

## Response to the comments of Referee No. 2.

Regardless of the ultimate fate of my paper, it is much improved as a result of the wide-ranging and deep comments of this referee (and as a result of the long list of minor errors and omissions!).

- (1) Re: “ 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.”

There may be an element of “we all know this works in practice, but does it work in theory” in the paper. However, the crucial role of irredeemability of base money – the formalization of the folk wisdom that (bas) money is an asset to the owner but not a liability to the issuer – as a necessary condition for helicopter money (which includes pure QE) to be effective at the ZLB is not part of the literature. From the Krugman (1998) paper (which I forgot to cite in the original version) to Woodford (2012) and Eggertsson and Mehrotra (2014), the asymmetry in the solvency constraints of households and the State is not recognized. None of these models therefore has effective QE in a permanent liquidity trap.

Viewing pure QE as deferred helicopter money (the permanent injection of money today through asset purchases) is also helpful. QE permits future tax cuts and/or higher public spending because it relaxes the intertemporal budget constraint of the State (in practice the Treasury, as the beneficial owner of the Central Bank has its intertemporal budget constraint relaxed, either through interest savings or, if interest rates are zero in the long run, by not having to redeem the monetary debt).

- (2) I now discuss the case of the permanent liquidity trap in Section 2.7 (pp 18-20) and refer to it in the Introduction.
- (3) I now consider the case of the cashless economy in Section 2.10 (pp. 23-24). The case where  $\alpha = 0$ , when there are no non-pecuniary benefits from holding money, given helicopter money ineffectiveness when money is non-interest bearing and the nominal interest rate is positive. If the interest rate is zero in the long run (or in a permanent liquidity trap), helicopter money will be effective if it is irredeemable. In the Woodford version of the cashless economy, where  $\alpha = 0$  but money bears the same interest rate as non-monetary government liabilities, there again is no effectiveness when interest rates are positive. In a permanent liquidity trap there still can be effectiveness if money is irredeemable.

We cannot consider a sequence of economies, indexed by  $\alpha$ , consider the limit as  $\alpha \rightarrow 0$  and arrive at the equilibrium when  $\alpha = 0$ . As long as  $\alpha$  is positive, regardless of how small it is, helicopter money drops work with undiminished effectiveness. When interest rates are positive, helicopter money is ineffective when  $\alpha = 0$ . Such discontinuities in the limit as a ‘friction’ goes to

zero are not uncommon. Nickelsburg's (1984) modification of the Kareken and Wallace (1981) exchange rate determination model is another example.

I have corrected (to the best of my ability) typos and the Type I and Type II errors in citations.

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