

Pigou and Buffer Effects in Monetary Economics

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I. Introduction

In 1943 *Pigou* launched his famous counterattack on *Keynes*, suggesting an alternative to the Keynesian link between real and monetary aggregates. As *Hicks* (1937) had explained earlier, the Keynesian link means that, given simplifying assumptions, investment levels depend on interest rates. Now, this indirect link between money and economic activity has become a standard ingredient of economic textbooks in the form of the well-known IS-LM model. Yet *Pigou* had suggested that money can also have a major direct effect on economic activity. As prices fell – as happened in the 1930s – the real value of cash balances would increase, he argued. This would boost wealth and hence private expenditure.

This direct transmission of money to real aggregates was not just an alternative to the Keynesian indirect transmission. It was a conscious effort to restore by a new way the self-equilibrating forces of the classical economy, which *Keynes* had sharply criticised in 1936. Although *Pigou* himself did not elaborate this point, the policy implications of his effect were far-reaching. It provided a rationale for governments not to intervene in a depressed economy but to rely on “automatic” recovery.

The concept of the *Pigou* or real balance effect was elaborated by, e.g., *Modigliani* (1944) and *Patinkin* (1948). Relevant is also that in the 1950s and 1960s, *Keynes*’s liquidity preference theory was developed and put within a wider context by *Tobin* (1958, 1971) and *Gurley and Shaw* (1960) in their portfolio balance approach and by *Brunner and Meltzer* (1963) in their wealth adjustment theory. An implication of these more general theories was that wealth effects would influence real aggregates. This actually gave the *Pigou* effect a more general and more refined theoretical foundation, even if it was not presented as such.

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Yet the *Pigou* effect never achieved such popularity as the Keynesian IS-LM model. One major reason for this seems to be that a dispute about what should be the proper definition of the wealth component of the Pigou effect has been going on for the last forty years. Another reason is presumably that Pigou took the functioning of the monetary sector for granted, whereas the IS-LM model provides some obvious starting points for further progress in analysing monetary phenomena. At the same time a substantial body of empirical literature has grown, dealing with a direct impact of money on real aggregates without referring to the Pigou or – more general – some wealth effect. As a rule these studies use some ad hoc arguments for the inclusion of a money or liquidity ratio in expenditure equations which touch only in some respects on the Pigou effect.

Such empirical use fits well into another growing body of literature, dealing with the so-called “buffer stock approach” to money. In the buffer stock approach, summarised and elaborated by *Laidler* (1984), money functions as a buffer when sudden changes occur in financial markets. For example, an excess supply of money would not only cause interest-rate adjustments but also non-price quantity adjustments – called buffers – in money. These buffers would spill over into real aggregates. The theoretical background of buffer stock monetarism is supplied by disequilibrium analysis which suggests that tension between supply and demand in a market need not always lead to price adjustments in order to attain an optimal position in the long run. The buffer stock approach to money differs from present-day monetary theory, which says that the price mechanism – i.e. interest rate changes – is a sufficient condition for equilibrating supply and demand in financial markets.

The present study seeks to show how the buffer stock approach to money relates to the *Pigou* effect. It will argue that the buffer stock approach provides a better theoretical underpinning of a direct link between monetary and real aggregates. This is the more important because both the Pigou and buffer effects can have important policy implications. The plan of this paper is as follows. First, the Pigou effect will be discussed in some detail in section II. Section III will deal with the direct link between money and real aggregates as follows from the buffer stock approach. The topic of section IV is the extent to which monetary buffers and the Pigou effect are similar or different theoretical concepts. Section V will set out some tentative conclusions as to the policy relevance of both the Pigou and buffer effects. Section VI, finally, will contain some concluding remarks.

II. The Pigou Effect

The *Pigou* effect can be summarised as follows. Money can have a direct effect on private expenditure. As a reason Pigou suggested that, as prices fall, the real value of the stock of money will rise, causing an increase in private consumption. The Pigou or real balance effect was a breakthrough in monetary economics for three reasons. First, it could be regarded as the precursor of the wealth effects suggested by *Tobin*, *Gurley* and *Shaw* in their “portfolio balance approach” and *Brunner* and *Meltzer* in their “wealth adjustment theory”. Second, the Pigou effect offers a new and wider interpretation of the classical direct transmission of money to nominal income. *Patinkin* (1972, p. 14) was quite right in saying that the Pigou effect “... is of much older origin. In particular, it is implicit in classical theorising on the quantity of money”. Yet in the long run the classical analysis suggests that extra money has only nominal consequences, in that it boosts inflation. *Patinkin* admitted, therefore, that the new element of the Pigou effect lay in the direct impact of money on real aggregates with lasting consequences. Third, the Pigou effect offers an alternative to the indirect Keynesian link between monetary and real aggregates as follows from the IS-LM model. This is important because Pigou thus circumvented the Keynesian “liquidity trap”. Moreover, economic literature provides certainly no overwhelming evidence for a strong interest rate sensitivity of real aggregates. Hence the importance of a direct link between money and real aggregates should not be underrated. Pigou (1943, p. 351) himself concluded his famous article by saying: “I have been concerned to show that, in given conditions of technique and so on, if wage-earners follow a competitive wage policy, the economic system must move ultimately to a full-employment stationary state which is the essential thesis of the classicals”. So the new direct transmission channel was explicitly not intended as an expansion or refinement of the indirect Keynesian transmission channel but as an alternative with extremely important policy implications.

The question of what should be the proper definition of the wealth component of the *Pigou* effect became an important issue in economic literature. Pigou (1943) himself was rather implicit on this point, using the term “stock of money” without defining it. Most of the economists who did elaborate the Pigou effect empirically, have therefore interpreted Pigou’s reference to “money” against the background of the most commonly used definition of money at the time when his article was published. This was the narrowly defined money supply – M1, the sum of currency and demand deposits.

