

Endogeneity in Wicksell's Monetary Theory

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Introduction

Probably the most famous aspect of Wicksell's contribution to monetary theory is his *cumulative process* of price determination. This has received attention from a number of commentators (e.g. Patinkin 1965; Laidler 1972; and Chiodi 1991) and while much of this work has been useful there persist some aspects of the theoretical framework surrounding the cumulative process which are less clearly understood than might be the case.

This lack of clarity stems from the fact that Wicksell's argument tends not to have been studied as a whole. Instead, certain sections have been taken as summaries of Wicksell's overall analysis and these have been studied at the expense of the framework which they are supposed to represent. Two commonly quoted sections are Chapter 9 of *Interest and Prices* which is entitled "Systematic Exposition of the Theory" and a section entitled "The Positive Solution" in the final chapter of volume two of *Lectures on Political Economy*.¹ The problem with this approach is that the overall framework is important for understanding what Wicksell is trying to do in any particular section. Conclusions about Wicksell's work which ignore the overall framework are likely to involve some degree of misinterpretation.

Three aspects of Wicksellian interpretation are of particular interest in this paper. The first concerns the possibility of a neoclassical model involving endogenous money. It has been suggested indirectly by Pivetti (1991 p.98) that Wicksell provides an example of such a model.² The second issue is whether any kind of real balance effect plays an important role in Wicksell's monetary theory. Laidler (1972 p.130) has argued that the focus of Wicksell's criticism of the Quantity Theory of Money is its neglect of a detailed real balance effect. Patinkin (1965 p.582) has argued that Wicksell has only the most preliminary form of such an effect and that he did not really understand or develop it to any significant degree. A third issue is whether Wicksell's monetary thought underwent any noticeable development between the writing of *Interest and Prices* and the writing of *Lectures II*.³ Chiodi (1991 pp.32-33) has argued that while no substantial *theoretical* difference exists between the two works there is a change of *perspective* from *Interest and Prices* to *Lectures II*. In the former, the perspective is a comparison of monetary and barter economies while in the latter, the perspective is switched to a comparison of direct versus intermediated lending. Bailey (1976 pp.55-56) has suggested that non-bank forms of money, such as gold or fiat government paper, are given detailed attention in *Lectures II* in contrast to *Interest and Prices*. While this statement is true, the context of the statement in Bailey's discussion seems to suggest that Wicksell has only bank money in the analysis of *Interest and Prices* and outside money plays no role. Thus a development from bank money to outside money is implied between the two works. Laidler (1972 p.126) seems untroubled by the possibility of development in Wicksell's thinking. He takes Wicksell's 1907 article as indicative of Wicksell's overall monetary thinking for no reason other than it is the most concise. The issue of evolution in Wicksell's monetary theory is largely secondary for the present study but will be addressed in the process of dealing with the second of the questions identified above.

The approach taken is to trace the development of Wicksell's theory of the absolute price level as expounded in the central chapters of *Interest and Prices*. This will involve a consideration of Wicksell's attitude to the Quantity Theory of Money, his views on the relationship between credit and the velocity of circulation, the impact of variations in the price of credit on expenditures and ultimately the degree of control of the banking system over this price. A conclusion can then be drawn about the place of money supply endogeneity in Wicksell's overall theory and whether this theory involves a real balance effect of any kind. In the process of considering Laidler's evidence that such an effect was part of Wicksell's thinking, the question of the development of Wicksell's monetary thinking can be answered.

Wicksell and the Quantity Theory

In his discussion of Wicksell's famous "cumulative process", Patinkin (1965 p.587f) suggests that Wicksell "... always regarded himself as an adherent to the quantity theory and as one of its loyal defenders and critics. At the same time, however, he consistently opposed mechanical formulations of this theory and emphasised the importance of rationalising it in economic terms". Patinkin reaches this conclusion despite conflicting statements made by Wicksell about the Quantity Theory in *Interest and Prices*. Compare the following:

"To sum up: The Quantity Theory is *theoretically* valid so long as the assumption of *ceteris paribus* is firmly adhered to. But among the "things" that have to be supposed to remain "equal" are some of the flimsiest and most intangible factors in the whole of economics - in particular the velocity of circulation of money, to which in fact all of the others can be more or less directly referred back. It is consequently impossible to decide *a priori* whether the Quantity Theory is in actual fact true - in other words, whether prices and the quantity of money move together in practice" (Wicksell 1965 p.42; original italics).

"So it is no good; the Quantity Theory cannot just be thrown overboard Relatively, at any rate, the Quantity Theory is the most competent of all the methods of interpretation that have so far been advanced of the oscillations of the general price level . . ." (Wicksell 1965 p.50).

"The velocity of circulation of money is now seen to be a somewhat elastic quantity, but it still possesses sufficient powers of resistance against expansion or contraction for the conclusions of the Quantity Theory to retain the appearance of substantial validity" (Wicksell 1965 pp.61-62).

"The matter can be put in other words as follows: Notes provide in themselves the basis for a more or less elastic system of credit, and they circulate with a velocity which is more or less variable. It is for this reason that it was never possible for even the older supporters of the Quantity Theory to provide a satisfactory demonstration of the exact relationship which they held to exist between the price level and the quantity of notes (and coin)" (Wicksell 1965 pp.69-70).

"Means of payment, or purchasing power, can be provided in accordance with the dictates of choice and necessity. The Quantity Theory of Money would therefore appear to be deprived of its very foundations" (Wicksell 1965 pp.75-76).

These passages suggest that Wicksell's attitude to the Quantity Theory is not a straight forward matter. They reflect both his respect for the Quantity Theory and his preparedness to criticise its mechanisms when these are inadequate or incomplete.

Wicksell's main problem with the Quantity Theory lies in the assumptions on which it is built (Wicksell 1965 pp.41-42). Four assumptions are identified: an individualistic system of holding cash balances (i.e. each individual holds their own cash balances rather than holding

bank deposits); the velocity of circulation is constant; all business is conducted by means of money, in the narrowest sense of the term (i.e. metallic currency); and the entire stock of currency is used only for transactions purposes and is not stored for any significant length of time. Because these assumptions: "... are some of the flimsiest and most intangible factors in the whole of economics . . . It is consequently impossible to decide a priori whether the Quantity Theory is in actual fact - in other words whether prices and the quantity of money move together in practice" (Wicksell 1965 p.42).

