Wickell on one hand and Lindahl, Myrdal and Ohlin on the other hand, interpreted the second equilibrium condition differently. Wicksell thought of equilibrium in the

[72] The reason why the price level is determinate after all is that it is given by the price level of the pervious period.
[73] In Wicksell (1898) chapter 9 B the natural rate of interest is exogenous. In other places he treated it as endogenous. According to Wicksell a greater capital stock would mean a smaller natural rate of interest. Examples are Wicksell ([1898] 1936, chapter 9 A; 1903, 505; 1909, 64; [1906] 1935b, 205). This was long before the debate on macroeconomic production functions with aggregate capital as a factor of production. For surveys, see Harcourt (1969), Blaug (1974) and Cohen and Harcourt (2003).

loans market whereas Lindahl, Myrdal and Ohlin had some kind of goods market equilibrium in their minds. The case is most clear for Ohlin who explicitly thought about the aggregate goods market. Two questions immediately pose themselves: (1) Did Wicksell develop the second condition for monetary equilibrium into a theory of interest rate determination? And (2) if Wicksell's followers did not conceive of the second equilibrium condition as referring to the loan market did they construct a supplementary theory of interest rate determination?

As to the first question Wicksell had some discussion in *Interest and Prices* of the determination of the loan rate of interest. As discussed above, he thought that a rising price level via internal drain would increase the loan rate of interest. This is a reaction of the banks to a decreased monetary base. In this way the loan rate is adjusted to the normal rate of interest via price level changes. This is evidently not a loanable funds theory of the determination of the loan rate of interest.

As to the second question neither Lindahl[75] nor Myrdal explicitly discussed the loan market(s). However, Ohlin (1937a; 1937b) in his famous papers, where he introduced the Stockholm School to an international audience, discussed Keynes liquidity preference theory as opposed to the Swedish loanable funds approach. Ohlin (1937b, 221) first declared that "[...] the rate of interest is simply the price of credit, and that it is therefore governed by the supply of and the demand for credit. […] Does this mean that its height has no connection with the disposition of individuals and firms to save and with other elements in the price system? Of course not. But it has such a connection only indirectly." Secondly, after mentioning Keynes' liquidity-preference Ohlin (1937b, 225) stated:

> A similar kind of reasoning can, of course, be applied *gross*, *i.e.* including the old claims which were outstanding when the period began. People's willingness to hold the different claims and other kinds of assets every day governs the supply of credit. The total supply of claims, etc., governs the demand for credit. In each market for different claims, etc.,

[74] Including the case of pure outside money.
[75] Lindahl's (1930) main objective was to analyze the *effects* on the price level of the interest rates set by the central bank. However, there was an instance when the central bank must follow a purely passive interest rate policy. This is the case of intertemporal equilibrium when interest rates have to adjust to the expected development of the price level, see Siven (2002).

> supply and demand are made equal by price. These prices for interest-bearing claims on certain fixed sums determine the rates of interest. It is quite obvious that this reasoning in gross terms leads to the same result as the net analysis above.

Interest rates are according to Ohlin consequently determined in the markets for claims. However, the pricing in the claims market(s) interacts with the pricing in other markets. The analysis can moreover be pursued in net terms, in terms of flow supply of and flow demand for claims given the stock of outstanding claims in the beginning of the period. Equivalently, the analysis can be pursued in gross terms of supply of and demand for stocks of claims at the end of the period.[76] Ohlin (1937b, 226) did not think that net demand for interest-bearing claims was a mere mirror of the gap between investment and saving: "[...] there is a third kind of purchases to be explained – namely, 'financial investment,' *i.e.* the purchases of bonds, shares and bank deposits and the failure to use savings either for real or for financial investment, which is identical with an increase in cash."

Keynes (1937a, 242) commented upon Ohlin's discussion of the determination of interest rates in the following way: "The liquidity-preference theory of the rate of interest which I have set forth in my *General Theory of Employment, Interest and Money* makes the rate of interest to depend on the present supply of *money* and the demand schedule for a present claim on money in terms of a deferred claim on money. […] The alternative theory held, I gather, by Prof. Ohlin and his group of Swedish economists, by Mr Robertson and Mr. Hicks, and probably by many others, makes it to depend, put briefly, on the demand and supply of *credit* or, alternatively (meaning the same thing), of loans, at different rates of interest. […] the theories are, I believe, radically opposed to one another."

Keynes (1937a) moreover suggested that Ohlin's argument implied that "*The net supply of credit*, thus defined, is exactly the same thing as the quantity of saving; […] the net demand for credit at different rates of interest is exactly the same thing as the quantity of net investment at different rates of interest." Keynes consequently did not notice Ohlin's (1937b, 226) discussion.

In his reply (Ohlin (1937c, 425) stressed "That the relation between the curves referring to savings and investment and those referring to credit is close should be obvious. [But they are not identical:] It is possible to plan to save and to increase the quantity of cash instead of lending. Also one can plan to extend new credits in excess of planned savings, if one is willing to reduce one's own quantity of cash. […] Similarly with the planned demand for credit, which may differ from planned new investment owing to a desire to vary the cash held, to cover expected losses or to finance consumption." Ohlin (1937c, 426) also stressed the equivalence between Keynes' theory of liquidity preference and the loanable funds theory: "The theory I advance does not dispute that the rate of interest 'equalises the advantages of holding actual cash and a deferred claim on cash' (Keynes, p. 245). There is no contradiction between that statement and the view that the rate of interest is the price of credit, *i.e.* is fixed on the market for different claims. It is on this market that the exchange of claims for cash takes place in such a way that an 'equalisation of advantages' takes place."