Yet we have here a major problem which *Pigou* neglected. Only a few months afterwards, *Kalecki* (1944, p. 132) argued in a comment on Pigou

that “The increase in the real value of the stock of money does not mean a rise in the total real value of possessions if all the money (cash and deposits) is “backed” by credits to persons and firms, i.e. if all the assets of the banking system consist of such credits ... the total real value of possessions increases only to the extent to which money is backed by gold”. Kalecki added in a footnote that, apart from gold, this held good for government securities too, but that he confined himself to gold because the classicals, including Pigou, used to abstract from the existence of national debt.

Kalecki continued by arguing that a big fall in prices would increase catastrophically the real value of debts and would consequently lead to wholesale bankruptcy and a confidence crisis. As to the latter, Kalecki presumably bore in mind Fisher (1933, 1935) who in the 1930s developed the “debt-inflation theory of great depressions” which said that, in a situation of overindebtedness, the liquidation of debts (i.e. a reduction of money supply) could not keep up with the price fall it caused. This would set off a downward spiral which Fisher (1933, p. 350) characterised as “... the mass effort to get out of debt sinks us more deeply into debt”. Tobin (1980, p. 9) therefore observed that “... Irving Fisher, had reached a diagnosis precisely the opposite of Pigou’s”.

After Kalecki, Patinkin (1948, 1956, 1969, 1972) went much deeper into a proper definition of the Pigou effect. In his 1948 article – in which he introduced the term “Pigou effect” – he emphasised that the stock of money relevant for the Pigou effect was completely different from money defined in the usual manner as the sum of currency and demand deposits. In Patinkin’s opinion money in the form of demand deposits should be excluded from the Pigou effect because it is backed by bank loans and discounts, meaning that gains of deposit holders are offset by losses of bank debtors. Patinkin (1948, p. 551) concluded: “Thus the net effect of a price decline on demand deposits is reduced to its effect on the excess of deposits over loans, or (approximately) on the reserves of the banks held in the form of hand-to-hand currency. Finally, hand-to-hand currency held by individuals outside the banking system is added in ...”. Here Patinkin suggested that base money should be the proper money component of the Pigou effect. This is in line with Kalecki who did not talk about bank reserves and currency held outside banks (which is base money defined in the standard way), but about its mirror image, gold (which by Kalecki’s criteria is the only source of base money).

In 1969 and 1972, Patinkin related the question of the proper definition of the Pigou effect to further developments in economic literature. Then he introduced into the discussion what he, following Gurley and Shaw (1960),

called “inside” and “outside” money. Patinkin (1972, p. 146) defined “inside money” as “... that part of the money supply which is generated by a fractional reserve banking system in its normal process of creating deposits by credit expansion. Hence this money does not represent a net asset of this sector”. In other words, “inside money” is the portion of the money supply coming into circulation on account of the “money multiplier”. Patinkin (1972, p. 146) defined “outside money” as “... what *Milton Friedman* and *Anna Schwartz* have denoted as ‘high-powered money’ – a term which they choose in order to underline the fact that this money represents the actual or potential reserves of the banking system, and hence the basis of a possible multiple expansion of the money supply”. According to Patinkin (1972, p. 163), a monetary expansion which does create a wealth effect is, by definition, one caused by an increase in outside money.

The contention that outside or base money should be the proper definition of net wealth was challenged by *Pesek* and *Saving* (1967) who said that total money represented the wealth of the community so that also bank money was net wealth. All this led to a lively discussion as can be found in *Marty* (1969), *Johnson* (1969), *Friedman* and *Schwartz* (1969), *Patinkin* (1969), *Saving* (1970, 1971), *Hynes* (1974), *Pesek* (1976, 1977 a, 1977 b), *Mayer* (1977) and *Dean* (1977). We can conclude from this discussion that the arguments initiated by *Kalecki* and *Patinkin* for making the base money notion the proper standard of net wealth, seem more tenable than the broader notions in the spirit of *Pigou*’s original proposal. It should be emphasised, however, that the final word has not yet been spoken. Even if one adopts base money as the proper money component of the *Pigou* effect, the question remains whether non-monetary government debt should be included or not, as is shown by *Barro* (1974, 1976) for example. Only to the extent that the public does not anticipate governmental tax increases to pay off outstanding debt, government debt represents wealth to the private sector. *Buchanan* (1976), *Feldstein* (1976) and *O’Driscoll Jr.* (1977) discussed the plausibility of this contention. As reconfirmed by *Tobin* (1980, p. 6 and 7), this debate has been going on since *Ricardo* (1817).

Definition of net wealth raises more unresolved questions. *Laidler* (1969), for instance, deals with the arguments for and against including human capital in wealth. Under certain conditions such inclusion can erase the distinction between inside and outside money. Recently *Thornton* (1983) argued that perfect competition in the banking industry is a necessary but not sufficient condition for excluding bank money from society’s net wealth. *Patinkin* too, has changed his view in the course of time, saying (1972, pp. 184 and 189 - 190) that the difference between outside and inside money is no longer

a relevant distinction for a wealth effect when assumptions on imperfect competition or imperfect foresight are included. What really matters is not whether the issuer of money is the government or the private banking sector, but whether there are costs involved in maintaining the stock of money at a constant level. At the same time Patinkin (1972, p. 190) does admit that, in general, such costs are negligible with reference to gold or fiat money (i.e. outside money). However that may be, only more theoretical and empirical research can help us find conclusive answers to these questions. Current economic literature, though, suggests that the money component of the *Pigou* effect should include base money at any rate. A possible inclusion of non-monetary government debt must be handled with care. Just using “money”, as e.g. M1, is open to serious theoretical objections.