The unacceptability of these assumptions leads Wicksell to criticise and indeed reject the mechanism by which the Quantity Theory ascribes increased prices to an increased quantity of money. This mechanism involves an exogenous change in the stock of money under the *ceteris paribus* condition (Wicksell 1965 pp.39-41). This change causes a direct change in expenditure which in turn changes the absolute price level. This mechanism clearly involves a form of the real balance, or wealth, effect of modern economics and Wicksell is critical of it:

" [Quantity Theorists] sometimes in fact express themselves as though the quantity of money ... must act as a *direct* and *proximate* price-determining force. That, of course, is putting the matter the wrong way around, and is open to a simple line of criticism" (Wicksell 1965 p.43; original italics).⁴

He therefore sets out in the following chapters to explain what he sees as the correct and "true" mechanism by which the quantity of money affects the price level. This is an intricate and detailed analysis which develops in a highly logical pattern but within which it is easy for the reader to lose sight of the place of any particular point in the overall argument. Great care must therefore be taken to contextualise each piece of Wicksell's argument within the overall framework he constructs.

The method employed by Wicksell is to amend the assumptions of the Quantity Theory he finds most problematic. The chief candidate is the assumption of constant velocity of circulation. In fact all of the other assumptions listed above may be related to the constancy of velocity and it is for this reason that Wicksell turns in Chapter 6 to consider this variable, its determinants and its consequences.

Credit and the Velocity of Circulation

In Chapter 6 of *Interest and Prices* Wicksell considers how developments in credit arrangements affect the velocity of circulation. He does this by looking at three stages in the development of a monetary system. The first is an initial stage where transactions are carried out only with cash. The second stage is characterised by the emergence of simple trade credit. Wicksell (1965 pp.59-60) uses his "trade fair" analogy to demonstrate that when trade credit is extended, less money is required to circulate the same output, and consequently the money that is used, circulates with higher velocity. The third stage is what Wicksell calls *organised credit* and is marked by the emergence of the banking system. He explains that the further increase in velocity which banking facilitates, is possible because banking overcomes certain limitations on the extension of simple trade credit. The two most significant of these limitations are insufficient information about borrowers and the need for producers to hold liquid reserves against business contingencies (Wicksell 1965 p.62⁵).

The first limitation is on the access to information about the credit worthiness of borrowers. Trade credit can, therefore, only be extended within a limited circle where information is more accessible and reliable. Banking overcomes this limitation for the now familiar reason that banks develop expertise in handling and gaining access to information which reduces information costs. The second limitation, the need for businesses to hold reserves against contingencies, is overcome because a new liquid asset is created by banks

which businesses are prepared to hold as reserves but which allows credit to be extended at the same time.

The centralisation of lending thus allows banking to drastically increase the velocity of circulation (Wickseil 1965 p.65). Inherent in this centralisation is what modern banking theory refers to as *maturity transformation* (Lewis and Davis 1987 p.64ff). Banks are able to structure their balance sheets with short term liabilities and longer term assets due to the law of large numbers and interdependence among the firms with which they deal. The law of large numbers causes the aggregate variation in money holdings, when deposits are held as money, to be smaller than the sum of individual money holdings when currency is the main monetary asset. Interdependence among firms produces what Tobin (1982 p.521ff) has more recently referred to as *deposit retention*. Since firms are interdependent in terms of trade, and most firms use current accounts to pay for transactions, one firm's call upon its deposits for use in payment, is another firm's receipt, and the deposit will simply be held and used in the same manner by the receiving firm (Wickseil 1965 p.66). In this way the bulk of deposits simply remains with the bank and only a small amount of base assets need be kept by the bank against the possibility of deposit redemption (Wickseil 1965 p.69). Wickseil's conclusion from this analysis is as follows:

"Notes provide in themselves the basis for a more or less elastic system of credit, and they circulate with a velocity which is more or less variable. It is for this reason that it was never possible for even the older supporters of the Quantity Theory to provide a satisfactory demonstration of the exact relationship which they held to exist between the price level and the quantity of notes (and coin)" (Wickseil 1965 p.69-70).⁶

Organised credit, or banking, not only leads to a greater velocity of circulation than pure cash or simple merchandise credit, but in its most extreme form it entails the variability of velocity itself. Taking the operation of credit to its extreme logical extension, it would be possible to have a system of completely variable velocity. In such a system there would only have to be a nominal quantity of money and perhaps none at all. In this case velocity would simply adapt, via the operation of credit, to the demands placed upon it.

In fact Wickseil conducts the great part of the analysis to come, in terms of such an extreme model:

"We intend therefore, as a basis for the following discussion, to imagine a state of affairs in which money does not circulate at all, neither in the form of coin (except perhaps as small change) nor in the form of notes, but where all domestic payments are effected by means of the Giro [cheque] system and bookkeeping transfers. A thorough analysis of this purely imaginary case seems to me to be worth while, for it provides a precise antithesis to the equally imaginary case of a pure cash system, in which credit plays no part whatever" (Wickseil 1965 p.70).

Another way of describing this system is as one of endogenous money. Money is simply bank deposits and may be created or destroyed by the extension or repayment of bank loans. This assumption must be kept firmly in mind when considering the following analysis, for Wickseil only occasionally reminds the reader of its existence and yet it is crucial for interpreting his argument and results.

Wickseil's Investment Function and the Cumulative Process

In the material considered above, it is clear that banks have considerable power to alter conditions within the monetary system. Such power would sound alarm bells for the average Quantity Theorist and raise the question as to how this power might affect the value of money and the average price level. Wickseil begins Chapter 7 by considering an historical argument

over the answer to this question, that between Ricardo and "the school of Tooke". Ricardo's position was that increases in prices were caused by excessive issues of money by the banks, such issues being achieved via lending at lower than usual rates of interest.

Tooke's counter-argument involved an empirical point and a theoretical one. The empirical point was an observed *positive* correlation between prices and interest rates. High prices were empirically associated with *high* interest rates rather than *low* interest rates. Reductions in the rate of interest could not, therefore, cause additional spending and higher prices through the granting of additional loans. Tooke's theoretical point was that variations in money interest rates could cause variations in the price level *directly* because the former constitute an important element in the costs of production which determine prices.

The second section of Chapter 7 is a criticism of Tooke's position. In general terms, Wicksell is in agreement with Ricardo against Tooke but he is not satisfied that Ricardo's explanation takes account of the influences on velocity. His first step is to reassert that easier credit in the form of lower money interest rates, does generate additional demand (Wicksell 1965 p.87). In this sense Wicksell outlines an investment demand function and this becomes the foundation for his famous *cumulative process* whereby the money rate of interest acts upon the absolute price level.⁷ Later he will fill out this explanation, strengthening Ricardo's explanation and the Quantity Theory tradition.