One reason for preferring the loanable funds theory is consequently that the rate of interest is fixed on the capital market. However, Ohlin was well-versed in general equilibrium theory. That the "rate of interest […] is fixed on the market for different claims" should therefore probably be interpreted in a dynamic sense.[77] The rate of change of the rate of interest is a positive function of the excess demand for loans. In spite of the equilibrium equivalence between the loanable funds and the liquidity preference theories there is a further reason for preferring the former. The liquidity preference theory will evidently not function in the case of pure inside money. There is then no money market to be equilibrated by the rate of interest (or any other prices), see the discussion above about Wicksell and Say's law.

Ohlin's (1937c) paper was the first in a triplet where Robertson (1937) and Hawtrey (1937) discussed Keynes (1937a). In his final answer Keynes (1937b) *inter alia* discussed Ohlin (1937c). Unfortunately, it seems that Keynes was not open to Ohlin's argument. Patinkin (1976, 139-41) has formulated it in the following way[78]: "[…] instead of undertaking the fruitful task

[76] For discussions of the stock-flow problem in connection with the liquidity preference - loanable funds debate, see Fellner and Somers (1941; 1949; 1950), Lerner (1944), Klein (1950a; 1950b), Tsiang (1956) and Patinkin (1958).
[77] In general equilibrium the rate of interest and all other prices are determined so that all markets simultaneously equilibrate. One therefore cannot say that the rate of interest depends on the situation in a certain market.
[78] Three footnotes are deleted from the citation.

[…] of applying Ohlin's ex ante/ex post analysis to the theory of effective demand and to its dynamic aspects in particular, Keynes devoted himself almost exclusively to its implications for the theory of liquidity preference – and in that context then began the pointless and depressing 'liquidity-preference *versus* loanable funds' debate that was to drag on in the literature for years. This debate – which Keynes also carried on with Robertson – stemmed largely from Keynes' failure to adopt the appropriate general equilibrium view of his own theory [...]"[79] Coddington (1979, 977) suggests that Keynes' failure might be explained by the Marshallian tradition of partial equilibrium analysis.

The question of the equivalence of the liquidity preference theory and the loanable funds theory was discussed already in Hicks' (1936) review of Keynes' *General Theory*. In this paper and more systematically in *Value and Capital*, pp. 153-62, Hicks used Walras' law to argue for the equivalence.

In a macroeconomic model with only two aggregate markets we would via Walras' law expect equilibrium in one market (the capital market) to automatically imply equilibrium in the other (the aggregate goods market). Furthermore if we know the notional excess demand function[80] for the first market we also know the functional form of the excess demand function for the second market. With several markets the case is not as clear. If we add a money market where Say's law does not hold (the excess demand function for money is not identically equal to zero) excess demand for loans (excess supply of loan instruments) could reflect a combination of excess demand for money and excess demand for goods.

The argument is consequently not that the capital market is a reflection of the money market. It is rather that we can eliminate one of the excess demand functions from a general equilibrium system. It does not matter if we eliminate the money market (we then get the loanable funds theory) or if we eliminate the capital market (we then get the liquidity preference theory). The

[79] For surveys of the debate, see Johnson (1951-52), Shackle (1961; 1967, 203-47) and Bridel (1987, 170-181).
[80] Notional behavior equations presuppose Walrasian equilibrium in all markets. Effective behavior equations are derived subject to one or more rationing restrictions reflecting rationing in one or more markets.

rate of interest has to be derived within the framework of a general equilibrium system such as in Hicks' (1937) IS-LM analysis.[81]

In temporary equilibrium all prices in the economy influence the excess demand function of a certain market. In addition the equilibrium price vector is found by simultaneously solving all excess demand functions, see Patinkin (1965, 376). This means that it is problematic to single out a few markets and study the equilibrium conditions for just these markets. From this point of view we cannot say that the rate of interest is a pure monetary phenomenon ("determined" in the money market) or a pure real phenomenon ("determined" in the "real" economy). As a by-product of their criticism of Wicksell's natural rate of interest, Myrdal and Palander discussed this question.

9. Is the rate of interest a monetary phenomenon?

Keynes (1937a, 245) concluded his interpretation of the loanable funds theory in the following way: "[…] my contention that the rate of interest (as we call it for short) is, strictly speaking, a *monetary* phenomenon in the special sense that it is the *own-rate* of interest (*General Theory* p. 223) on money itself, *i.e.* that it equalises the advantages of holding actual cash and deferred claim on cash."

Keynes argument for interpreting the rate of interest as a monetary phenomenon, is different from the arguments of Myrdal (1931, 198-9) and Palander ([1941] 1953, 22) cited above. The arguments of Myrdal and Palander first of all speak against the theoretical possibility of using Wickell's natural rate of interest in the analysis. Their first argument concerned the aggregation problem. It is only in an economy with only one good or alternatively in stationary equilibrium that it is possible to define the own rate of interest of the "real" economy. Otherwise a monetary

[81] However, in disequilibrium we could for example assume that the time derivative of a certain price is a positive function of the excess demand of the same market. The question of loanable funds versus liquidity preference consequently makes more sense for disequilibrium models. See for example Klein (1950a), Grossman (1971) and Bibow (2000). In spite of Ohlin's (1937c, 426) argument for preferring loanable funds for liquidity preference theory, disequilibrium theory does not unequivocally speak for one or the other. The reason is that the time derivative of a certain price may be a function of several excess demand functions, see Samuelson (1947, 274). Excess demands in other markets can via spill-over effects affect excess demand in the capital market; see Grossman (1971) and the discussion below of temporary equilibrium with rationing.

measure is needed. Myrdal and to some extent Palander discussed these problems before macroeconomic models became standard practice.

The second argument of Myrdal (1931) and Palander (1941) is that it is impossible to abstract from money when determining the natural rate of interest. The rate of interest is denominated in money. This is an argument that merely touches the surface of the problem.

