Referee's Report on "The Simple Analytics of Helicopter Money: Why it Works – Always",
by Willem H. Buiter

The author presents theoretical arguments in support of the proposition that a "helicopter drop" of money always raises aggregate demand. These arguments are based, not on a fully specified dynamic general equilibrium model, but just on a very careful discussion of the dynamic optimisation problems of overlapping generations of private agents who have uncertain lifetimes of the Yaari-Blanchard type; and of the intertemporal budget constraint of the government. Buiter wishes to leave open the question of whether prices are flexible or sticky, and other features of the macroeconomic equilibrium. Hence he studies what would happen to an agent's consumption demands, following a helicopter drop of money, at an unchanged sequence of current and expected future prices (including "prices" in the sense of wages, interest rates, etc.) In fact, the assumption that there are overlapping generations is not critical to the arguments in the paper, since the author makes clear that his main contentions would still hold if the birth rate were zero. However, overlapping generations enable a richer analysis to be carried out.

The analysis is carefully and elegantly done and some subtle issues are addressed. I agree with all the formal results that are derived. However, my first reaction was one of puzzlement as to why it is necessary to work so hard in order to prove a result that I had thought was obvious and well known to nearly all economists, i.e. the result that a helicopter drop of money always raises aggregate demand. In other words, the author's motivation for writing this paper is something which could be made clearer.

To elaborate: the context in which it might be challenged that a helicopter drop of money works is, of course, a "liquidity trap". The literature on liquidity traps underwent a renaissance following the Japanese stagnation of the 1990s, and has received further impetus since the financial crisis struck the West in 2007-8. A paper by Krugman (Brookings Papers on Economic Activity 1998) was one of the first to show how a liquidity trap could be modelled in a simple way using the standard ingredients of modern monetary dynamic general equilibrium models. (Curiously, this paper is not cited by Buiter.) Krugman obtains the result that, if the nominal interest rate is at its zero lower bound, then an increase in the current money supply will have no effect in raising output, in the face of a one-period rigidity in the price level, even though the economy is at less than full employment following an adverse private sector shock. Krugman also shows that credibly announcing, in period t, an increase in the money supply to be implemented in period t+1, will successfully raise current output, in the same situation. The reader might therefore ask whether Buiter would reject Krugman's "ineffectiveness" result. At first sight it may appear as if he is implicitly doing so, but on closer inspection one realises that this is not the case. The reason is that Krugman's ineffectiveness result arises only if the money supply increase is a purely temporary, one period, increase. Buiter's "helicopter drop", by

contrast, is defined as a permanent increase in the money supply. It is therefore equivalent to the sum of the two types of monetary expansion considered by Krugman. In a sense, therefore, Buiter's result is not new. He in fact acknowledges that several other authors have made the point that "to boost demand in a liquidity trap, base money increases should not be, or expected to be, reversed" (see p. 2). What he claims to be new, however, is his demonstration that it is the "irredeemability" of money that gives a helicopter drop the power to raise aggregate demand.

I agree that Buiter's explanation of why a permanent increase in the money supply does succeed in raising output even when the economy is in a liquidity trap, is interesting. Its practical interest and topicality are reinforced by the possibility of also interpreting the "helicopter drop" as being a case of "quantitative easing" (QE). At first I hesitated to accept this interpretation. There has been much debate over exactly what "QE" is and over how it may work, and Buiter's way of representing QE omits what many consider to be key features, such as references to the degree of liquidity of the assets purchased by the central bank. His version doesn't immediately sound like "unconventional" monetary policy. However, after hearing the full story, I was convinced that this is one possible way, at least, of trying to explain how QE might work. I would suggest, however, that a somewhat stronger attempt could be made to motivate the paper by reminding readers of what is already known from simple monetary dynamic general equilibrium models about the modelling of a liquidity trap and of monetary policies to escape from it, such as I have tried to do above using Krugman's analysis as the example.

Another way of strengthening the motivation of the paper concerns a more extreme form of liquidity trap. At certain points, but mostly only in passing, Buiter mentions the idea of a "permanent liquidity trap" (see, e.g., p. 2). This is something that will be unfamiliar to most readers. The most commonly encountered models of liquidity traps, in the modern theoretical literature, see them as temporary phenomena. This is especially because they are strongly associated with the Keynesian feature that prices are "sticky", and stickiness of nominal prices is much more plausibly modelled as being something temporary rather than permanent. However, later in Buiter's exposition it becomes clear that to examine what happens in a hypothetical situation of a permanent liquidity trap does have interest, because it enables him to make the point that the effectiveness of a helicopter drop may stem purely from the "irredeemability" property of money (which is effectively the same thing as the possibility, for the authorities, of making the money supply increase permanent). In order to counter possible scepticism on the part of the reader about the notion of a permanent liquidity trap, it would be helpful if somewhat more could be said about how a permanent liquidity trap might arise. In the paper as it currently stands, the Introduction contains passing references to phenomena such as "lowflation" and "secular stagnation" (see especially footnote 1), but I doubt whether it is widely understood what these mean or how they might come about. If the reader were to be more convinced that these are situations which might actually occur, Buiter's discussion of

how a helicopter drop enables us to escape from them would carry greater significance.