So far, so good. Up till now nothing has been said that would warrant fundamental rejection of the *Pigou* effect. A direct impact of somehow defined money on real aggregates still holds. Yet the theoretical foundation of this direct transmission channel itself is the weak link in the arguments supporting the *Pigou* or real balance effect. This weakness is rooted in the important implicit assumption underlying the *Pigou* effect, that the monetary sector is in equilibrium. In such a world there is no decisive reason for a direct impact of “money” on real aggregates. In fact, such a transmission could simply be represented by relative prices in financial and real markets. Against this background it is no coincidence that as a rule supporters of the portfolio balance approach and wealth adjustment theory suggest the use of relative prices – inter alia through the so-called “equity effect” – as the appropriate transmission channel for linking financial and real markets through wealth effects. See, for instance, *Tobin* (1963), *Brunner and Meltzer* (1963) and *Spencer’s* (1974) review of this issue. *Mishan* (1958, p. 116) explicitly rejected the *Pigou* effect – which he called the “asset-expenditure” effect – by saying that in a classical interest-flexible system such effect has no impact whatsoever at the aggregate-income level. Given the foregoing, it can be argued that the theoretical underpinning of the direct transmission of money to real aggregates ought to include other – non-wealth – arguments. It is emphasised, however, that what is denied is not the validity of the *Pigou* effect itself, but the claim that this effect should work essentially through relative prices. For this reason it should not be regarded as a well-founded direct monetary transmission channel.

III. The Buffer Effect

The buffer effect is an alternative, non-wealth, direct transmission of somehow defined money to real aggregates. Its roots can be found in the working of the monetary sector itself, starting from the contention that money can function as a buffer stock. In monetary economics this contention is relatively new. Recently *Laidler* (1984) devoted his entire “Harry Johnson Lecture” to this issue. He showed that many studies dealing implicitly or explicitly with “money as a buffer stock” can be brought together in one theoretical concept. According to *Laidler* (1984, p. 32), the theoretical basis of the buffer stock approach is “... well developed and simple, and it has already withstood a good deal of empirical testing”. He ended his lecture by saying that this approach “... ought to be taken seriously, not least by those looking for a starting point towards further progress in monetary economics”. Apart from *Laidler* (1984), *Jonson* (1976), *Knoester* (1975, 1979a, 1984) and *Goodhart* (1982, 1984) explicitly discuss the theoretical backgrounds of the buffer stock approach. Elements of this approach are found moreover in *Judd* and *Scadding* (1981, 1982) and *Andersen* (1984) who deal with monetary disequilibria in money demand functions. The main characteristics of the buffer stock approach can be summarised as follows.

The key proposition of buffer stock monetarism is that the price mechanism does not induce a complete clearing between money supply and demand. Apart from price adjustments, so-called “non-price-induced quantity adjustments” imply additional tendencies towards a new equilibrium. Such quantity adjustments occur because money serves not only as a means of exchange or as a wealth component, but also as a buffer stock to absorb sudden changes in money supply and demand. So the buffer stock approach differs in an essential part from present-day monetary theory, such as the portfolio balance approach and wealth adjustment theory because the latter are founded on a Walrasian system of balance sheet identities in which the price mechanism provides a complete clearing of all financial markets.

The microeconomic arguments for the buffer stock approach are certainly not completely new. As a matter of fact, there are many similarities to broadly accepted behaviour in economics. In analyses dealing with real phenomena non-price-induced quantity adjustments are common sense. Well-known examples are so-called “undesired” changes in inventories, “home pressure of demand” in relation to foreign trade, the “discouraged worker effect” in the labour market and, last but not least, the effect of “excess capacity” on the demand for labour, implying the possibility of Keynesian unemployment. Even in monetary economics non-price quantity

adjustments can be traced. Especially the theory of credit rationing, as discussed e.g. by *Jaffee* (1971), *Jaffee and Modigliani* (1969) and *Koskela* (1983), offers some obvious starting points.

The microeconomic arguments for the buffer stock approach are in line with present-day disequilibrium analysis. They can be summarised as follows:

- First, economic agents will have considerable difficulties in constructing reliable forecasts because they live in a world of uncertainties. In such a climate it may be attractive for them to accept a short-term position that seems suboptimal at first glance, in order to achieve an optimal position in the long run.
- Second, collecting data and making decisions takes time, money and energy. So for most economic agents, action in the spirit of the Walrasian continuous clearing case, with daily or even hourly reactions to completely flexible prices, will in practice be the exception rather than the rule. There are, of course Walrasian agents on Wall Street, in Chicago and Amsterdam who trade in shares, gold and currencies, or options on them, but it seems doubtful if the average economic agent seeking e.g. to raise money on a mortgage or to finance a new plant, is of the Walrasian kind.
- Third, technical bottlenecks can frustrate transactions. Examples of such bottlenecks in financial markets are regulations on international capital flows, cartels and ceilings on foreign liabilities.
- Fourth, in financial markets “normal” behaviour can be greatly influenced by changes in risks. For instance, a rise in interest rates can increase the risk of debtors finding themselves unable to repay loans. This line of argument has been discussed in detail in the literature on credit rationing. Moreover, there is the risk of monetary authorities trying to offset certain “market-induced” developments.
- Fifth, even if markets clear at a micro level, aggregate data may not always reflect the relevant information adequately. For example, interest rates aggregated over relatively short periods may already conceal underlying volatile daily rates correlated with daily fluctuations in money market tensions. This might be an additional reason for economic agents not to react only to measured interest rates, but, apparently, also to non-price indicators representing the “monetary climate”.
- Sixth, banks may find it useful to seek stable relations with their customers in the long run. So they may refrain from passing every interest rate increase on to their debtors immediately, but try instead to attain

optimum portfolios in the long run not only by price, but also non-price quantity adjustments.

All these reasons suggest that non-price quantity adjustments of financial assets can be seen as normal and calculated behaviour in monetary economics. This does not mean, of course, that the price mechanism is altogether irrelevant. On the contrary, all disciples of the buffer stock approach believe that this classical mechanism must continue to play a major role in equilibrating supply and demand in financial assets. The relevant point is, though, that there is another equilibrating mechanism in addition to the classical one, namely non-price-induced quantity adjustments or operation of the buffer mechanism. As shown by the afore-mentioned microeconomic arguments, the operation of the buffer mechanism implies a reaction of money to monetary pressure not expressed in interest rates.