Following Townshend (1937), Robinson (1951) and Kahn ([1954] 1972) one could instead argue that the demand for money is a function of the current in comparison with the expected rate of interest, the latter having no connection to thrift and productivity: "If the rate of interest is hanging by its own boot straps, so is the price of Picasso's paintings." (Robinson 1951, 103).[82] Without taking the opposite extreme position and suggest that money is "a veil"[83] the following can be said.

We can assume that "the" rate of interest is both a "monetary" and a "real" phenomenon. In a small aggregate neoclassical four-market model with one labor, one goods, one bond and one money market[84] we would expect that the rate of interest "operates simultaneously on the 'threefold margin' of time preference (consumption decisions), marginal productivity of capital (investment decisions) and liquidity preference (decisions as to the relative sizes of bond and money holdings)" (Patinkin 1965, 378-9). A similar argument can be found in Robertson (1937, 431): "The fact that the rate of interest measures the marginal convenience of holding idle money need not prevent it from measuring *also* the marginal inconvenience of abstaining from consumption."

However, the rate of interest could be seen as a "real" phenomenon if its long-run value were independent of monetary disturbances, see Patinkin (1965, 379-80). For example, in a model with

[82] The allusion to "boot straps" refers to a discussion in Hicks (1946, 164) where he concludes that "there must be more in it than that". The "more in it" presumably is (abstracting from financial bubbles) that the expected rate of interest is related to the normal rate, the latter being determined by productivity and thrift, see Bridel (1987, 176). In the same way, the expected future price of a Picasso painting may be influenced by the esthetical quality of his works.
[83] For a discussion of the history of the concept and an interpretation, see Patinkin and Steiger (1989).
[84] As in Patinkin (1965, chapters 9-10). Note that Patinkin (1965) assumed that supply and demand for labor do not depend on the rate of interest. If they were functions of the rate of interest we would have one additional margin.

pure outside money and no distribution effects a monetary disturbance would in the long run leave the real economy (including the rate of interest) unchanged and only affect the price level. Such long run neutrality of money might be an argument for using an intertemporal model such as that of Wicksell (1893) with two goods and two factor markets, but without money. In this case the natural rate of money is determined within the "real" sector.[85] The properties of "the" rate of interest consequently depend on the choice of type of equilibrium model.

10. Different equilibrium models

Wicksell (1896, chapter 9B) analyzed cumulative processes as sequential clearing during the period of the factor and goods markets, respectively. Even if the natural rate differs from the loan rate of interest, there will be equilibrium in the non-financial markets. But there will not be simultaneous equilibrium unless the two rates of interest are equal.[86] In contrast, Lindahl (1930) analyzed the cumulative process with the temporary equilibrium method. He consequently assumed that all markets clear simultaneously in the same period. Whereas Wicksell obtained finite price-movements during a certain period, Lindahl's assumption of simultaneous market clearing resulted in infinite price changes. To get finite price changes he assumed that wages are less flexible than goods prices. The resulting change of the income distribution means that price level changes will restore equilibrium in the (consumer) goods market, even for the case of pure inside money. However, the non-equilibrating relative prices will probably result in a situation with quantity rationing in markets with effective excess supply or effective excess demand. There can still be temporary equilibrium, but it will now be equilibrium with rationing.[87]

[85] On a more fundamental level one might argue that it is difficult to distinguish between "real" and "monetary" phenomena. The reason is the following. The Walrasian general equilibrium model assumes friction-less markets with perfect competition. The principal function of money is to decrease market frictions, see Menger (1892; [1871] 1976, chapter 8). From this perspective the absence of frictions in a perfectly competitive exchange economy actually presupposes the existence of money. It is no coincidence that Walras in his successive expositions of the general equilibrium theory assumed money to be an integral part of the system, see Marget (1935). For a discussion of Menger's theory of the development of money, see O'Driscoll (1986). From the early 1970s interest in Menger's theory of money has grown. Stenkula (2003) discusses Menger´s theory in perspective of the network theory of money. For surveys of recent theory of the development of monetary exchange see Ostroy and Starr (1990) and Alvarez (2004).

[86] For an interpretation of Wicksell's analysis in terms of the IS-LM model at full employment, see Hicks (1937, 158).

[87] The term temporary equilibrium thus means Walrasian temporary equilibrium. This is in contrast to temporary equilibrium with quantity rationing.

Let us assume that there is rationing in some markets due to fixed non-market clearing prices. We further assume that the economy is characterized by temporary equilibrium, so that *effective* excess demand is zero for all markets.[88] An example of this is Keynesian unemployment equilibrium. Other examples are classical unemployment and general excess supply with repressed inflation, respectively. For details, see Barro and Grossman (1976) and Malinvaud (1977). Rationing in a market influences the behavior in other markets. Supply and demand curves will shift (spill-over effects) and price elasticities will change, see Tobin and Houthakker (1950-51) and Tobin (1952). This means that different fixed price vectors lead to different temporary equilibria with rationing. The functional forms of the supply and demand functions in a certain market are in general different if we compare two of these temporary equilibrium situations. However, Walras' law still holds under temporary equilibrium with rationing, see Barro and Grossman (1976, 58). But now the sum of the monetary values of the *effective* excess demands should be zero.

Both prices and rationing restrictions may thus be involved in the equilibrium solution. If Lindahl (1930) had taken a further step and analyzed the consequences of assuming inflexible wage rates his temporary equilibrium method would have been generalized to temporary equilibrium with rationing. However, one of the messages of Myrdal´s analysis of monetary equilibrium is that we have to take the step into the realm of disequilibrium analysis. We discuss this question in the section below.

11. Disequilibrium analysis

The question of equilibrium versus disequilibrium models permeated the discussion of monetary equilibrium.