The development of Wicksell's investment demand function deals with two issues. The first concerns the mechanism by which a change in the money rate of interest should alter demand for productive inputs. This is a qualitative argument. The second concerns the size of the change in the rate of interest necessary to generate such a qualitative investment response. Wicksell's qualitative mechanism involves a simple matter of profitability:

"It is impossible to conceive that to-day, when almost every enterprise works on borrowed capital of one shape or another, it should be a matter of *complete* indifference whether the need for credit is met at 3 per cent. or 4 per cent., or only at 6 or 8 per cent" (Wicksell 1965 p.89; original italics).

Tooke and Nasse had argued that only if some "other stimulus" was present would a change in the rate of interest have any impact upon the demand for factors of production. The only such stimulus that Wicksell regards as necessary is the profitability of investment spending and this resides in the relation between the revenues and costs associated with the investment:

"The 'other stimulus' of which Nasse speaks cannot possibly reside in anything else but the *hope of higher profits*. This may result from the expectation of an increased demand for particular groups of commodities, or from technical discoveries, lower wages, and the like which hold out the hope of a higher return to producers. Now it must be a matter of indifference to the individual business man whether he derives his profit from higher gross receipts, from lower costs, in the narrow sense of the word, or from cheaper credit" (Wicksell 1965 p.89; original italics).

Lower interest rates reduce costs, improve profitability and set up a tendency for additional production. Whether this tendency manifests itself in the form of increased output or prices depends upon the degree of capacity utilisation but since Wicksell is working from the point of full employment (Wicksell 1965 p.90) the impact is borne by prices.

Wicksell's treatment of the quantitative issue is much more complex. He demonstrates that a small change in the three month interest rate will only have a relatively small impact upon profitability and therefore on a producer's ability to increase demand for productive resources. The same change in the rate of interest on a loan for a number of years will, however, have a much more significant impact upon prices. Provided any change in short rates persists for a sufficient period to affect long rates, prices will clearly be affected (Wicksell 1965 p.93). Short

rates do, however, exert their own influence on prices because while the changes they engender in prices are small, they are *permanent* and *cumulative*.

The argument is worth examining in close detail. It revolves initially around three cases of borrowing and lending which are subject to an interest rate shock. Case 1 depicts a producer who sells goods against a bill of exchange for three months discounted at 4% p.a. The question is what happens to prices if the market rate of discount falls to 3% p.a.? The holder of the bill will now be able to sell it for a greater amount than the value of the goods it was used to finance. To illustrate Wicksell's point, assume that the goods are sold for \$99,009.90 and the face value of the bill is \$100,000. The bill can now be sold for \$99,255.58 and this gives the bill holder a profit of \$245.68.⁸

Case 2 is a slight variation of Case 1. Instead of allowing the exchange of goods to be completed by the time the market interest rate falls, Wicksell assumes that the exchange is just about to be completed. The *purchaser* of the goods is now in a position to benefit from the fall in interest rates as well as the seller of the goods. In our example, she potentially has access to an additional \$245.68. If this is used to demand more of the factors for which the bill is drawn, the price of those factors will rise (due to their being fully employed) until the \$245.68 is fully absorbed. This represents an increased expenditure and prices of 0.25% (Wicksell 1965 p.91).

Case 3 involves finance from a third party rather than trade credit. The purchaser pays cash for the goods and obtains a loan from bank A. Provided the fall in interest rates occurs before the writing of the loan, exactly the same principles operate with respect to prices in this case as did in the previous case and prices rise by up to 0.25% as a result of the fall in interest rates of 1% p.a..

This explains why a change in the short rate will only have a small impact on prices.⁹ A 1% reduction in interest only produces a 0.25% increase in prices. A *single* such reduction in the short-term rate will only have a *small* impact upon prices but *persistent* or *repeated reductions* of this kind can have a *significant* impact upon the price level because the small changes in the price level resulting from changes to the discount rate are *permanent* and *cumulative* in nature.

The permanence of these effects is best illustrated by the "period of production" model that Wicksell outlines in Chapter 8 of *Interest and Prices*.¹⁰ Wicksell's concern in Chapter 8 is with the mechanism by which the natural rate of interest regulates the money rate. This mechanism involves the generation of inflation from differences between these two rates. To show the operation of this mechanism, he uses a circular flow, or production period, model which builds upon, and therefore elaborates, the effect of changes in interest rates upon prices. This model is foreshadowed in Chapter 7 (p.95) to demonstrate the permanence of discount rate induced price changes. It is therefore reasonable to consider the more extensive treatment it receives in Chapter 8 to provide a detailed analysis of its use in Chapter 7.

Laidler (1972 pp.133-134) and Chiodi (1991 pp.16-19) each provide accounts of the production period model in Wicksell (1965 pp.102-106). Laidler provides a brief but accurate verbal description while Chiodi attempts to tabulate the flows involved with the use of a balance sheet for each of the parties depicted in the model. The following exposition takes an alternative, diagrammatic approach but is consistent with each of these prior expositions.

Wicksell's model has five types of agent: a bank, an entrepreneur, labour, landlords and a capitalist/trader. Production is organised by the entrepreneur who borrows all of his capital (\$K) from the bank and hires labour and buildings (which we assume are sufficient productive inputs for the sake of simplicity) to the value of \$W and \$R respectively. These inputs along with a managerial contribution are used to produce an output whose value is \$K(1 + r), where r is the rate of profit or Wicksell's natural rate of interest. Labour, the landlords and the entrepreneur, whose combined income is equal to \$K,¹¹ have a propensity to consume of unity

and purchase consumer goods from the capitalist-trader. The trader's total income is therefore derived from supplying these goods and from interest on the only bank deposit in the model. The value of this deposit is assumed to be $\$K$. The value of the annual interest it earns is, therefore, $\$K.i$, where i is the annual money rate of interest (both for deposits and for loans which Wicksell (1965 p.116) explicitly assumes). Capitalists also have a propensity to consume of unity and their total income is spent replenishing the stock of goods for sale and on their own consumption. These goods are purchased from the entrepreneur.

