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How central banks can take nominal rates deeply negative

By **Editor** - May 18, 2019

The popular view that nominal interest rates have a natural zero lower bound has become obsolete in modern financial systems. It may be more appropriate to consider this boundary a convenient policy choice that can be revised. Technically, the zero lower bound arises from potential arbitrage at negative nominal rates, in the form of cash withdrawal, storage and redeposit. However, the central bank can break this arbitrage by using its power at the cash window, i.e. by altering the conditions at which commercial banks can withdraw and redeposit paper money. There are two viable options for doing so. The so-called 'clean approach' creates a crawling exchange rate between paper money and electronic money, effectively devaluing the former relative to the latter at a predictable continuous rate. The so-called 'rental fee approach' charges commercial banks for using paper money and is equivalent to imposing negative rates on cash held by the private sector.

[Agarwal, Ruchir and Miles Kimball \(2019\), "Enabling Deep Negative Rates to Fight Recessions: A Guide", IMF Working Papers, WP/19/84](#)

The post ties in with [SRSV's summary on non-conventional monetary policies](#), particularly the section on "types of monetary policy".

The below are excerpts from the paper. Emphasis and cursive text have been added.

The case for taking nominal interest rates deeply negative

"Downturns are likely to happen again, and currently there is relatively little room available to advanced country central banks to fight them by interest rate cuts in the positive region. 500-600 basis points cuts in policy rates have been typical during recessions in advanced countries, but at present policy rates in most advanced countries remain too close to zero

to make cuts of that size possible without using negative rates. Moreover, in the future, without the ability to implement negative rates, zero lower bound episodes are expected to occur frequently and are expected to be severe, lasting several years. Therefore, it is clear that the zero lower bound on interest rates has proved to be a serious obstacle for monetary policy.”

“The zero lower bound is not a law of nature; it is a policy choice... With readily available tools a central bank can enable deep negative rates whenever needed—thus maintaining the power of monetary policy in the future to end recessions within a short time.”

“Standard transmission mechanisms from interest rates to aggregate demand are likely to remain unchanged in deep negative rate territory... In any nook or cranny of the economy where interest rates fall...those lower interest rates create more aggregate demand by a substitution effect on both the borrower and lender and effective wealth impacts.... In standard [economic] models, without nominal illusion, it is the real interest rate that matters. Therefore, if a higher steady state inflation from a higher inflation target would make a zero nominal rate more stimulative, negative rates should be more stimulative than zero with no change in inflation...Thus, when the rate of return on paper currency is a policy variable and the health of banks is attended to, central banks have unlimited monetary policy firepower.”

The central bank’s power at the cash window

“The public typically obtains cash from commercial banks by making withdrawals from automated teller machines (ATMs) or by cashing checks. But where do banks obtain the cash? To meet the demands of its customers, banks get cash from the central bank by using the central bank’s cash window. The larger commercial banks typically have an account with the central bank, and the cash window allows the banks to exchange electronic currency in this account for paper currency.”

“For example, in the U.S., most medium and large banks maintain reserve accounts at the Federal Reserve. These banks can receive paper currency (cash) in exchange for electronic currency (reserves) by asking the Fed to debit their reserve account. That is, when a bank orders paper currency from the Fed, the Fed releases the shipment of paper currency from its cash offices to armored carriers for delivery to the bank, and at the same time debits an equivalent amount in the bank’s reserve account maintained at the Fed.”

“At the cash window, the central bank typically treats a 100-dollar note as worth 100 electronic dollars and does not charge any substantial fees for the issuance or acceptance of paper currency. But...this is not the only possibility since central banks’ role as the source of

paper currency gives them an underappreciated power to charge a non-zero paper currency interest rate to commercial banks at the cash window when not prohibited by law from doing so.”

“Central banks...can determine how much a paper dollar is worth compared to an electronic dollar in a reserve account by how they treat the paper currency at the cash window. Alternatively, central banks can charge a rental fee for paper currency issued... Thus, if the central bank can affect the dividend yield or appreciation rate of paper currency it can create a non-zero rate of return for holding paper currency.”

“If arbitrage profits are made by withdrawing paper currency, storing it and redepositing it at the cash window, it is the central bank that is on the losing side of the withdrawal and redeposit transactions. While paper currency storage must be part of [arbitrage at negative nominal rates], in terms of transactions, the arbitrage profits happen at the cash window. If the central bank takes action to avoid taking a hit to its balance sheet at the cash window, that necessarily implies that there will be no arbitrage profits for the private sector as a whole from paper currency withdrawal, storage and redeposit.”

“Guaranteeing to forever freely trade paper currency for reserves at par with no substantial fees or restrictions when rates are deeply negative is like a car dealer promising to buy back a car at the sale price (no matter how far in the future) when the depreciation rate exceeds inflation.”