Several of the interpreters of Wicksell's cumulative process have pointed out that it concerns phenomena outside equilibrium, for example Hansson (1987, 736) and Iwai (1981, 4-5). The exact meaning of the concept of disequilibrium was not defined by Hansson or by Iwai. Laidler (1972, 125) more specifically argued that Wicksell in his monetary analyzed trade at "non-equilibrium prices".

[88] The notional supply and demand functions contain prices as arguments whereas the effective supply and demand

One might also define equilibrium as the stronger requirement of zero excess demand in combination with fulfillment of expectations. Here we need only assume that the expectations for the present period are fulfilled. This was not the case in chapter 9 B of *Interest and Prices* version of Wicksell's cumulative process. Here factor markets are cleared before the goods market, but within the same period. Price expectations are wrong when factor prices are set. Brems (1986) used this definition and visualized the Wicksellian cumulative process as a succession of disequilibria. It depends of course on where exactly we draw the demarcation line between equilibrium and disequilibrium models. But if we do not require simultaneous clearing of all markets within the same period, we can visualize the cumulative process as a sequence of partial equilibria.

Lindahl (1930) used the temporary equilibrium method in his monetary analysis. The assumption of general equilibrium for the first period precludes the occurrence of a gap between the natural and the loan rate of interest. In temporary equilibrium the loan rate of interest is always normal.

Myrdal (1931) was very critical of Lindahl's (1930) method of temporary equilibrium. His main objection was that the assumption of coordination in the beginning of each period and market trading at fixed prices in the remaining part of the period was unrealistic. Myrdal consequently argued for disequilibrium analysis. This means that the actions and the expectations of the agents are not coordinated via prices and rationing restrictions. People will experience surprises during the period. The *ex ante* values will consequently differ from the *ex post* values.

Even if Myrdal (1933; 1939) contains some discussion of how a discrepancy between investments and saving *ex ante* is resolved into equality *ex post* one cannot say that he succeeded in performing disequilibrium analysis. Johansson (1934) contains a non-theoretical discussion of special cases, see Hansen (1981). Lundberg (1937) represents an attempt to formulate model sequences suitable for dynamic analysis. Chapter 8 is of special interest, see Siven (1985). Svennilson (1938) gives an outline of the microeconomic underpinning necessary to build

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functions contain prices as well as rationing restrictions as arguments.

disequilibrium models, see Siven (1991). However, he did not derive behavior equations. His analysis stopped at a principles stage.

In comparison to the various attempts to formulate dynamic theory referred to above the first part of Lindahl (1939) contains a more systematic treatment. In an "Introduction to the Study of Dynamic Theory" he outlined how dynamic analysis both of individual behavior (the general theory of planning, Lindahl 1939, 40-51) and market outcomes (the general theory of development, Lindahl 1939, 51-60) in principle should be developed.[89] This microeconomic and macroeconomic analysis could be performed by either assuming equilibrium[90] or disequilibrium. In both cases Lindahl used period analysis, the argument being that prices are not changed continuously.

When comparing the usefulness of equilibrium versus disequilibrium method Lindahl (1939, 68-69) pointed out that the disequilibrium method was the more general one. The temporary equilibrium method assumes "an abrupt transition from one such equilibrium position to another" (p. 69). Lindahl also pointed at the strategic role played by expectations in monetary equilibrium. Incompatible expectations lead to revisions in the beginning of each period. Consequently the dynamic development under temporary equilibrium is driven by changed expectations. However, in order to take expectations seriously they have to be explicitly accounted for which will complicate the theory. Still equilibrium theory does not have to use the "cumbersome *ex ante* and *ex post* terminology" (p. 68). Moreover the temporary equilibrium method without explicit analysis of anticipations regarding future periods may be useful when analyzing the main lines of development. Lindahl (1939) consequently discussed the pros and cons of disequilibrium analysis. The starting point for Myrdal's plea for disequilibrium analysis was a criticism of Lindahl's (1930) use of the temporary equilibrium method. Lindahl of 1939 acknowledged disequilibrium method as the more realistic one, but pointed at its costs in the form of greater analytical complexity.

[89] A version of Lindahl's discussion existed already in 1934, see Steiger (1971).
[90] Lindahl (1939, 64-68) distinguished between two equilibrium methods. The first was partial temporary equilibrium, the second general (multimarket) temporary equilibrium. Wicksell's analysis in *Interest and Prices* chapter 9, section B, uses an equilibrium concept of the first type.

The question whether the Stockholm School anticipated (or even surpassed) the analysis of Keynes *General Theory* is connected to the question of whether the Swedish economists performed disequilibrium analysis or not. One of the reasons why Keynes did and the Stockholm School did not form the starting point for the development of macroeconomics during the coming decades was that Keynes formulated an equilibrium model. The Stockholm economists generally lacked the appropriate analytical methods to perform disequilibrium analysis. Disequilibrium analysis of the Stockholm type thus usually turned into analysis of special cases. The general principles were not easy to distinguish. In contrast the clear structure and the easy comprehension of the interdependencies of equilibrium models worked in the Keynesian favor.

12. Conclusion

The problem of monetary equilibrium was on the agenda in Sweden for over 50 years, from Wicksell's ([1889] 2001) monetary paper up to Palander's (1941) criticism of Myrdal's work. Even if Myrdal did not mint the term until 1931, in substance it was in focus from the very beginning. When Wicksell chose to analyze the case of pure inside money, he could no longer work with equilibrium in terms of quantities (supply of and demand for money) but had to use prices (the natural and the loan rate of interest). Wicksell's formulation of monetary theory raised two important controversies during his lifetime, the first with David Davidson, the second one with Gustav Åkerman. Neither controversy ended with a clear conclusion. Furthermore, Wicksell was constantly ready to revise his theory. He never reached a conclusion that he himself considered being final.