The value of the entrepreneur's output is, therefore, $\$K(1 + r)$ and the value of the capitalist's income, exhausted on the purchase of this output, is $\$K (= \$W + \$R + \$M) + \$K.i = \$K(1 + i)$. Thus demand and supply for commodities in this model are equal in value terms provided that $r = i$. These flows are illustrated in Figure 1.

Provided the money rate of interest and the rate of profit are equal, Wicksell's system is self sustaining and stationary. Lending, production and expenditure will occur at the same levels in each period. There will be no tendency for prices to rise (which are given and, at the moment, implicit in the model). As Laidler (1972 p.134) points out, among the assumptions made in this approach is that which synchronises the period of production in each sector of the economy¹². This allows the operation of what Laidler calls a "sequential price formation mechanism". The function of this mechanism in the above description is, however, to *maintain* prices rather than to *determine* their level. Essentially, factor markets are cleared first, and factor prices and incomes are determined. These incomes are then used to purchase output and commodity prices are determined by the clearance of the commodity market. The level of money income then determines the economy's monetary needs.¹³

If the bank now offers the entrepreneur loans at a rate lower than the rate of profit, a similar pattern of flows emerges but the position in the commodity market at the end of the period will be different. The value of commodities produced will be greater than the value of commodities demanded, i.e. $\$K(1 + r) > \$K(1 + i)$. Entrepreneurs will be able to repay their loans with the $\$K(1 + i)$ which represents the proceeds of sales, and will have left over $[\$K(1 + r) - \$K(1 + i)]$ of commodities for their own consumption. This constitutes for Wicksell an additional profit that acts as an incentive to production:

"If prices remain unchanged, entrepreneurs will in the first instance obtain a surplus profit (at the cost of the capitalists) over and above their real entrepreneur profit or wage. This will continue to accrue so long as the rate of interest remains in the same relative position. They will inevitably be induced to extend their businesses in order to exploit to the maximum extent the favourable turn of events. And the number of people becoming entrepreneurs will be abnormally increased. As a consequence, the demand for services, raw materials, and goods in general will be increased, and the prices of commodities must rise" (Wicksell 1965 pp.105-106).

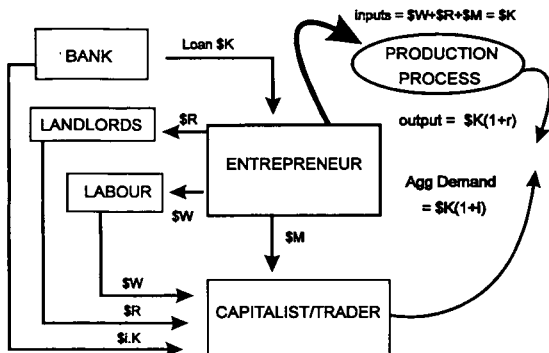


Figure 1: Wickseil's Production Period Model, Period 1 with $i = r$

In the following period there will be an increased demand for loans from the bank. Given the assumption of a perfectly elastic monetary system with which Wickseil is still working at this stage in Chapter 8 (see Wickseil 1965 p.70), the bank will grant the additional loan by creating the necessary deposits.¹⁴ Let us assume that the new loan demand is $\$K(1+r-i)$.¹⁵ The value of production will be $\$K(1+r-i)(1+r)$ and the value of demand will be $\$K(1+r-i)(1+i)$. The loan repayment to the bank including interest is exactly equal to the value of aggregate demand. The entrepreneur, therefore, once again receives an additional profit, this time $\$K(1+r-i)(r-i)$.

The reason for the permanence of price changes is now apparent. The additional credit extended by the bank enables the entrepreneur to demand more productive resources in value terms. While the supply of these resources is at its maximum, the incomes paid to them are inflated and these increased incomes are translated to the commodity markets where commodity prices are forced up. Since the entrepreneur is able to repay the bank loan, there will be no problem with credit in the following period. There is, therefore, no tendency for the factor incomes and commodity prices to fall back to their previous levels.

It may also be seen why these changes to incomes and prices are cumulative. Provided the money rate of interest remains below the rate of profit in the following period, the entrepreneur can expect to earn an additional profit over and above the managerial wage. As long as this profit is positive, there will be an incentive to demand additional loans and for production to expand. A bigger loan will cause factor prices, incomes and commodity prices to be bid up *further* than their levels at the end of the previous period. The price level will keep rising. As argued above, this analysis is foreshadowed in Chapter 7:

"If the rate of interest remains at a low level for a considerable period of time, its influence on prices must necessarily be *cumulative*; that is to say, it goes on repeating

itself over equal intervals of time in precisely the same manner. The producer has to pay more for raw materials, wages, rents, etc., but he receives correspondingly better prices for his own products. He finds himself in precisely the same situation as before the rise in prices took place, and he is therefore in a position to pay the same rate of interest as before for the credit which he requires. If, however, the credit institutions maintain the lower rates of interest, he will be in a position to offer rather more for raw materials, labour and land, and competition will to some extent force him to do so. As a consequence, the demands of workers and landlords will be raised, and this will bring about a further rise in the price of consumption goods; and prices will continually rise higher and higher" (Wicksell 1965 p.95; original italics).

Care must be taken at this point in the exposition to avoid a potential confusion. In the pages which lead up to this analysis, Wicksell makes it clear that he is applying this cumulative process to changes in the short term rate of interest or the discount rate. He has set aside the large price changes that result from changes in the long rate. This allows him to focus on the short rate. Minor editing allows the flow of Wicksell's argument to be highlighted:

" We have seen that a casual and temporary change in the discount rate would not in itself exert any marked influence on prices. . .

This, it may be noted, is in itself a reason for not expecting any precise correlation between movements in the discount rate and in commodity prices. . . But as soon as the long-term rate of interest moves in sympathy, *and provided that conditions remain otherwise unaltered*, prices suddenly rise and the whole world knows that "the upward phase" has started. . .

If we leave on one side these violent changes in the price of such raw materials and services as are required for the purpose of long-term investment, and their reaction on the prices of other commodities, it would appear that a change in the rate of interest could exert only an extremely trivial influence on prices...

Such would be the case if it could be assumed that the effect of a single permanent change in the rate of interest was *confined to the immediate impact*, so that any further rise in prices would require a further fall in the rate of interest. But this assumption immediately leads to absurd conclusions.

On every consideration of probability things happen quite differently. It is to be supposed that the maintenance of a lower rate of interest has effects, *ceteris paribus*, which are not only permanent but also *cumulative*" (Wicksell 1965 pp.92-94; original italics).

Therefore, even changes in the short term rates by themselves can have significant effects on the price level.

