

# NEGATIVE INTEREST RATE POLICY AS CONVENTIONAL MONETARY POLICY

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As long as all interest rates move in tandem – including the rate of return on paper currency – economic theory suggests no important difference between interest rate changes in the positive region and interest rate changes in the negative region. Indeed, in standard models, only the real interest rate and spreads between real interest rates matter. Thus, in most respects, negative interest rate policy is conventional. It is only (a) what needs to be done with paper currency, (b) difficulties in understanding negative rates or (c) institutional features interacting with negative rates that make negative interest rate policy unconventional.

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It took a long time within mathematics for negative numbers to be fully accepted. To this day, negative numbers seem exotic to many people. So it will take a while for people to fully understand negative interest rates. But economic theory makes surprisingly little distinction between positive and negative rates. And the sophisticated business people and financiers who are key to the most important effects of interest rates will grasp the essentials of negative interest rates quickly.<sup>1</sup> Therefore, let me argue on both theoretical grounds and by spelling out some of the practical details that negative interest rate policy will turn out to be a more conventional type of monetary policy than people now realise.

In standard economic models, nominal interest rates don't matter: only real interest rates and the spreads between them matter. The one seeming exception is not an exception at all: the opportunity cost of holding paper currency is closely related to the spread between the real interest rate on, say checking accounts, and the real interest rate on paper currency. Sometimes this equals the nominal interest rate because it has been traditional to have a zero nominal interest rate on paper currency, but it matters in the model because it is the spread between two real interest rates.

This essay is about how best to break with that restrictive tradition and engineer nonzero interest rates on paper currency when needed for economic stabilisation. If central banks take control over the paper currency interest rate, then it is possible to get paper currency out of the way of targeting any real interest rate – even deep negative rates – if necessary for economic stabilisation. But the principles of economic stabilisation and the monetary policy tools needed to achieve it – *other than getting paper currency out of the way* – are exactly the same as conventional monetary policy before the era of large-scale long-term asset purchases.

Building on Willem Buiters and Nikolaos Panigirtzoglou (2001, 2003) and Buiters (2004, 2007, 2009a,b,c) I have tried to figure out how to free up the paper currency interest rate in a way that is as close as possible to the current system in an effort to minimise the political cost to a central bank of getting paper currency out of the way of interest rate policy. I have taken the resulting specific proposal to on the whole receptive audiences at central banks around the world (listed in updated versions of Kimball, 2013a), and have made efforts to explain such a negative interest rate policy to the general public by blog posts on my blog 'Confessions

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of a Supply-Side Liberal', articles in online magazines such as Quartz and Slate, and by explaining negative interest rate policy to journalists. The blog posts and online magazine articles have included a children's story (together with amateur rap, operatic, and read-aloud videos dramatising the story), an account of a conversation with my non-economist neighbour about negative interest rates, a quiz, and questions-and-answer posts answering such questions as "Is Electronic Money the Mark of the Beast?". A regularly updated set of links to all of this material can be found in my regularly updated bibliographic post, 'How and Why to Eliminate the Zero Lower Bound: A Reader's Guide' (Kimball 2013b). Along with coauthors, I have several academic papers on negative interest rate policy in the works.

There have been at least five recent milestones for negative interest rate policy as a real-world policy tool:

1. The current mild negative interest rates in the euro zone, Switzerland, Denmark and Sweden (see, for example, Randow, 2015).
2. The boldly titled 18 May, 2015 London conference on 'Removing the Zero Lower Bound on Interest Rates', cosponsored by Imperial College Business School, the Brevan Howard Centre for Financial Analysis, the Centre for Economic Policy Research and the Swiss National Bank.
3. The 19 May, 2015 Chief Economist's Workshop at the Bank of England, which included keynote speeches by Ken Rogoff, presenting 'Costs and Benefits to Phasing Out Paper Currency' (Rogoff, 2014) and my presentation '18 Misconceptions about Eliminating the Zero Lower Bound' (Kimball, 2015). Ken Rogoff's paper is also scheduled to be the keynote presentation at the 19–20 November Bank of Canada Conference on Electronic Money and Payments.
4. Bank of England Chief Economist Andrew Haldane's 18 September, 2015 speech, 'How low can you go?' (Haldane, 2015).
5. Ben Bernanke's discussion of negative interest rate policy on his book tour (for Bernanke, 2015), ably reported by journalist Greg Robb in his Market Watch article 'Fed officials seem ready to deploy negative rates in next crisis' (Robb, 2015).

I want to emphasise that I consider the policy I am proposing as a realistic policy option that could be

implemented at any point by central banks that have had it under active consideration and so have done the necessary staff work, and within a matter of weeks if necessary by central banks that have been caught flat-footed by a crisis without yet having done any of the staff work to prepare.

The remainder of this essay has three parts: first, explaining some of the details of my proposal to engineer a nonzero paper currency interest rate and thereby eliminate the lower bound; second, pointing out all of the aspects of monetary policy that would be unchanged by getting paper currency out of the way; and third, discussing the politics of negative interest rate policy.