When Lindahl during the 1920s took a fresh look at monetary theory, his starting point was Wicksell's approach. However, he based his monetary theory on another equilibrium concept than that of Wicksell. Lindah's assumption of temporary equilibrium eliminated the possibility of a gap between the two interest rates. When Myrdal argued against Lindahl's analysis he consequently choose to criticize the use of temporary equilibrium method. Myrdal's discussion was rich in ideas. It was also quite influential; the members of the Stockholm School to a large extent analyzed economic processes in time, not equilibrium positions. However, the Swedish economists were not ready to make the necessary analytical simplifications. Their results therefore too often consisted of special cases, which were difficult to draw general conclusions

from. Palander's criticism indicated a number of directions for further analytical development of the period analysis of the Stockholm School.

The discussion of monetary equilibrium on the whole took place within a small closed system. The Swedish economists based their analysis on Wicksell's monetary theory. They mainly wrote in Swedish. Exports and imports of ideas were of minor significance. This makes it comparatively easy to follow the development of the Swedish analysis of monetary equilibrium and to see the interactions between the participating economists. The small system also implied a certain unity in the views of Swedish Economists. For example, they were all (with Wicksell himself and perhaps Hammarskjöld (1933) as exceptions) critical to the quantity theory of money. Their critical attitude also implied that they preferred loanable funds to liquidity preference when analyzing interest rate determination. In consequence the Swedes did not interpret the concept of monetary equilibrium as equilibrium in the money market but as a more general macroeconomic equilibrium.

References

Alvarez, Andrés. 2004. Learning to Choose a Commodity-Money: Carl Menger's Theory of Imitation and the Search Monetary Framework. *European Journal of the History of Economic Thought* 11.1:53-77.

Andvig, Jens Cristopher. 1991. Ragnar Frisch and the Stockholm School. In *The Stockholm School of Economics Revisited,* edited by Lars Jonung. Cambridge: Cambridge University Press.

Barro, Robert, and Herschel Grossman. 1976. *Money, Employment, and Inflation.* Cambridge: Cambridge University Press.

Bellofiore, Riccardo. 1998. Between Wicksell and Hayek. Mises' Theory of Money and Credit Revisited. *American Journal of Economics and Sociology* 57.4:531-578.

Bibow, Jörg. 2000. The Loanable Funds Fallacy in Retrospect. *History of Political Economy* 32: 789-831.

Blaug, Mark. 1974. *The Cambridge Revolution*. London: The Institute of Economic Affairs.

Boianovsky, Mauro.1998. Real Balances, the Price Level and the Unit of Account: From Wicksell to Patinkin and Beyond. *American Journal of Economics and Sociology* 57.4: 579-612.

Boianovsky, Mauro and Trautwein, Hans-Michael. 2001. An Early Manuscript by Knut Wicksell on the Bank Rate of Interest. *HOPE* 33.3:485-507.

Brems, Hans. 1978. What was New in Ohlin's 1933-34 Macroeconomics? *HOPE* 10:398-412.

Brems, Hans. 1986. *Pioneering Economic Theory, 1630-1980*. Baltimore and London: The John Hopkins University Press.

Bridel, Pascal. 1987. *Cambridge Monetary Thought*. New York: St. Martin's Press.

Coddington, Alan. 1979. Hicks's Contribution to Keynesian Economics. *Journal of Economic Literature* 17: 970-88.

Cohen, Avi J. and Harcourt, Geoffrey C. 2003. What Happened to the Cambridge Capital Theory Controversies? *Journal of Economic Perspectives* 17.1: 199-214.

Davidson, David. 1916. Thornton, om penningränta och varupriser [Thornton on interest rate and goods prices]. *Ekonomisk Tidskrift* 18:391-393

Dixit, Avinash K. and Robert S. Pindyck. 1994. *Investment under Uncertainty.* Princeton: Princeton University Press.

Dostaler, Gilles. 1990. An Assessment of Gunnar Myrdal's Early Work in Economics. *Journal of the History of Economic Thought* 12:196-221.

Fellner, William and Harold M. Somers. 1941. Alternative Monetary Approaches to Interest Theory. *The Review of Economic Statistics*, 23: 43-48.

Fellner, William and Harold M. Somers. 1949. Note of "Stocks" and "Flows" in Monetary Interest Theory. *The Review of Economics and Statistics* 31: 145-46.

Fellner, William and Harold M. Somers. 1950. Stock and Flow Analysis: Comment. *Econometrica* 18: 242-45.

Fisher, Irving. 1896. *Appreciation and Interest.* New York: Macmillan.

Fregert, Klas. 1991. Erik Lindah's Norm for Monetary Policy. In *The Stockholm School of Economics Revisited*, edited by Lars Jonung. Cambridge: Cambridge University Press.

Grandmont, Jean Michael. 1982. Temporary General Equilibrium Theory. In vol. 2 of *Handbook of Mathematical Economics,* edited by Kenneth J. Arrow and Michael D. Intriligator. Amsterdam: Elsevier Science Publishers.

Grandmont, Jean Michael. 1983. *Money and Value*. Cambridge: Cambridge University Press.

Grossman, Herschel I. 1971. Money, Interest and Prices in Market Disequilibrium. *Journal of Political Economy* 79: 943-61

Gurley, John G., and Edward S. Shaw. 1960. *Money in a Theory of Finance.* Washington, D.C.: The Brookings Institution.

Hammarskjöld, Dag. 1933. *Konjunkturspridningen* [Propagation of business cycles]. SOU 1933:29. Stockholm: P. A. Norstedt & söner.

Hammarskjöld, Dag. [1944] 1955. The Swedish Discussion on the Ends of Monetary Policy. Translated by Ralph Turvey. *International Economic Papers,* no. 5. London: Macmillan.