It must be noted then, that Wicksell originally uses the term *cumulative* in *Interest and Prices* to explain why changes in the short-term rate will have a significant impact upon prices *against one's expectation*. He does not use it at this stage of the argument to describe the overall effect of changes in the interest rate (both long and short) on commodity prices although it will clearly possible to apply it in this way. If a prolonged fall in the short-term rate can bring about significant changes to commodity prices because these effects are permanent and cumulative, then prolonged reductions in the long-term rate will also have permanent and cumulative consequences. Wicksell (1965 pp.95-96) argues along these lines later in the analysis. The point here is that Wicksell introduces the term in a much more specific context than is generally realised and the result that short-term rates affect prices, helps to establish an investment demand function which counters Tooke's and Nasse's denouncement of the Quantity Theory.

Limitations on Bank Rate Policy

If Wicksell's purpose in Chapter 7 of *Interest and Prices* is to establish that changes in interest rates affect prices via investment expenditure, his purpose in Chapter 8 is to qualify that proposition or rather to make it more precise. The most important *condition that remains otherwise unaltered* in the passages cited above from pp.92-94 is the *natural rate of interest*. The influence of the natural rate qualifies the effect of the money rate on prices.

The approach taken in Chapter 8 to expand on the nature of this qualification, has three aspects. Firstly, Wicksell defines and explains the determinants of the natural rate. Secondly, he explains the relation between the natural rate and the money rate, and thirdly he uses this relation to outline what he regards as the correct version of the Quantity Theory of Money.

The *natural rate of interest* (Wicksell 1965 pp.102, 106) is given various names by Wicksell. It is the rate of *profit* in the production period model considered above (See Wicksell 1965 p.103 cf. 1978 p.190), it is called the *average rate of interest* or the *normal rate of interest* (Wicksell 1965 p.120 cf. 1978 p.192) and there are occasions on which it is referred to as the *real rate* or the *normal or natural real rate* (Wicksell 1978 pp.192-193). It is determined by the "supply and demand for capital" (Wicksell 1965 p.103¹⁶) or, more specifically, by the productivity of capital in the productive process (what Wicksell calls "the efficiency of production"), by the available amount of fixed and liquid capital and by the supply of other productive inputs (Wicksell 1965 p.106). This is the first aspect of Wicksell's discussion of the natural rate.

The second aspect brings us to the heart of Wicksell's monetary theory, the proposition that differences between the natural rate and the money rate of interest, whether the discount rate or the long-term rate, cause fluctuations in the price level:

"Our problem is, therefore, to show that in those periods when upward movements of prices have been observed, the contractual rate of interest - the money rate- was *low* relatively to the natural rate, and that at times of falling prices it was relatively *high*. It is only in this relative sense that the money rate of interest is of significance in regard to movements of prices. It can at once be seen that it is quite useless to try to demonstrate the existence of any direct relation between absolute movements of the rate of interest or of the discount rate and movements of prices" (Wicksell 1965 p.107).

In fact the movement of prices when the two rates are unequal is the very factor which removes the inequality. The question is: which of the rates changes to achieve equality?

As always, Wicksell (1965 pp.108-109) first considers the conventional answer to the question. It is that the natural rate sets the pace for the money rate because money and loans simply cloak real forces. He is in agreement with this answer but is of the opinion that stronger support for it lies in studying the behaviour of prices when the two rates are *not* equal:

"The only possible explanation lies in the influence which is exerted on prices by the difference between the two rates of interest. When the money rate of interest is relatively too low all prices rise. The demand for money loans is consequently increased, and as a result of a greater need for cash holdings, *the supply is diminished*. The consequence is that the rate of interest is soon restored to its normal level, so that it again coincides with the natural rate" (Wicksell 1965 pp.109-110; italics added).

This passage at once provides the key to Wicksell's version of the Quantity Theory and the role played by interest rates in that theory, and also raises some questions about the elasticity of the money supply which has so far been assumed to be infinite.

It is clear from the above passage that the money rate of interest gravitates to the natural rate in Wicksell's conception of monetary dynamics and that the mechanism by which this occurs involves price level variations. The higher prices brought about when the money

rate is below the natural rate (which occurs via the operation of the investment demand function) leads to an increased demand for money, or cash holdings, to facilitate the same level of full employment transactions. Wicksell describes this as diminishing the supply of money. This description, however, cannot be taken literally. There is no process by which the supply of money could be decreased by such an increase in demand. Wicksell must be referring to some notion of *excess* supply or supply *relative to demand*. In this case it is easy to make sense of the argument as long as it is assumed that the supply of money is fixed.

But this new assumption of a fixed money supply raises a problem, for it has already been assumed that the supply of money is perfectly elastic. The problem is addressed by Wicksell following the above quotation. After the explanation of how the two rates come into equality with each other, Wicksell explains that with an *elastic* money supply, the two rates will *not* come into equality. In this case, they will continue to be different for considerable periods of time and the impact on prices will also be considerable. He explores this case further and notes that the obstacles standing in the way of such a system existing in reality are decreasing all the time. He provides a summary of the analysis in Chapter 6, recounting how the velocity of circulation is increased when banks form the core of the monetary system and cheques are used extensively for payments. Thus the reader is reminded that, in the ideal state introduced on p.70, *every* payment and *every* loan involves the use of cheques and the transfer of deposit balances within the banking system, and this is a system to which actual systems are always tending to move.

But it is in this, *and only in this*, ideal system, that it is "... no longer possible to refer to the supply of money as an independent magnitude, differing from the demand for money... [Only here, the] "supply of money" is ... furnished by the demand itself " (Wicksell 1965 p.110). This is not, however, the way the world actually works, and while such an ideal model is useful for reasons that shall be discussed shortly, it is not the model on which Wicksell will settle in the end. He now investigates "... the limits which on one side or the other restrict the power of the banks [to maintain a rate of interest different from the natural rate]" (Wicksell 1965 p.111).