An example of an indicator for such pressure can be found in *Knoester* (1979a, 1984) and *Knoester and Van Sinderen* (1985), where it is defined as the growth rate difference between redefined base money and nominal sales. Redefined base money stands for the limit of the long-term money supply or, in other words, for monetary capacity. The term nominal sales stands for the short-term demand for money which is needed anyway. The suggested indicator for monetary pressure or monetary excess capacity represents the buffer variable. As will be discussed later, alternative definitions of the buffer variable are possible. Yet the key characteristic of this variable should be clear, being the difference between long-run money supply and short-run normal money demand. It should be emphasised that the buffer variable shows some striking similarities to the usual indicator for non-price pressure in the market for goods, viz. the utilisation rate defined as the difference between short-run demand (actual production) and long-run supply (production capacity).

The buffer variable is a determining element in the demand for and the supply of money. For example, when base money grows faster than nominal sales, part of the evolving “excess supply” will be temporarily hoarded by the public in demand and time deposits, and by the banking system in free reserves and net foreign assets. As a result of the then occurring buffers, demand for money increases whereas money supply decreases. Not only the buffer mechanism, but also the price mechanism will induce adjustments towards a new ex post monetary equilibrium, because the interest rate will tend to fall. Once an ex post equilibrium has been reached due to the simultaneous operation of the two mechanisms, this type of equilibrium can be defined as the monetary sector in quasi equilibrium. The word “quasi” denotes that an ex post equilibrium between money supply and demand is

the result not only of the price mechanism but also of the buffer mechanism. Of course, this monetary quasi equilibrium is also reflected in interest rates. In such a world interest rates differ from those that would have obtained in a Walrasian economy. It seems interesting to note that according to *Hines* (1971, Ch. 4) and *Visser* (1980, p. 249), monetary disequilibria may reconcile the “liquidity preference” and “loanable funds” theories on interest rates.

An important implication of the buffer approach are its consequences for the transmission of monetary impulses to real aggregates. It provides a theoretical basis for a direct transmission of money to real aggregates, which is not based on wealth effects in the spirit of the *Pigou* effect. The only step we have to make is to combine the buffer mechanism with what is a usual feature of markets in disequilibrium, namely the so-called “dynamic intermarket pressures” or “spillover effects”. As shown by e.g. *Tucker* (1968) and *Negishi* (1965), these terms mean that non-price-induced pressure in a market can lead to a certain spillover into other markets. For monetary analysis, vide in particular *Patinkin* (1956, pp. 178 and 266) who says that, since the very function of money is to be spent on both commodities and bonds, dynamic intermarket pressures (spillover effects) become the very essence of any analysis concerned with the money market. Following this line of reasoning, monetary buffers will spill over into other markets, which provides an alternative direct effect of money on real aggregates. Empirical evidence for such buffer effects can be found e.g. in *Jonson* (1976b), *Knight* and *Wymer* (1978), *Coghlan* (1981), *Knoester* (1979a), *Knoester* and *Van Sinderen* (1985) and *Davidson* (1984).

It is emphasised that, in empirical analyses, inclusion of a direct impact of money on real aggregates is a common practice. As a rule one uses a money or liquidity ratio based on ad hoc arguments which touch in some respects on the real-balance effect. For examples, see *Suits* (1962), *Duesenberry* et al. (1965), *Goldfeld* (1966), *Fair* (1976), *Verdoorn* et al. (1970), the *Bank of England* (1979) and *Den Butter* (1983). The said spillover of the buffer effect provides an additional theoretical background for such a procedure.

IV. Similarities and Differences between the Pigou and Buffer Effects

The impact of the *Pigou* and buffer effects on real aggregates is based on different theoretical concepts. The *Pigou* effect represents a wealth effect, whereas the buffer effect represents the spillover of monetary pressure not reflected in interest rates. The fundamental underlying hypothesis of the buffer stock approach is the denial of the continuous clearing case by price adjustments in monetary markets. So, according to buffer stock monetarists,

the portfolio balance approach or wealth adjustment theory is not irrelevant but needs revision through inclusion of the possibility of non-price-induced quantity adjustments (i.e. the buffer mechanism). It should be emphasised that the buffer stock approach also rejects the central proposition of new classical economists, who believe in a quick and smooth working of the price mechanism in all markets including the financial ones. *Laidler* (1984, p. 23) points out in this respect that “For the neo-Austrian, the real balance effect which lies at the heart of our stability experiment guarantees that a discrepancy between the supply and demand for money will not persist for any interesting time interval; for the buffer stock advocate, the same effect is made manifest in the movement over time of the macro variables in which he and every other macroeconomist is interested”.

Another difference between the *Pigou* and buffer effects touches on the relevant counterpart in somehow defined money. In the case of the *Pigou* effect this counterpart is the inflation rate, so as to define the real balance effect. In the case of the buffer effect the relevant counterpart is not the inflation rate but normal money demand represented by nominal sales or national income. This different treatment in defining the direct transmission channel is the logical consequence of the said different theoretical backgrounds of both approaches. According to the *Pigou* disciples, there is nothing wrong with the monetary sector itself. There, the working of the price mechanism equals supply of and demand for financial assets which provide a certain nominal wealth. This wealth increases in real terms, e.g. when prices fall. So the incentive behind the *Pigou* effect lies in comparing two different worlds, viz. the monetary sector implicitly being in equilibrium on the one hand and prices of real aggregates on the other. However, the heart of the buffer effect lies in the monetary sector itself, because it is based on the proposition that the price mechanism does not by any means provide a sufficient condition for equilibrating money supply and demand. In addition, non-price quantity adjustments occur, which provide a rationale for monetary spillover effects on other markets. Such buffer effects reflect disequilibrium positions in the monetary sector, whereas the *Pigou* effect reflects the discrepancy between money in equilibrium and the inflation rate. This difference implies that, in modelling the buffer effect, not the inflation rate but a proxy for normal money demand – like nominal output or nominal sales, including real output – is the relevant counterpart of the money component of the buffer variable.