Hansen, Bent. 1951. *A Study in the Theory of Inflation.* London: George Allen and Unwin.

Hansen, Bent. [1955] 1967. *The Economic Theory of Fiscal Policy.* Lund: Studentlitteratur.

Hansen, Bent. 1981. Unemployment, Keynes, and the Stockholm School. *HOPE* 13.2: 256-77.

Hansson, Björn A. 1982. *The Stockholm School and the Development of Dynamic Method.* London: Croom Helm.

Hansson, Björn A. 1987. Cumulative Processes. In *The New Palgrave Dictionary of Economics,* edited by John Eatwell, Murray Milgate, and Peter Newman. London: Macmillan.

Harcourt, Geoffrey C. 1969. Some Cambridge Controversies in the Theory of Capital. *Journal of Economic Literature* 7.2: 369-405.

Hawtrey, Ralph G. 1937. Alternative Theories of the Rate of Interest: Three Rejoinders. *Economc Journal* 47:436-443.

Hayek, Friedrich A., von. [1929] 1933. *Monetary Theory and the Trade Cycle.* Translated by N. Kaldor and H. M. Croome. London: Jonathan Cape.

Hayek, Friedrich A. von. 1935. *Prices and Production*. Second edition. London : Routledge.

Hicks, John. 1936. Keynes' Theory of Employment. *Economic Journal* 46:238-253.

Hicks, John. 1937. Mr Keynes and the "Classics"; A Suggested Interpretation. *Econometrica* 5:147-159.

Hicks, John. 1946. *Value and Capital*. Second edition. Oxford: Clarendon Press.

Iwai, Katsuhito. 1981. *Disequilibrium Dynamics*. New Haven and London: Yale University Press.

Johnson, Harry G. 1951-52. Some Cambridge Controversies in Monetary Theory, *Review of Economic Studies* 19: 90-104.

Johansson, Alf. 1934. *Löneutvecklingen och arbetslösheten* [The development of wages and unemployment]. Stockholm: S.O.U 1934.2.

de Jong, F. J. 1956. The Concept of Monetary Equilibrium, and its Relation to Post-Keynesian Economics. *Weltwirtschaftliches Archiv* 77:1-43.

Jonung, Lars. 1991. Introduction and Summary. In *The Stockholm School of Economics Revisited,* edited by Lars Jonung. Cambridge: Cambridge University Press.

Kahn, Richard. 1954. Some Notes on Liquidity Preference. *Manchester School* 8: 72-96. Reprinted in *Selected Essays on Employment and Growth*, Cambridge University Press, 1972.

Keynes, John Maynard. 1936. *The General Theory of Employment Interest and Money*. London: Macmillan and Co. Ltd.

Keynes, John Maynard. 1937a. Alternative Theories of the Rate of Interest. *Economic Journal* 47:241-252.

Keynes, John Maynard. 1937b. The "Ex-Ante" Theory of the Rate of Interest. *Economic Journal* 47:663-669.

Klein, Lawrence R. 1950a. Stock and Flow Analysis in Economics. *Econometrica* 18: 236-41.

Klein, Lawrence. 1950b. Stock and Flow Analysis: Further Comment. *Econometrica* 18: 246.

Laidler, David. 1972. On Wicksell's theory of Price Level Dynamics. *The Manchester School of Economic and Social Studies* 40.2:125-44.

Laidler, David. 1991. *The Golden Age of the Quantity Theory.* New York: Philip Allan.

Laidler, David. 1999. *Fabricating the Keynesian Revolution.* Cambridge: Cambridge University Press.

Landgren, Karl-Gustaf. 1960. *Den "nya ekonomien" i Sverige* [The "new economics" in Sweden]. Diss., University of Uppsala.

Leijonhufvud, Axel. 1981. *Information and Coordination*. Oxford: Oxford University Press.

Lerner, Abba P. 1944. Interest Theory – Supply and Demand for Loans or Supply and Demand for Cash. *The Review of Economic Statistics* 26: 88-91.

Lindahl, Erik. 1929. Prisbildningsproblemets uppläggning från kapitalteoretisk synpunkt [The place of capital in the theory of price]. *Ekonomisk Tidskrift* 31:31-81..

Lindahl, Erik. 1930. *Penningpolitikens medel* [Means of monetary policy]. Malmö: Förlagsaktiebolaget.

Lindahl, Erik. [1929] 1939. The Place of Capital in the Theory of Price. In *Studies in the Theory of Money and Capital.* London: George Allen & Unwin.

Lindahl, Erik. 1939. *Studies in the Theory of Money and Capital.* Translated by Tor Fernholm. London: George Allen & Unwin.

Lindahl, Erik. [1930] 1939. *Means of Monetary Policy.* In *Studies in the Theory of Money and Capital.* London: George Allen & Unwin.

Lundberg, Erik. 1937. *Studies in the Theory of Economic Expansion*. London: P. S. King & son, Ltd.

Malinvaud, Edmond. 1977. *The Theory of Unemployment Reconsidered.* Oxford: Basil Blackwell.

Marget, Arthur W. 1935. The Monetary Aspects of the Walrasian System. *Journal of Political Economy* 43:145-186.

Marshall, Alfred. 1926. *Official Papers of Alfred Marshall*. London: Macmillan and Co., Ltd.

Marshall, Alfred. [1890] 1961. *Principles of Economics*. London: Macmillan and Co. Ltd.

Marshall, Alfred. 1975. Money. In Whitaker, J. K. 1975. *The Early Economic Writings of Alfred Marshall, 1867-1890*. London: Macmillan.

Menger, Carl. 1892. On the Origins of Money. Translated by C. A. Foley. *Economic Journal* 2:239-55.

Menger, Carl. [1871] 1976. *Principles of Economics*. Translated by James Dingwall and Bert F. Hoselitz. New York and London: New York University Press.