The conclusion to this investigation is arrived at within a short space. In reality coin and notes circulate in the monetary system and banks must hold reserves of these instruments to honour redemption of deposits and possibly notes. When prices rise and demand for money increases, there will be increased demand for currency both for circulation and also for reserves in the banking system. The operation of the system of cheques and deposits that Wicksell has been considering through the pages of *Interest and Prices*, certainly increases the extent to which a given quantity of monetary base items are able to serve the circulation demands of the economy. However, for a system which has any quantity of a physical monetary base asset, there is a finite limit to the extension of this service. For any system at this limit, an increase in prices caused by too low a money rate of interest relative to the natural rate, will place pressure on money interest rates via increased demand for money and money base assets. "The limit [of the banks' power to maintain this too low rate of money interest] is now, of course, much narrower" (Wicksell 1965 p.113). The banks must eventually raise the money rate to stem the demand for money (Wicksell p.114; the opposite case is considered on p.116) and they are unable to maintain a money rate of interest which is different from the natural rate. The single factor which ensures this, is the *exogeneity* of the monetary base.

Wicksell had earlier (1965 p.101) signalled this result. At the end of Chapter 7, he contrasts the determination of relative prices with that of the absolute price level using the simile of a pendulum and a cylinder. The determination of relative prices is like the operation of a pendulum. There is a fixed point to which the pendulum will always return if disturbed. The absolute price level *in the context of a pure credit system* is more like a cylinder rolling on the

surface of a table which is somewhat rough. It will remain at rest (in equilibrium, with equality between money and natural rates) until it is acted on by some force (a difference between the money and natural rates). It continues to move as long as the force is applied. Once the force stops, it comes to rest but does not return to its initial position. There is no unique equilibrium value for the absolute price level in the context of a pure credit system. That is, unless there is some counteracting force pushing it back towards its initial position:

"It is, of course, clear that such *forces* can never be entirely absent, no matter how developed the credit system may be, if a precious metal or some other material substance serves as a monetary basis" (Wicksell 1965 p.101; italics added).

The *forces* referred to in this quotation are the counteracting forces pushing the price level back to its initial value. Wicksell regards the operation of such counteracting forces as being exerted by a fixed monetary base in contrast to what happens with a pure credit system. At this earlier stage in the argument, Wicksell therefore, signals the theoretical position to which his exposition will eventually lead.

Wicksell's Version of the Quantity Theory and the Role of Endogenous Money

The dissatisfaction Wicksell expressed toward the Quantity Theory which he had inherited may now be seen to lie in the failure of that theory to recognise the role played by interest rates in the determination of the price level. It was shown above that Wicksell rejected the real balance effect by which the Quantity Theory explained variations in the price level. It was also shown that the assumption of an individualistic system of cash holdings was Wicksell's major point of departure from this tradition.

This is the reason Wicksell sets out on such a lengthy discussion of the determinants of the velocity of circulation and how a concentration of deposits with the banking system not only increases velocity but, at the same time, introduces interest rates into the analysis. The increased velocity and monetary efficiency brought about by banks, go hand in hand with the advent of institutional interest rates and this, for Wicksell, is of the most profound significance for understanding monetary theory and the behaviour of prices.

The introduction of this relationship between the bank rate and the natural rate, however, serves not to overthrow the Quantity Theory but to strengthen it, for ultimately Wicksell recognises the existence of an *exogenous* supply of some base monetary asset. It was shown in the previous section that this is the single factor responsible for determining absolute prices at some particular level but it raises yet another question. This is the question as to why Wicksell introduces his "purely imaginary case" so early in the analysis and why he conducts so much of the analysis in terms of this case. If ultimately, monetary conditions are locked down by an *exogenous* money supply, why use the assumption of an *endogenous* money supply in the analysis?

The answer to this question lies in Wicksell's *method of exposition* rather than any necessary *theoretical imperative or possibility*. It has been argued that the focus of Wicksell's contribution to the Quantity Theory tradition lies in his attention to the banking sector and to the behaviour and impact of interest rates determined by that sector. The reason he temporarily suspends other relevant factors, including exogeneity of the monetary base, is to highlight the central features of his contribution. The assumption of pure credit money is simply the most extreme, logical extension of the effects banks have in increasing the velocity of circulation. A position to which he believed actual monetary systems were constantly moving. Use of this assumption allows Wicksell to show that the discrepancy between the money rate and the natural rate affects commodity prices. Without understanding this mechanism one cannot properly understand the determination of the absolute price level. But this is not the end of the story. The bank or money rate of interest is not itself free to take any value, it is constrained to

ultimate equality with the natural rate because the absolute price level feeds back against a limit determined by the exogenous monetary base. The assumption of pure credit money is introduced for a provisional and pedagogical purpose, to show how velocity, interest rates and prices are related, and it is dropped when it has fulfilled this purpose.

The Real Balance Effect and the Relation Between *Interest and Prices* and *Lectures II*

This interpretation is at odds with Laidler's interpretation of Wicksell's criticism of the Quantity Theory. Laidler (1972 p.130) argues that Wicksell's main problem with the Quantity Theory was that it contained an unsatisfactory real balance effect not that it had no alternative interest rate mechanism. He cites a passage from *Lectures II* (pp.159-160) in which Wicksell indicates that one must show *why* an increase in the quantity of money will lead to price increases and not simply assert that it does. Laidler then explains that in the following pages, Wicksell outlines a mechanism which fills this gap but which omits any role for interest rates. The mechanism thus outlined is akin to the modern wealth effect, and Wicksell's contribution to the Quantity Theory tradition lies in advocating *this* mechanism. Laidler admits that Wicksell's attention thereafter shifts to the role of the banking system in price determination and some role is allowed for interest rates but he claims this to be only a shift of emphasis and not a radical break with the Quantity Theory tradition and presumably its real balance mechanism. This may appear to highlight a potential theoretical shift from *Interest and Prices* to *Lectures II*, or at least a "shift of focus". To see whether this is the case, the structure of the argument in *Lectures II* must be considered.

Almost immediately after the quote Laidler takes from pp.159-160 of *Lectures II*, Wicksell recounts Hume's original discussion of a kind of real balance effect and then comments: "But since the whole idea contains an assumption contrary to reality, we may perhaps add that the rise in prices required by the Quantity Theory from an increased supply of money is in fact *not* reached in *this* manner" (Wicksell 1978 p.161; original italics). In the following pages, Wicksell examines three ways in which an increase in the quantity of money can actually be produced. The output of gold mines may be increased (Wicksell 1978 pp.161-165). The quantity of state paper money may be increased, for example in connection with government expenditures (Wicksell 1978 pp.165-168). Or finally, the quantity of bank money may be increased through the interest rate policy of the banks (Wicksell 1978 pp.168-197).