A third, but related difference between the buffer and *Pigou* effects concerns the theoretical underpinning of the direct impact of “money” on real aggregates. As pointed out before, there is no decisive theoretical argument

for the Pigou effect, because such wealth effects can just as well be represented by relative prices. However, the key element of the buffer effect is that it cannot be represented by relative prices. By definition the only way to model the buffer effect is by using a proper indicator for the spillover of non-price-induced quantity adjustments, which implies a direct transmission of money to real aggregates.

There are not only differences between the *Pigou* and buffer effects but also important similarities. The main similarity is, of course, that both the Pigou and buffer effects suggest a direct impact of money on real aggregates. An interesting question is, what in both approaches should be considered the proper definition of money. As for the Pigou effect, a great deal has already been said in the foregoing. Starting with *Kalecki*, many authors have discussed the proper definition of money in its meaning as the wealth component of the Pigou effect. In the main their conclusion has been that outside or base money should be used at any rate. Wider money definitions are debatable issues on serious theoretical grounds.

It should be emphasised that in defining the money component of the buffer effect too, some definition of base money is preferable. *Knoester* (1979, 1984) uses for this purpose a redefinition of base money for an open economy, including not only the central bank's open-market portfolio and international reserves but also potential base money hidden in net foreign assets of commercial banks. As said, this elaboration of the buffer effect – representing the pressure between long-term conditions for money supply and the short-run need for money demand – boils down to the contention that in the long run base money functions as the dominant determining factor for the supply of more broadly defined money aggregates.

The same argument can be used if we take the modelling of the *Pigou* effect as our starting point. Here *Patinkin* (1972, p. 151) enters the picture once more when he says: "... In summary, then, the secular and wartime monetary expansions in the United States during the past 80 years can be largely explained by corresponding increases in the quantity of outside money, which have represented corresponding increases in the net worth of the public". The notion that outside money, base money or high-powered money functions as the dominant determining factor for the long-term growth trend of money supply can be traced to several authors. See e.g. *Friedman* and *Schwartz* (1963) and *Cagan* (1965) for the U.S., and *Korteweg* (1973) for the Netherlands.

Are there any cases in which the *Pigou* and buffer effects are completely identical? This question cannot be answered with a simple yes or no. The answer depends on the chosen premisses. Consider for instance *Patinkin's*

economy in which outside money is the only asset. There, an autonomous increase in outside money will induce more net wealth which in turn leads via the Pigou effect to extra spending. At the same time, however, the increase in outside money will drive a wedge between the supply of money and the demand for money. According to buffer stock monetarists this will lead to monetary buffers on the demand side which will spill over into the commodity markets. Then extra spending results as a consequence of the buffer effect. If this spillover of monetary buffers were complete – which seems plausible but is not a necessary theoretical condition – then both the Pigou and buffer effects are identical. However, this is a special case. For a totally inside money economy, the exact opposite can be argued. Then economic agents can be still off the demand for money function, while there is no change in net wealth at all. That is the opposite limiting case without any overlap between the Pigou and buffer effects. It seems plausible to expect what really happens somewhere in between the two mentioned extremes. Thus the Pigou and buffer effects can overlap in different degrees in their empirical elaborations.

This seems to be the case also for another empirical question. As pointed out before, there are important theoretical differences between the uses of the inflation rate or nominal income as the relevant counterparts of the “money” component of the *Pigou* and buffer effects respectively. However, the quantitative difference between these two items will diminish in a stagnating and/or inflationary economy, because then the inflation rate will dominate the growth rate of nominal income.

This leads to the conclusion that there is also an area in which *Pigou* and buffer effects may overlap. This overlapping area is not primarily a theoretical but an empirical one. The main differences between both effects can be reduced to different theoretical foundations, which goes especially for the question of whether or not the price mechanism can clear monetary markets. Anyhow, the said differences and similarities between the *Pigou* and buffer effects suggest that on both theoretical and empirical grounds there is still a lot of work to do. An empirical question which – given the foregoing – deserves special attention is how to look at the use of more broadly defined money concepts like $M1$, $M2$ or $M3$ in buffer and *Pigou* effects. As suggested e.g. by *Buiter* and *Owen* (1979), *Jonson* (1976a), *Jonson* and *Trevor* (1981) and *Goodhart* (1982), disciples of both schools use such broader money definitions. Moreover, there is the common empirical practice of including either money or a money or liquidity ratio in equations for real aggregates based on some ad hoc arguments which only occasionally touch on aspects of the real balance effect.

In our opinion there may be empirical reasons for using broader money concepts, such as difficulties of quantifying net wealth or monetary buffers. However, such a procedure is not fully covered by theoretical arguments. The broader money concepts could be challenged on serious grounds. In the philosophy of the *Pigou* effect, a broad definition of money can be rejected because it covers non-wealth components. In the philosophy of the buffer effect, broadly defined money contains elements which have nothing to do with non-price quantity adjustments, let alone with the spillover of monetary buffers into real aggregates. So in both approaches, using some definition of base or outside money seems to be the better alternative for theoretical reasons.

Summarising, we find that there are significant similarities and differences between the *Pigou* and buffer effects. The main difference lies in their theoretical underpinning. The *Pigou* effect represents a wealth effect on real aggregates coming from a monetary sector in equilibrium. Actually, there is no decisive theoretical foundation for such a direct transmission mechanism, because wealth effects can be represented also by relative prices. The buffer effect represents the spillover of monetary non-price-induced quantity adjustments to real aggregates as follows from monetary disequilibrium. Here, disequilibrium analysis provides a theoretical foundation for the buffer effect. The main similarity between the *Pigou* and buffer effects is the joint proposition that somehow defined money will have a direct impact on real aggregates. In their empirical elaboration there is an area in which both effects may overlap.

V. Policy Implications of Pigou and Buffer Effects

A direct transmission of money to real aggregates can have far-reaching policy implications. *Pigou* (1943) himself argued that the suggested direct transmission of money to real aggregates would act as an automatic pilot, ultimately moving the economic system to a full-employment stationary state. Consequently, there would be no need for active government intervention in disequilibrium situations.