Mises, Ludwig von. 1912. *Theorie des Geldes und der Umlaufsmittel.* Munich: Duncker & Humblot.

Mises, Ludwig von. [1912] 1971. *The Theory of Money and Credit*. Translated by H. E. Batson. New Haven: Yale University Press.

Myhrman, Johan. 1991. The Monetary Economics of the Stockholm School. In *The Stockholm School of Economics Revisited,* edited by Lars Jonung. Cambridge: Cambridge University Press.

Myrdal, Gunnar. 1931. Om penningteoretisk jämvikt. En studie i den "normala räntan" i Wicksells penninglära [On monetary equilibrium: A study in the "normal rate" of interest in Wicksell's theory of money]. *Ekonomisk Tidskrift* 33:191-302.

Myrdal, Gunnar. 1933. Der Gleichgewichtsbegriff als Instrument der geldtheoretischen Analyse. Translated by Gerhard Mackenroth. In *Beiträge zur Geldtheorie*, edited by Friedrich A. von Hayek. Wien: Julius Springer.

Myrdal, Gunnar. 1934. *Finanspolitikens ekonomiska verkningar* [Economic effects of fiscal policy]. SOU 1934:1. Stockholm: P. A. Norstedt & söner.

Myrdal, Gunnar. 1939. *Monetary Equilibrium*. Translated by R. B. Bryce and N. Stolper. London: Hodge.

O'Driscoll, G. Jr. 1989. Money: Menger's Evolutionary Theory. *HOPE* 18:601-16.

Ohlin, Bertil. 1933. Till frågan om penningteoriens uppläggning. *Ekonomisk Tidskrift* 35:45-81.

Ohlin, Bertil. 1934. *Penningpolitik, offentliga arbeten, subventioner och tullar som medel mot arbetslöshet* [Monetary policy, public works, subsidies and custom duties as means against unemployment]. SOU 1934:12. Stockholm.

Ohlin, Bertil. 1936. Introduction. In Wicksell, Knut. *Interest and Prices*. Translated by R. E. Kahn. London: Macmillan.

Ohlin, Bertil. 1937a. Some Notes on the Stockholm Theory of Savings and Investments I. *Economic Journal* 47:53-69.

Ohlin, Bertil. 1937b. Some Notes on the Stockholm Theory of Savings and Investments II. *Economic Journal* 47:121-40.

Ohlin, Bertil. 1937c. Alternative Theories of the Rate of Interest. Three Rejoinders. *Economic Journal* 47:423-427.

Ohlin, Bertil. [1933] 1978. On the Formulation of Monetary Theory. *HOPE* 10:353-88. Translated by Hans J. Brems and William P. Yohe.

Ostroy, Joeph M. and Starr, Ross M. 1990. The Transactions Role of Money. In *Handbook of Monetary Economics Volume* I, edited by Benjamin M. Friedman and Frank H. Hahn. Amsterdam: North Holland.

Palander, Tord. 1941. Om ’Stockholmsskolans’ begrepp och metoder. Metodologiska reflektioner kring Myrdals ’Monetary Equilibrium’ [On the methods and concepts of the Stockholm school. Methodological reflections around Myrdal’s ’Monetary Equilibrium’]. *Ekonomisk Tidskrift* 43:88-143.

Palander, Tord. 1942. Keynes allmänna teori och dess tillämpning inom ränte-, multiplikator- och pristeorien [Keynes’ General Theory and its application to interest, multiplier and price theory]. *Ekonomisk Tidskrift* 44: 233-272.

Palander, Tord. [1941] 1953. On the Concepts and Methods of the ”Stockholm School”. *International Economic Papers* 3:5-57.

Patinkin, Don. 1958. Liquidity Preference and Loanable Funds: Stock and Flow Analysis. *Economica* 25: 300-18

Patinkin, Don. 1965. *Money, Interest, and Prices.* 2d ed. New York: Harper & Row.

Patinkin. Don. 1976. *Keynes’ Monetary Thought. A Study of its Development*. Durham: Duke University Press.

Patinkin, Don. 1978. Some Observations on Ohlin’s 1933 Article. *HOPE* 10: 413-18.

Patinkin, Don. 1982. *Anticipations of the General Theory?* Oxford: Basil Blackwell.

Patinkin, Don and Steiger, Otto. 1989. In Search of the “Veil of Money” and the “Neutrality of Money”: A Note on the Origin of Terms. *Scandinavian Journal of Economics* 91: 131-146.

Ricardo, David. [1810] 1994. The High Price of Bullion, A Proof of the Depreciation of Bank Notes.1994. In O’Brien (editor). *Foundations of Monetary Economics*. London: William Pickering.

Robertson, Dennis H. 1937. Alternative Theories of the Rate of Interest. Three Rejoinders. *Economic Journal* 47:428-436.

Robinson, Joan. 1951. The Rate of Interest. *Econometrica* 19: 92-11.

Samuelson, Paul A. 1947. *Foundations of Economic Analysis*. Cambridge: Harvard University Press.

Sandelin Bo. 1998. Three Features of Wicksell's Theory of Capital. In *Studien zur Entwicklung der ökonomischen Theorie XVIII,* edited by Erich W. Streissler. Berlin: Duncker & Humblot.

Shackle, G.L. 1961. Recent Theories Concerning the Nature and Role of Interest. *Economic Journal* 71: 209-54.

Shackle, G. L. S. 1967. *The Years of High Theory*. Cambridge: Cambridge University Press.

Siven, Claes-Henric. 1985. The End of the Stockholm School. *Scandinavian Journal of Economics* 87:577-93.

Siven, Claes-Henric. 1991. Expectations and Plan: The microeconomics of the Stockholm School. In *The Stockholm School of Economics Revisited,* edited by Lars Jonung. Cambridge: Cambridge University Press.