### **How to engineer a nonzero paper currency interest rate in a way that is at minimum distance from the current system**

My goal in policy design has been to find the paper currency policy closest to the current system that fully removes any zero lower bound. If I have not succeeded, I welcome any suggestions of how to find an alternative closer to the current monetary system, provided it allows short-term interest rates to go as low as needed to revive an economy, without the help of other stimulative policies, even after a shock significantly larger than the one that threw the world economy into the Great Recession, and regardless of how low inflation is.

In addition to looking for a system close to the current monetary system in order to minimise the political costs for a central bank implementing the policy I suggest, another reason to look at options close to the current system is to help bring the policy within the current legal authority of many central banks. Thinking of monetary politics in the United States, I am alert to the question of what could be done by the Federal Reserve System with the support of only the Executive Branch and a blocking coalition in Congress – a situation that would preclude any new enabling legislation. I cannot fully address all the legal questions here. The answer to many legal questions about the authority of the Fed are simply unknown, particularly since the more serious a future crisis, the more a court is likely to defer to the Fed's judgment. And detailing the legal authority of all the central banks that might be interested in engineering a nonzero paper currency interest rate would be a large task indeed. It is my understanding that a number of central banks have significantly more legal leeway than the Fed to act on their own authority.

In 1932, Robert Eisler anticipated the essential element of the policy I am advocating (and that Willem Buiter and Nikolaos Panigirtzoglou discuss): a time-varying exchange rate between paper currency and money in the bank. Nowadays, money in the bank is a number in a computer, so I refer to it as ‘electronic money’.<sup>2</sup>

In this sense of electronic money, most US residents use electronic dollars almost every day when they pay for things by credit card, debit card, cheque or electronic funds transfer. In his 18 September speech (Haldane, 2015), Andrew Haldane advocates extending official government-sponsored electronic money from reserve accounts at the central bank and government-run payment clearing systems to government-sponsored electronic accounts that any household or firm could use. Although this would be helpful in furthering an electronic money policy, I do not think it is necessary. High-powered electronic money in reserve accounts and in the payment clearing system, plus electronic money in government-insured bank accounts provides enough of a starting place to institute an electronic money policy of the sort I am advocating.

Central banks have the power to establish the relative prices of different forms of money under their jurisdiction, a fact which is missing from many current money and banking textbooks. Currently, the Federal Reserve System has fixed exchange rates between all of the different forms of money under its jurisdiction. Two \$10 bills are worth one \$20 bill because at its cash windows, the Federal Reserve System will give banks \$10 bills in unlimited quantities in exchange for half the number of \$20 bills, and conversely, the Federal Reserve System will give banks \$20 bills in unlimited quantities in exchange for twice the number of \$10 bills. It is this exchange rate between \$10 bills and \$20 bills at the cash windows of the Fed and *not* the numbers printed on the faces of the green pieces of paper that determines their relative values.

There is no reason to alter the exchange rate between \$10 bills and \$20 bills, but there is a reason to free up the exchange rate between an electronic dollar (e-\$) and a paper dollar (p-\$): eliminating the zero lower bound as an effective constraint. Unlike higher inflation while keeping the exchange rate between paper dollars and electronic dollars at par, a time-varying exchange rate between paper dollars and electronic dollars can generate extra ‘inflation’ *relative to paper currency* at those times – and only those times – when inflation relative to paper currency is needed, without generating extra inflation relative to electronic money.

The exchange rate between paper dollars and electronic dollars would move very gradually. Cutting paper interest rates 400 basis points to –4 per cent per year to match electronic interest rates of –4 per cent per year (both expressed in terms of electronic dollars) is quite a large cut in interest rates. But it corresponds to lowering the value of an electronic dollar by only 1 per cent over a 90-day period or so – about 1.1 basis points decline in the value of the paper dollar per day. In other words, p-\$1000 worth e-\$1000 on day one would be worth about e-\$999.89 on day two. That 11 cent per day change in the value of 1000 paper dollars is slow enough that it would give people time to adapt.

The starting point for the policy I am advocating is to encourage economic actors to use the electronic dollar – or euro, yen, pound, peso, etc. – as the unit of account, and as the unit in which prices are expressed. (To fix ideas, from here on I will write about the ‘electronic dollar’, which should be read in each case as ‘the electronic dollar – or euro, yen, pound, peso, etc.’). 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 dollar, and the electronic money system will work most smoothly if all but a small fraction of prices are expressed in terms of electronic dollars. The idea is that purchases paid for by credit card, debit card, cheque, or electronic funds transfer would look exactly like they do now, while for paper currency purchases, retailers would have the option of applying a storewide paper currency surcharge, assessed at checkout as sales taxes now are. If, however, vending machine items and a few convenience store items continue to have separately determined paper currency prices, that is fine.