The first two cases need not involve any changes in interest rates¹⁷ but these are not the most common causes of monetary disturbance. Credit is the most important source of variation because most payments are made not with notes or gold but with cheques (Wicksell 1978 p.172). Wicksell's treatment of credit in *Lectures II* is very similar to the treatment it receives in *Interest and Prices*. He first considers the approaches taken in the Currency-Banking debate to the influence of credit on prices. He criticises Ricardo in exactly the same way as he does in *Interest and Prices*, for failing to consider the role of interest rates in the extension of credit, and therefore for the influence they have on the absolute price level (Wicksell 1978 p.178). His principal objection to Tooke on the other hand, is Tooke's belief that a lowering of the rate of interest will not have any influence on prices because it will fail to stimulate demand (Wicksell 1978 pp.182-183). He answers this point with reference to a condensed version of the production period model. When loans are offered by the banks more cheaply than was previously the case, entrepreneurs are able to pay higher prices for all productive factors. "A tendency to increased enterprise, to an increased demand for goods and services, and therefore directly and indirectly to rising prices, thus undoubtedly underlies every spontaneous lowering of the loan rate" (Wicksell 1978 p.186).

This analysis is developed further in the section of the final chapter of *Lectures II* entitled "The Positive Solution" (Wicksell 1978 p.169). The argument of this section also follows the structure of the argument in *Interest and Prices*. The loan rate is compared with the natural rate and the relationship between them is explored in the contexts of simple credit and organised credit. In the latter case, the two rates are connected by movements in commodity prices. Again there are two sub-cases and Wicksell first analyses a pure credit system (Wicksell 1978 p.194; cf. Wicksell 1965 p.109). The production period model is again used to explain how a money interest rate lower than the natural rate produces higher prices and over the course of the following two pages Wicksell uses this model to show that the increased prices are permanent and cumulative. An explicit reference is made to *Interest and Prices* on this point and Wicksell also alludes to the analogy of the pendulum and the cylinder which is used in *Interest and Prices* to describe the determination of the absolute price level especially under the assumption of a pure credit system (Wicksell 1978 pp.196-197).

Wicksell, however, drops the assumption of pure credit money in order to describe the ultimate determination of the absolute price level and the forces that determine the equilibrium value of the money rate of interest. The role of exogenous metallic reserves in bringing the money rate into equality with the natural or normal rate and stopping the rise in prices is clear from the following passage :

"Frequently commodity prices therefore rise continuously [due to an increase in the real rate relative to the money rate], business requires greater cash holdings, bank loans increase without corresponding deposits, bank reserves, and often bullion reserves, begin to fall and the banks are compelled to raise their rates somewhat, though this does not prevent the continuous rise in prices, until the interest rates have reached the level of the normal rate" (Wicksell 1978 pp.206-207).

The final result is the determination of the absolute price level by the quantity of the reserve asset. This quantity represents the counteracting forces which operate on the cylinder and which fix absolute prices at their equilibrium level.

Laidler's interpretation that Wicksell focuses on developing a real balance effect to strengthen the Quantity Theory, is not, therefore, supported by a careful examination of Wicksell's overall argument. It is also the case that there is no discussion of any theoretical significance in *Lectures II* that is not present in *Interest and Prices*. It is, therefore, also hard to agree with Chiodi that *Lectures II* represents a change in viewpoint from *Interest and Prices*. In both works Wicksell contrasts simple trade credit (direct finance) with the operation of banks (intermediated finance) to show how banks alter velocity and to introduce institutional interest rates. Indeed it has been argued that this method of focusing on velocity is central to the argument of *Interest and Prices*. It is also clear that Bailey's suggestion that *Interest and Prices* does not deal with outside money cannot be supported. In this sense there is no development in Wicksell's thinking from *Interest and Prices* to *Lectures II*.

Conclusion

This paper has confirmed Patinkin's view that Wicksell was an advocate of the Quantity Theory of Money but that he was also critical of some of its aspects. It has, however, been argued that Laidler's account of Wicksell's criticism is incorrect. Wicksell was *not* critical of the absence of a thoroughly worked out real balance effect in the Quantity Theory but of the absence of a clearly articulated role for interest rates. This role, for Wicksell, is a complex one, involving not a single interest rate but a relation between the money rate of interest and the natural rate of interest. The connecting link between these two rates is the absolute price level.

This is why it is crucial, from Wicksell's perspective, to understand the behaviour of these rates if a correct theory of prices is to be developed.

Commodity prices can only act as the bridge between the money rate and the natural rate because investment spending is interest rate sensitive. Wicksell first uses the idea of a *cumulative process* to show that changes in the *short term* rate have an effect on spending, and therefore prices, in *addition* to the effect exerted when the *long rate* changes. The cumulative process is thus used to strengthen the effect of interest changes on prices. While this view of the cumulative process is very closely connected with the common perception of it as describing the overall affect of interest rate changes on prices, it is a good deal more specific in its purpose within Wicksell's exposition than is commonly supposed.

It has also been argued that Wicksell conducts his explanation of the cumulative process within the framework of a pure credit model for pedagogical reasons. In such a pure credit model, there is no fixed monetary quantity against which leverage can be applied against the money rate of interest to bring it into equality with the natural rate. Prices, consequently, rise or fall without limit. The impact on prices, of differences between these rates may, therefore, be seen clearly within such a model. Ultimately however, the existence of a fixed quantity of some monetary base which locks absolute prices at a particular level is acknowledged by Wicksell. While this argument is most clearly and systematically elaborated in *Interest and Prices*, Wicksell's approach in *Lectures II* follows the same chain of reasoning and contains no fundamental difference in its central monetary propositions.

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Notes

- ¹ Henceforth referred to as *Lectures II* following Chiodi (1991 p.14) and Patinkin (1965 p.582).
- ² Pivetti's argument is quite intricate. It compares Keynes' system with Wicksell's and argues that the difference is not great because they both contain the idea of a natural rate of interest. In Keynes' system some rigidity is ultimately needed to stop gravitation of the money rate of interest to the natural rate in order to generate unemployment. Pivetti suggests that there is no automatic mechanism in Wicksell's system to achieve equality of the two rates and to this extent Keynes' theory simply rehearses Wicksell's. Since it is only in the case of endogenous money that there is no gravitation of the two rates to equality in Wicksell's approach, Pivetti appears to have in mind that Wicksell offers a workable neoclassical model which contains endogenous money.
- ³ The issue of any development in Wicksell's thinking is not helped by the fact that Wicksell wrote in Swedish and was translated into English on later occasions. Pivetti (1987 p.915) sets out Wicksell's works in a most helpful manner. *Interest and Prices* was originally published in 1898 as *Geldzins and Guterpreise*. It was translated into English by R.F. Kahn and published by Macmillan in London in 1936. It was then reprinted in 1965 and published by Augustus Kelley in New York. Also in 1898 a paper entitled "The Influence of the Rate of Interest on Commodity Prices" was written. This was the basis of a paper read before the British Association in 1906 and published in the *Economic Journal* in 1907 as "The Influence of the Rate of Interest on Prices". The two volumes of *Lectures on Political Economy* (or *Forelasningar i nationalekonomi*) were originally published in 1901 and 1906 respectively. The third Swedish editions of these volumes were translated into English by E.Classen and published by Routledge and Kegan Paul in London. Volume I was published in 1934 and Volume II was published in 1935. They were reprinted and published by Augustus Kelley in Fairfield N.J. in 1978. There is not therefore a particularly long period of time between the original publication of *Interest and Prices* and *Lectures II* in which a development of thinking may have taken place.