This attack on the Keynesian analysis has been challenged for various reasons. According to *Patinkin* (1948, p. 558), for example, it is impractical to depend upon the *Pigou* effect as a means of policy. In his opinion the required price decline could either be excessive or lead into an indefinite deflationary spiral. This is in line with the arguments of *Fisher* (1933) and *Kalecki* (1944).

Recently *Tobin* (1980, p. 19) wound up his discussion of the *Pigou* effect by saying "... The practical moral is that active policy, along with market response, is part of the social mechanism for maintenance or restoration of equilibrium". As *Lucas* (1981) showed in a review article, even new classical economists seem to feel no urge at all to include the *Pigou* effect as a standard ingredient in their analyses. To the best of my knowledge only *McCallum* (1983) analysed the *Pigou* effect within the context of rational expectations. However, he seemed to be primarily concerned not with strengthening the new classical case by including the *Pigou* effect as the forgotten cornerstone, but with using it as one possible element needed for dynamic stability in a rather special model, namely one with a liquidity trap, a *Lucas*-type "classical" aggregate supply function and rational expectations.

Obviously, present-day economic theory does not support a central role for the self-equilibrating forces of the real balance effect, which *Pigou* had in mind when he wrote his 1943 article. Consequently, the contention that the *Pigou* effect would by itself suffice for automatic movement towards the full-employment stationary state, is not an issue in debates on economic policy, but is seen as merely an academic question. It must be noted that the same holds even for *Pigou* himself. In his 1947 article he argued that his analysis held good only on the basis of the used assumptions. According to *Pigou*, it would be extremely improbable for his assumptions to be ever fulfilled in practice. In his words (p. 188) "... it is ridiculous to suppose that the public authorities would stand passive in the case of catastrophic disturbances ... Thus the puzzles we have been considering ... are academic exercises, of some slight use for clarifying thought, but with very little chance of ever being posed on the chequerboard of actual life".

All this suggests that the practical policy implications of the *Pigou* effect should not be exaggerated. With *Pigou*, no sensible policy-maker would rely exclusively on the self-equilibrating potential of this effect. The principal point is, however, that the *Pigou* effect suggests a direct impact of money on real aggregates. In the 1940s this was a pioneering contention, because the classical economists believed only in a direct impact of money on the inflation rate, whereas the Keynesians focused only on the indirect impact of money on real aggregates. Meanwhile, a number of empirical analyses indicate that a certain role for the *Pigou* effect can be seen as a plausible or at least as a debatable issue. Examples can be found in *Sinai and Stokes* (1981), *Tait* (1978), *Buiter and Owen* (1979), *Eggertsson* (1982), *Laidler and Bentley* (1983) and *Startz* (1984).

If there is a direct impact of money on real aggregates, the policy implications can be far-reaching. Just think of the discussions in e.g. the U.S., the

U.K. and the OECD in the early 1980s on whether and, if so, to what extent priority for fighting inflation by tight money policies would be at the cost of economic growth. One could answer this question, of course, in line with the well-known monetarist contention that money has only transitory effects on real output. But even transitory effects can do a lot of harm, especially if they appear to be permanent. Besides, given the admission that the *Pigou* effect cannot solve all economic problems, it is important to know for what goals of economic policy the possible direct impact of money on real aggregates will be most relevant. For closed economies these goals may be different from those of open ones.

Before discussing these matters in detail, it seems useful to revert to the afore-mentioned different theoretical concept for a direct impact of money on real aggregates, namely the buffer effect. As said, the buffer effect is not a wealth effect but a spillover into real aggregates of monetary tension not reflected in interest rates. For those who agree with the critics of the *Pigou* effect, the buffer effect may suggest an alternative theoretical foundation for a direct impact of money on real aggregates. It should be emphasised, though, that in the foregoing we have pointed out the main similarity between the two effects, which is the joint proposition of a direct transmission of money to real aggregates. We have also argued that there is no decisive theoretical foundation for the *Pigou* effect, because such wealth effects can be represented just as well by relative prices. Once again, what is at stake is not the validity of the *Pigou* effect itself, but the claim that it works through relative prices and not as a direct monetary transmission channel. Where the theoretical foundations of the buffer effect as a direct monetary transmission channel seem to be the more convincing, we will focus now on the policy implications of the buffer effect.

An important characteristic of the buffer effect is that, in principle, this direct effect of money on real aggregates can have lasting consequences. For instance, the pent-up monetary tension may spill over into private investment and consumption. As a result economic growth will decline, whereas unemployment will increase. Therefore, the economic consequences of the buffer effect may reach further than the afore-mentioned monetarist transitory effects. It seems useful to keep in mind that this contention is certainly not revolutionary. *Hahn* (1982, p. 61), for instance, said about the effects of a monetary impulse "... The claim that real effects are 'short run' is simply without scientific foundation ... One can leave it to a graduate student to construct simple models where the real effects of a single shock never die out". *Ferguson and Hart* (1983) concluded, less provocatively, that simulation experiments with a vigorous monetary shock in a disequilibrium

macroeconomic model clearly show that national product is very sensitive to the degree of spillover from the bond to the commodity market.

Yet here is a major problem which has some analogy to the features of inventory-cycle models for commodities as discussed e.g. by *Metzler* (1973). A central element in this discussion is what happens when the commodity markets go into disequilibrium. Then business inventories will function as a buffer to absorb real shocks. Such reaction creates a series of oscillations around a new equilibrium. According to *Metzler* (1973, p. 404) the cycle repeats itself, but each time with a smaller amplitude. Finally, a new equilibrium will be reached for income. Under specific conditions business inventories cannot alter the equilibrium of income which – according to *Metzler* (1973, p. 426 - 427) – depends only upon the propensity to consume and the amount of non induced investment.