Siven, Claes-Henric. 1997. Capital Theory and Equilibrium Method in Wicksell's Cumulative Process. *HOPE* 29:201-17.

Siven, Claes-Henric. 1998. Two Early Swedish Debates about Wicksell's Cumulative Process. *European Journal of the History of Economic Thought* 5:120-39.

Siven, Claes-Henric. 2002. Analytical Foundations of Erik Lindahl's Monetary Analysis, 1924-1930. *HOPE* 34.1:111-153.

Stadermann, Hans-Joachim and Steiger, Otto. 2001. *Allgemeine Theorie der Wirtschaft – Erster Band: Schulökonomik.* Tübingen: Mohr Siebeck.

Steiger, Otto. 1971. *Studien zur Entstehung der Neuen Wirtschaftslehre in Schweden.* Berlin: Duncker & Humblot.

Steiger, Otto. 1978. Prelude to the Theory of a Monetary Economy: Origins and Significance of Ohlin's 1933 Approach. *HOPE* 10: 420-46.

Steiger, Otto. 1987. Monetary Equilibrium. In *The New Palgrave Dictionary of Economics,* edited by John Eatwell, Murray Milgate, and Peter Newman. London: Macmillan.

Stenkula, Mikael. 2003. Carl Menger and the Network Theory of Money. *European Journal of the History of Economic Thought* 10.4:587-606.

Svennilson, Ingvar. 1938. *Ekonomisk planering* [Economic planning]. Uppsala: Almqvist & Wicksells Boktryckeri AB.

Thomas, Brinley. 1936. *Monetary Policy and Crises: A Study of Swedish* Experience. London: G Routhledge and Sons.

Thornton, Henry. 1994. An Inquiry into the Nature and Effects of the Paper Credit of Great Britain. In O'Brien (editor). *Foundations of Monetary Economics*. London: William Pickering.

Tobin, James. 1952. A Survey of the Theory of Rationing. *Econometrica* 20.4:521-53.

Tobin, James, and H. S. Houthakker. 1950-51. The Effects of Rationing on Demand Elasticities. *Review of Economic Studies* 18:140-53.

Tooke, T. 1844. *An Enquiry into the Currency Principle.* London: Longman, Brown, Green and Longmans.

Townshend, Hugh. 1937. Liquidity-Premium and the Theory of Value. *Economic Journal* 47: 157-69.

Trejos, Alberto and Wright, Randall. 1995. Search, Bargaining, Money and Prices. *Journal of Political Economy* 103, 118-141.

Tsiang, Sho-Chieh**.** 1956.Liquidity Preference and Loanable Funds Theories, Multiplier and Velocity Analysis: A Synthesis. *American Economic Review* 46: 539-64.

Uhr, Carl G. 1960. *Economic Doctrines of Knut Wicksell.* Berkeley: University of California Press.

Wadensjö, Eskil. 1991. The Committee on Unemployment and the Stockholm School. In *The Stockholm School of Economics Revisited,* edited by Lars Jonung. Cambridge: Cambridge University Press.

Wicksell, Knut. 1893. *Über Wert, Kapital und Rente.* Jena: Gustav Fisher.

Wicksell, Knut. 1896. *Finanztheoretische Untersuchungen nebst Darstellung und Kritik des Steuerwesens Schwedens*. Jena: Gustav Fischer.

Wicksell, Knut. 1898. *Geldzins und Güterpreise*. Jena: Gustav Fisher.

Wicksell, Knut. 1903. Den dunkla punkten i penningteorien [The obscure point in the theory of money]. *Ekonomisk Tidskrift* 5:485-507.

Wicksell, Knut. 1909. Penningränta och varupris [Money Rate of Interest and Goods Prices]. *Ekonomisk Tidskrift* 11:61-66.

Wicksell, Knut. ([1914] 1999). Review of *Theorie des Geldes and der Umlaufsmittel,* by Ludwig von Mises. In Sandelin, Bo, ed. 1999. *Selected Essays [of Knut Wicksell] in Economics. Vol.* 2. Translated by Timothy Chamberlain. London: Routledge.

Wicksell, Knut. [1901] 1935a. *Lectures on Political Economy. Vol. 1, General Theory.* Translated by E. Classen. London: George Routledge.

Wicksell, Knut. [1906] 1935b. *Lectures on Political Economy. Vol.* 2, *Money.* Translated by E. Classen. London: George Routledge.

Wicksell, Knut. [1898] 1936. *Interest and Prices.* Translated by R. E. Kahn. London: Macmillan.

Wicksell, Knut. [1893] 1954. *Value, Capital and Rent.* Translated by S.H. Frohwein. George Allen & Unwin Ltd, London 1954. Reprinted 1970 by Augustus M. Kelley Publishers, New York.

Wicksell, Knut. [1898] 1958. The Influence of the Rate of Interest on Commodity Prices. Translated by Reginald S. Stedman, Sylva Gethin, and Alan Williams. In *Selected Papers on Economic Theory,* edited by Erik Lindahl. London: George Allen & Unwin.

Wicksell, Knut. [1914] 1999. Review of *Theorie des Geldes und der Umlaufsmittel,* by Ludwig von Mises. In *Selected Essays [of Knut Wicksell] in Economics. Vol.* 2 edited by Bo Sandelin. Translated by Timothy Chamberlain. London: Routledge.

Wicksell, Knut [1889] 2001. Knut Wicksell's "Bank Rate of Interest as the Regulator of Prices". Edited and translated by Mauro Boianovsky and Hans-Michael Trautwein. *HOPE* 33.3:509-516.

Yohe, William P. 1978. Ohlin's 1933 Reformulation of Monetary Theory. *HOPE* 10:447-53.