The clean approach to introduce deeply negative interest rates

“The ‘clean approach’...is an electronic money system that takes paper currency off par...[It] relies targets the exchange rate between paper currency and reserves to create a non-zero rate of return for holding paper currency. ”

“Suppose the Fed wants to establish a negative 1% paper currency interest rate at the cash window. Then, at the beginning of the year, it will stand to exchange paper currency for electronic currency at par (i.e. 1 for 1) with banks at the cash window. At the end of the year, (a) when a commercial bank comes to the cash window of the central bank and hands in a paper 100-dollar note to have the money put into its reserve account, the Fed would add only 99 dollars to that commercial bank’s reserve account; and (b) when a commercial bank came to the cash window of the Fed and asked for a paper 100-dollar note, only 99 dollars would be deducted from its reserve account...This exchange rate will predictably and gradually change throughout the year as per the principles of compound interest.”

“This mechanism creates a crawling-peg between the two types of currencies—in this case with the paper currency smoothly depreciating by 1 percent over the course of the year... The central bank has unlimited firepower for defending any exchange rate it declares between different forms of money under its jurisdiction.”

“To overcome the zero lower bound the clean approach requires combining (a) the non-zero paper currency interest rate at the cash window using an exchange rate, and (b) using electronic money as the unit of account. Here, when we say that electronic money is the ‘unit of account,’ what is most important is that it be the unit in which prices are fixed. It is not essential that all prices be expressed in terms of the electronic dollar, but it is important that prices for a significant fraction of expenditure be expressed in terms of the electronic unit of account... The idea is that purchases paid for by credit card, debit card, checks, or electronic funds transfer would look exactly like they do now—in which case they would implicitly be denominated in the electronic unit of account... Retailers who regularly accept both cash and cards would have the option of applying a storewide paper currency surcharge, assessed at checkout as sales taxes now are in the U.S.”

“The exchange rate at the central bank’s cash window keeps track of how much cumulative interest has been earned on paper currency to keep that cumulative interest equal to what would have been earned in electronic accounts over that interval... The exchange rate will hold throughout the financial system, but not necessarily at retail.”

“The clean approach generates a negative rate of return on paper currency located anywhere. Imagine a drug lord trying to spend some of his or her cache of cash. Since banks can get paper currency at a discount from the cash window of the central bank, and competition eventually causes banks to pass on cash at a discount, the drug lord’s cash is also only accepted at a discount (barring a gun to the head).”

“There is likely to be a psychological and computational cost associated with paper currency being away from par. Anything new is likely to worry people, whether or not there is a good reason to worry. Beyond this psychological cost, there would be some computational cost—most consequentially for households. However, computationally, a surcharge on certain cash purchases is no more complex than sales taxes assessed at the time of the final sale—a form of sales taxes familiar in the U.S.”

The rental fee approach to accomplish deeply negative interest rates

“The ‘rental fee approach’ keeps paper currency at par within the financial system and the large corporate sector... It allows the central bank to create a negative paper currency interest rate at the cash window without taking paper currency off par at the cash window.

While the rental fee approach can be almost as effective as the clean approach, it comes with some side effects—mainly in connection to pass-through of the rental fee and to profitability of banks.”

“In the rental fee approach, the Fed would generate a -1% paper currency interest rate by announcing a 1% per annum rental fee for commercial banks withdrawing paper currency from the cash window. Whenever a bank withdrew a 100-dollar note from the Fed, in addition to being debited 100 electronic dollars from its reserve account at the time of the transaction, it would pay 1 dollar per year as a rental fee to the Fed—which could be directly charged to the bank’s reserve account at the Fed...The fee can be levied on a monthly basis by the Fed to the commercial banks on the outstanding amount of cumulative net withdrawals of paper currency by the bank.”

“What is rented is the ‘paperiness’ of a given amount of currency...Creating a non-zero paper currency interest rate at the cash window using this method requires no action beyond what happens at the central bank’s own cash window. However, it puts a substantial burden on commercial banks to figure out how to transmit or transform the rental fee imposed at the cash window when they provide paper currency to their customers.”

“The rental fee mechanism is equivalent to a central bank imposing a negative interest rate on a bank’s cash holdings beyond its cash holdings at the inception of the policy. That is, in interlocking clauses, a central bank can put any bank with access to the cash window on the hook for (i) whatever paper currency interest rate the central bank decides to charge (ii) on that bank’s cumulative net withdrawals of paper currency after a certain date—(iii) regardless of who actually ends up with that paper currency. Then it is up to the bank to figure out how and whether to pass on to its customers the negative paper currency interest rate it faces on that extra paper currency. To avoid inconveniencing households, the central bank could set an exemption amount for this policy, allowing banks to withdraw amounts up to the net withdrawal of paper currency on behalf of customers up to that per-customer, per-month limit.”

“A version of [the rental fee approach] was put into place by the Swiss National Bank (SNB) in 2014. The SNB’s negative rate policy imposes such a charge to banks for excess paper currency withdrawals. In their implementation, a negative interest rate is charged only on the portion of the bank’s reserves (“sight deposit balance”) at the SNB that exceeds a certain threshold. The calculation of the exemption threshold explicitly takes into account the net increase in cash holdings. That is, the exemption amount for a given bank’s sight account balance at the SNB that is not subject to negative rates is reduced one-for-one for any net increase in its cash holdings since 2014. This effectively imposes a charge to banks (equivalent to the rental fee) for excess paper currency withdrawals. In 2016, the Bank of

Japan (BoJ) followed in the footsteps of the SNB. Their implementation of negative interest rate policy is similar to that of the SNB.”

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