- 4 This concept of the real balance effect is central to the work of Patinkin who quotes this precise passage from Wicksell noting the "... vividness with which the real-balance effect is here described" (Patinkin 1965 p.582). But this is the only passage in Chapters 5 to 8 of *Interest and Prices* in which Wicksell mentions this effect and it will play no part in his own version of the Quantity Theory as developed in those chapters. It should also be noted that Patinkin does not attempt to argue that Wicksell's work did contain a clear exposition of the real balance effect. He merely indicates that the concept is present in Wicksell's writings but that Wicksell does not appear to have properly understood it.
- 5 Wicksell does not state explicitly that these are the most important of the obstacles to trade credit extension. He lists all of the obstacles in discursive fashion (Wicksell 1965 p.61) and explains how each one limits velocity. At the beginning of the following section, he recounts only two of these and argues that they are overcome by banking. It can be deduced that he regards these as the most important because banking (which overcomes them) allows velocity to be increased almost without limit and also because, by their nature, the other two obstacles can be seen to be relatively unimportant. These other obstacles are the relative poverty of most people who would not thus be granted access to credit and the fact that very wealthy people will from time to time wish to temporarily hold money while they rearrange the form in which their wealth is held and give consideration to asset choice. Credit is thus inappropriate to meet this demand.
- 6 cf. Wicksell 1965 p.43 "[The supporters of the Quantity Theory] sometimes in fact express themselves as though the quantity of money, or of that part that at any moment finds itself in the hands of the public, must act as a *direct* and *proximate* price-determining force. That, of course, is putting the matter the wrong way round, and is open to a simple line of criticism" (original italics). The simple line of criticism to which Wicksell refers is that associated with developments and variations in velocity, as discussed above.
- 7 This formulation of the argument makes sense of an earlier statement in *Interest and Prices* which at first reading seems a surprising one from a Quantity Theorist. Wicksell (1965 p.43) had suggested that it was wrong to argue that a greater issue of notes causes a proportional increase in prices. This would put the matter the wrong way around and such an argument would have too much in common with the arguments of Tooke and Nasse, that higher prices require higher monetary circulation. Wicksell's point is much clearer in the light of the analysis of pp. 87-95 of *Interest and Prices* as summarised above. There is no causation between additional money and higher prices one way or the other. Both are the consequences of a third causal factor, namely the reduction in interest rates, or in Wicksell's parlance "easier credit conditions".
- 8 The price of a 90 day bill of face value \$100,000 is given by the following expression: $P_B = \frac{100,000}{(1+r \frac{90}{360})}$, where r is the 90 day rate of interest. Thus if the 90 day rate is 4% $P_B = \$99,009.90$. If this rate falls to 3% $P_B = \$99,255.58$. The profit identified above is the difference between these amounts.
- 9 To see that changes in the long rate have a larger influence consider a fourth case similar to Case 1 above, except that a loan term of three years instead of three months is involved. The value of a bullet security with such a term would be \$89,285.71 for a face value of \$100,000 at 4%. If the rate fell by 1%, the value of the security would increase to \$91,743.11. The potential profit from the rate change would therefore be \$2,457.40 and if this profit were used to bid up the prices of the commodities the security was used to finance, an increase of 2.75% in these prices would be possible. In Wicksell's words: "... a casual and temporary change in the discount rate would not in itself exert any marked influence on prices" (Wicksell 1965 p.92). "This, it may be noted, is in itself a reason for not expecting any precise correlation between movements in the discount rate and in commodity prices. The direct influence of the one on the other is at first trivial and may easily be masked by other factors or altogether annulled. But as soon as the long-term rate of interest moves in sympathy, and provided that conditions remain otherwise unaltered, prices suddenly rise and the whole world knows that 'the upward phase' has started" (Wicksell 1965 p.93).
- 10 Laidler (1972 p.137) has described this as "... close to a fully developed Keynesian circular flow model of income determination in disequilibrium". While it is difficult to agree that Wicksell's model is Keynesian in any theoretical sense, it does represent a circular flow framework similar to that used in Keynesian theory.

- ¹¹ Chiodi (1991 p. 17) assumes that $\$W + \$R = \$K' < \K . Chiodi will be followed in this respect which implies that $\$M$ (managerial income) = $\$K - \$K' = \$K''$.
- ¹² This assumption is built into the fact that there is only one productive sector.
- ¹³ Assumptions will simply be made about the state of the money market for the moment. Equilibrium in this market will be the subject of later discussion.
- ¹⁴ The ownership of these deposits creates some accounting complications in terms of assigning the interest income they receive. The simplifying assumption made here is that the interest for the whole period is assigned to the capitalist who at some stage owns the deposit. Clearly as the deposit is spent, its ownership changes and so the interest for the period should be allocated to all who hold it in proportion to the length of holding. This would alter the distribution of interest income but it would not change the overall level of income for the economy in the particular period in question. Since it is with the latter that we are concerned in this investigation, the assumption is a satisfactory one.
- ¹⁵ That is, the old demand plus the profit that entrepreneurs made in the last period.
- ¹⁶ In *Lectures II* Wicksell makes it clearer that the supply of capital is determined by the rate of saving and he couches the explanation of the natural rate explicitly in these terms: "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 newly created capital, will then be the normal or natural real rate" (Wicksell 1978 p.193). The concept of saving is certainly important in *Interest and Prices* but is slightly less explicit.
- ¹⁷ Wicksell (1978 p.196) does in fact argue that interest rates *may* play some role in disseminating an increased production of gold.

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