One could argue that the same will hold for the functioning of the buffer mechanism. Indeed, monetary buffers can be interpreted as the occurrence in financial markets of behaviour which is common sense in analyses dealing with the inventory-cycle models for commodity markets. Resulting monetary buffers will induce oscillations around a new equilibrium for money demand and supply. However, there are no a priori reasons why such oscillations should lead to a new equilibrium exactly equalling the original one. Empirical evidence could help us find answers to this problem. In *Knoester* (1979) and *Knoester and Van Sinderen* (1985) empirical applications of the buffer stock approach to the Netherlands suggest that a once-and-for-all increase in monetary buffers will ultimately have no lasting consequences for the money stock or production level. However, lasting effects can be traced for international reserves. Simulations with permanent instead of once-and-for-all increases in monetary buffers indicate also lasting consequences for the money stock, economic growth and the inflation rate.

For a better understanding of the policy implications of the buffer effect it seems useful to discuss briefly the operation of the buffer mechanism. Readers interested in a more detailed description, are referred to *Knoester* (1984). Now, let us suppose an autonomous increase in money supply, say through open market purchases by the monetary authorities. According to the buffer stock approach, the excess supply of money, or monetary tension, will set in motion two different absorbing reactions. First, there is the traditional reaction through the price mechanism. This implies a falling interest rate and, consequently, an increasing demand for money and a second order decrease in the endogenous components of the money supply.

Such an tendency towards a new monetary equilibrium will be accompanied by a second simultaneous reaction through the buffer mechanism.

This means that part of the evolving monetary pressure will lead to buffers in the demand for money. In addition, commercial banks will hold buffers in the form of free reserves or net foreign assets, resulting in a lower endogenous supply of money. For the reasons pointed out in section III these monetary buffers are the non-price-induced quantity adjustments. As a result, money demand will be higher and money supply lower than they would have been without the buffer mechanism. Consequently, the interest rate decline caused by the open market purchases will be smaller than it would have been without the buffer mechanism.

Next, we have to consider what happens to real aggregates. First, demand picks up through the IS-LM mechanism, as the interest rate has fallen. In addition, however, monetary buffers will spill over into private investment and consumption. As a result of both mechanisms, economic growth will increase with feedback effects on money demand and supply as the monetary buffer tapers off. So thus far the effect on real aggregates of an autonomous increase in the money supply is a positive one. At this stage it is important to consider whether we are talking about a closed economy or an open one. In the abstract case of a fully closed economy, a question to be answered is whether the higher level of economic activity will induce a higher inflation rate. For the convinced monetarist the answer will no doubt be yes. *Kaldor* (1982, p. 45), however, suggests that this answer may be based on false premisses. In his opinion one should make a careful distinction between demand inflation (underlying the Walrasian world of monetarists) and cost inflation. According to Kaldor, in the real world cost inflation will be the dominant phenomenon. Following this line of reasoning, even in a closed economy, the buffer effect can have a lasting impact on real output.

Of course, the open economy is a much more fruitful starting point for discussion, because the facts of the 1970s and early 1980s suggest that even the U.S. economy is a significantly open one. We must therefore consider the balance of payments consequences of an increase in economic growth induced through the buffer effect. In open economies this leads to more imports of goods and services, so that the current account deteriorates. Hence, the initial excess money supply will leak abroad. To what extent it will do so, depends on the relative openness of the economy and on possible absorbing reactions of the capital account. If the leak is complete, as may be the case for small and very open economies like the Netherlands, an once-and-for-all increase in monetary buffers will have no lasting positive impact on real output. In this respect one can trace a similarity with the *Metzler*-approach of inventory models for commodities. In less open economies the

ultimate result will be a combination of more aggregate demand and a balance of payments deficit.

Detailed discussions of the policy implications of the buffer effect are found in *Jonson* (1976a), *Jonson and Kierzkowski* (1975), *Knoester* (1979), *Knoester and Van Sinderen* (1985), *Laidler and O'Shea* (1980), *Laidler and Bentley* (1983) and *Laidler et al.* (1983). For a related study which is not explicitly but implicitly based on the buffer effect – i.e. using the concept of monetary disequilibria – see *Sassanpour and Sheen* (1984). All these studies – dealing with the open economies of Australia, Canada, the Netherlands, France, Germany, the United Kingdom and the United States – suggest that direct effects of money on real aggregates will ultimately have important consequences for the balance of payments. So the buffer effect touches on important policy issues as raised, e.g., by *Meade* (1951) and *Mundell* (1968). Besides, the buffer effect provides causal relationships which may clarify the monetary approach to the balance of payments and exchange rates as pointed out by *Johnson* (1977) and *Frenkel and Johnson* (1976, 1978). *Laidler* (1984, p. 26) in this respect argues "... In the context of the macroeconomics of the open economy, the buffer stock approach is a natural complement to the monetary approach to balance of payments and exchange rate analysis". It is interesting to note that this contention seems to fit a conclusion drawn much earlier by *Nurkse* (1950, p. 16), namely that "... the basic function of international currency reserves is to serve as a 'buffer' giving each country some leeway for the regulation of its national income and employment and providing it with a means to soften the impact of economic fluctuations arising outside its borders". Roots of this contention can be found in *Nurkse* (1935).