As the author shows, a helicopter drop or "QE", of the type defined in the paper, can be understood as working by increasing households' total lifetime net wealth at an unchanged sequence of current and future prices (understanding interest rates and wages as also being "prices"). He moreover identifies three conditions that must be satisfied for this mechanism to work. The condition which he particularly stresses is the "irredeemability" of money, and the paper is structured around an explanation of its importance. However, another condition mentioned is that money must also confer "non-pecuniary" benefits on the holder. In Buiter's formal model, this is captured by assuming real money balances enter the utility function, where they represent the transactions services that money provides in helping households to buy goods. This is a familiar method of modelling non-pecuniary benefits, and I have no objections to it, but in reading the paper I was struck by the fact that it is different from the assumption made in the majority of monetary policy papers of the last ten years or so, where instead the assumption of the so-called "cashless" economy is routinely encountered. Such an assumption is of course particularly associated with the name of Woodford (see especially his Interest and Prices, 2003). In a "cashless" economy, money exists as a unit of account and prices are set in terms of it, but money does not provide non-pecuniary benefits. In Woodford's own variant of this assumption, a supply of money exists, but it is assumed to pay interest at the same rate as bonds, so that households are indifferent between holding bonds and money. In another variant (particularly associated with Galí – see his Monetary Policy, Inflation and the Business Cycle 2008), money does not pay interest and hence there is no demand for it, and consequently there can be no willingly-held supply, either. These authors generally justify this assumption as being a reasonable approximation to a more fully articulated monetary economy such as the one presented by Buiter. One could think of the cashless economy as similar to a version Buiter's economy in which the parameter $1-\alpha$ (the exponent on real balances in the utility function) is very close to zero.

The above observations however prompt the question of how would Buiter's analysis be affected if his economy were "cashless"? One could try to think about this by allowing his $1-\alpha$ parameter to tend to zero. Holding the sequence of all prices constant, the equilibrium level of real money balances demanded by the household at each date would also tend to zero. (By the way, the coefficient in the money demand function (11) should surely be $(1-\alpha)/\alpha$, not $\alpha/(1-\alpha)$.) It then follows that the monetary component of a household's real lifetime wealth (the term given in footnote 4) would also tend to zero. Suppose we now consider a "helicopter drop" involving a permanent increase in the money supply, such that nominal balances rise by a common percentage, x%, at each date. At an unchanged sequence of prices, the monetary component of real lifetime wealth would also rise by x%; but, for very small values of $1-\alpha$, the percentage rise in the household's total real lifetime wealth, and this in its consumption demand, would be very small. Therefore it seems that, quantitatively speaking, for a helicopter drop to raise consumption demand significantly, we need the value of $1-\alpha$ to be non-negligible.

Otherwise stated, in a Woodford-Galí cashless economy - which I interpret to be the limiting case in which 1-α has actually reached zero - the helicopter drop would not work. In an economy "close" to a cashless economy, it would work, but the size of the percentage increase in money supply needed, in order to have a significant percentage effect on consumption, would be huge.

The conclusion I would draw from this reasoning, however, is not that it exposes a weakness in Buiter's argument. Rather, I would be inclined to see it as a clear and important example of where the "cashless economy" assumption is not innocuous. Given that, in practice, real money balances are not zero, it seems likely to me that the author's mechanism is not in practice negligible, though I cannot claim to have attempted a serious quantitative investigation of this. This being so, one would definitely not want to adopt the assumption of a cashless economy when studying this issue. My suggestion, then, is that Buiter could further strengthen the interest of his results by referring to the alternative possibility of making the currently fashionable "cashless economy" assumption in the paper, an assumption which authors nowadays typically adopt with no discussion whatsoever. By pointing out that this is a case where to do so would completely undermine the main phenomenon of interest, the paper might help encourage a more thoughtful approach to how money is modelled amongst monetary policy researchers.

I end with a list of minor errors spotted:

p. 2, 2nd para Here there are a large number of references to the literature which are omitted from the reference list at the end: see Hall (1983), Stockman (1983), King (1983), Fama (1983), etc., etc.

p. 5, eqn. (8) "du" should be part of the exponent. The same applies in the preceding equation

p. 6, 2nd para I think you mean "human wealth", rather than "human capital"

p. 7, footnote 7 I think you mean "ratio of real government bonds to output"

p. 19, 1st para I think you mean "each NCB has its Treasury as its beneficial ownerWeb.: http://willembuiter.com/