VI. Conclusions

In economic textbooks the Keynesian indirect link between monetary and real aggregates is a standard ingredient. This indirect link runs through relative prices and is usually formalised in the well-known IS-LM model by an interest rate effect on investment. This paper deals with the less common direct link between monetary and real aggregates. It is shown that economic literature provides two main theoretical foundations for such a direct link. The first and oldest is the *Pigou* or real balance effect, which was introduced in the 1940s and represents the effects of changes in (real net) wealth on real aggregates. The second and latest foundation is the buffer effect which was introduced in the 1970s and early 1980s, representing the spillover of non-price-induced monetary quantity adjustments – i.e. monetary disequilibria

– into real aggregates. Our treatment of both effects covers the plausibility of their theoretical foundations, their similarities and differences and their policy implications. Our findings can be summarised as follows:

1. The direct link between monetary and real aggregates by means of the *Pigou* or real balance effect never achieved the popularity of the indirect Keynesian one. An important reason seems to be that a dispute over what should be the proper definition of the wealth component of the Pigou effect has been going on since the 1940s. From this discussion we can conclude that the money component of the Pigou effect should include base or outside money at any rate. Broader money definitions should be handled with care on serious theoretical grounds.
2. However, the most important theoretical weakness of the *Pigou* effect is its implicit assumption of monetary equilibrium. In such a world there is no need for a direct impact of money on real aggregates because such a link could simply be represented by relative prices which are the central element in the portfolio balance approach and wealth adjustment theory.
3. Meanwhile a substantial body of empirical literature has developed, dealing with a direct impact of money on real aggregates without referring to the *Pigou* effect. Such empirical use fits well into a growing body of economic theory dealing with the so-called “buffer stock approach” to money. The buffer stock approach suggests an alternative, non-wealth, direct impact of somehow defined money on real aggregates.
4. The key proposition of the buffer stock approach is that the price mechanism does not include a complete clearing between money supply and demand because financial disequilibrium can occur. Apart from price adjustments, so-called “non-price-induced quantity adjustments” imply additional tendencies towards a new equilibrium. Such quantity adjustments are called buffers, which are determining elements in the demand for and the supply of money. The microeconomic foundations of this behaviour are in line with present-day disequilibrium analysis.
5. The buffer effect shows some analogy to inventory models for commodity markets, where business inventories function as buffers absorbing real shocks. Monetary buffers absorb financial shocks, which has consequences for the real economy.
6. Monetary buffers will spill over into other markets, which implies a direct impact of money on real aggregates. Such a spillover effect – called the buffer effect – is similar to the so-called dynamic intermarket pressures of modern disequilibrium analysis.

7. Between *Pigou* and buffer effects are not only differences but also important similarities. The main similarity is that for different reasons somehow defined money has a direct impact on real aggregates.
8. There is an area where *Pigou* and buffer effects may overlap. This overlapping area is primarily an empirical one. The main differences between both effects can be reduced to different theoretical foundations, viz. monetary equilibrium versus monetary disequilibrium.
9. Both *Pigou* and buffer effects can have important policy implications. The *Pigou* effect suggests an automatic tendency towards full employment in a depressed economy. Economic literature indicates that the importance of this contention should not be exaggerated. The buffer effect suggests that in open economies direct effects of money on real aggregates will ultimately have important effects on the balance of payments.
10. So the buffer effect provides a theoretical background for the monetary approach to the balance of payments and exchange rates. Empirical indications for this contention can be traced for the U.K., Australia, Canada, the Netherlands, France and Germany.

All this suggests that the direct link between monetary and real aggregates has been and should be treated as an important topic in monetary economics. For theoretical reasons the buffer effect seems to be a serious alternative to the *Pigou* effect. Like the *Pigou* effect, the buffer effect has important policy implications. It should be emphasised, however, that the last word in this matter has not yet been spoken. Though promising, the buffer stock approach to money needs further theoretical and empirical elaboration. For instance, in theory the buffer stock approach is not only relevant to the money market, but in principle to all financial markets. Also the empirical elaboration of the buffer effect needs further attention. At this moment, economic literature does certainly not provide one single formula for this effect. It is hoped that this paper will encourage some further research to diminish the blanks which no doubt still exist.

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Zusammenfassung

Pigou-Effekte und Buffer-Effekte in der Geldtheorie

Dieser Aufsatz behandelt die beiden Hauptrichtungen der Geldtheorie in bezug auf die Verbindung zwischen Geldmenge und realen Aggregaten. Eine direkte Verbindung wurde erstmals von *Pigou* im Jahre 1943 als Alternative zu der indirekten Verbindung des keynesianischen IS-LM-Modells erarbeitet. Es wird gezeigt, wie dieser Pigou-Effekt in der Nachkriegszeit analytisch behandelt und kritisiert wurde. Und es wird behauptet, daß seine größte Schwäche in der Annahme eines monetären Gleichgewichts liegt. Weiter wird die Auffassung vertreten, daß die moderne Ungleichgewichtstheorie eine weitaus bessere Begründung für eine direkte Verbindung zwischen Geldmenge und realen Aggregaten bietet. Eine solche Verbindung – als Buffer-Effekt bezeichnet – paßt gut zu der ständig wachsenden ökonomischen Literatur über den sogenannten Buffer-stock-Ansatz des Geldes.

Summary

Pigou and Buffer Effects in Monetary Economics

This paper discusses the two mainstream monetary views on the direct link between money and real aggregates. The oldest direct link was elaborated by *Pigou* in 1943 as an alternative to the Keynesian indirect link as formalised in IS-LM models. It is shown how this Pigou effect was elaborated and criticised in the postwar period. It is argued that its most important weakness lies in the implicit assumption of monetary equilibrium. The paper suggests that modern disequilibrium analysis provides a far better theoretical foundation for the direct link between money and real aggregates. Such link – being called the buffer effect – fits well into the growing body of economic literature dealing with the so-called buffer stock approach to money.

Résumé

Effets de Pigou et de compensation dans des théories économiques monétaires

Cet article discute des deux tendances principales des théories sur le lien direct entre la monnaie et les agrégats réels. En 1943, *Pigou* élaborait le premier lien direct, posant ainsi une alternative au lien indirect de *Keynes*, formalisé dans les modèles IS-LM. L'auteur montre comment cet effet de Pigou fut élaboré et critiqué après la guerre. On argumentait que sa faiblesse la plus importante était de partir de l'hypothèse implicite d'équilibre monétaire. L'auteur suggère que l'analyse moderne du déséquilibre offre une base théorique nettement meilleure pour montrer le lien direct entre la monnaie et les agrégats réels. Un tel lien – appelé l'effet de compensation («buffer effect») – se retrouve dans la littérature qui traite de l'approche monétaire par le dit stock de compensation.