Arguably, the US and many other countries already have an electronic unit of account and electronic unit of price quotation in the sense of this thought experiment: suppose the exchange rate between paper currency and electronic money departed from par, but the central bank and the rest of the government maintained a studied neutrality about what the unit of account should be (including somehow making the two accounting systems equivalent as far as taxes go). I would bet that businesses would choose to do their accounting and their business-to-business transactions in terms of the electronic dollar instead of doing their accounting and business-to-business transactions in terms of the paper dollar. It is even more likely that electronic money would be the unit of account if, say, the announced policy of the central bank and the executive branch of the government

was to favour the electronic dollar as much as existing legislation allowed. And if the electronic dollar were the unit of account in this sense, it is likely that it would also be the unit of price quotation *at least for those retailers selling goods that are now mostly purchased with credit cards, debit cards, cheques or electronic funds transfers.*

My view is that governments are big enough actors in the economy and in declaring focal points in multiple equilibrium situations (as the government does for Daylight Savings Time) that governments generally have control over what the unit of account is within their jurisdictions, *except when there is an extremely high inflation rate or a history still burned into people's memory of an extremely high inflation rate in that unit of account.* Even nations that do lose control of their units of account are often able to partially restore that control with a newly created unit of account if policies are put in place to keep inflation rates in that new unit of account lower. And to the extent that prices in post-hyper-inflationary economies are still quoted in other units of account, it is usually associated with inflation that, while lower, is still high enough that the economy is far away from the zero lower bound. Here it is worth noting that the perception of extra inflation from paper currency's depreciation itself is extra inflation *relative to paper currency*, which in any case the central bank is trying to make look unattractive as a unit of account. Electronic money is the hard money and paper currency is the soft money in this system. Thus, I think it likely that most governments could successfully declare an electronic unit of account, even when many people think of the status quo ante as a paper unit of account. To the extent that the electronic money policy is backed by the central bank and the executive branch while legislation is locked in place by legislative blocking coalitions in both directions – or by an unwillingness of the government to impose too high a political cost on members of parliament by an explicit parliamentary vote – I suspect that central bank and executive branch action alone is enough to establish an electronic unit of account.

What is a little trickier is the extent to which government control of the unit of account translates into control over the unit of price quotation. Actually, the key issue is the even more subtle one of whether current inflation inertia is carried over to electronic dollar prices or to paper dollar prices. During periods when the zero lower bound would otherwise be binding, I propose to have the value of a paper dollar in terms of electronic dollars fall very gradually according to a crawling peg exchange rate. If inflation inertia carries over to electronic goods

prices, then the decline in the value of paper currency relative to electronic money can loosen the zero lower bound as much as needed, thus eliminating the zero lower bound as an effective constraint.

At the opposite extreme, if inflation inertia carries over in full to paper dollar prices, then the appreciation of the electronic dollar relative to the paper dollar implied by the depreciation of paper currency does nothing to loosen the zero lower bound.

If inflation inertia is carried over to some weighted average of the electronic dollar prices and paper dollar prices, there *would* be loosening of the zero lower bound. If the weights in the weighted average are relatively invariant, then it would still be possible to loosen the zero lower bound as much as needed (thus eliminating it as a binding constraint), though there would be a side effect of a short-run drift in the relative prices of goods and services priced in paper dollars relative to goods and services priced in electronic dollars.

I consider this mixed case most likely in the initial stages of putting into action a nonpar exchange rate between paper currency and electronic money – for an interesting reason. Under the current system, both paper currency payments and debit and credit card payments of different types are all accepted at face value at most retailers that accept more than one form of payment. Thus, it is likely that up to several per cent away from par in the exchange rate between the paper dollar and the electronic dollar, both electronic and paper prices would be set at the same number in relation to face values. In that case, it is likely that the unit of account would dominate price setting for this unified face value price. If so, that effectively makes inflation inertia carry over to the electronic dollar prices, and makes paper dollar prices effectively cheaper relative to those electronic prices than the way they would compare now – though in this initial period of time only within the band in which some customers choose to pay in paper while other customers choose to pay in electronic form: by credit card, debit card or cheque.

In terms of the effectiveness of interest rate policy, having both electronic dollar prices and face value paper dollar prices carry over the preexisting level of inflation inertia is fine at first. The most important transmission mechanisms are through the cost of purchasing durables and investment goods and international capital flows, all of which involve goods most likely to be purchased with electronic means of payments – by credit card, debit card, cheque or electronic funds transfer – and therefore

most likely to have a price set in electronic dollars. (Note that many popular monetary policy models *exclude this entire list of key transmission mechanisms for monetary policy* by having only nondurable goods in a closed economy.)

In this section, I have emphasised the messy case. My claim is that it is very hard to come up with a plausible scenario in which depreciating the paper dollar relative to the electronic dollar at a sedate pace that creates a negative rate of return for paper currency (with the rate of return expressed in terms of electronic dollars) would *not* provide leeway *vis à vis* the zero lower bound. It is not plausible that all prices would be quoted primarily in paper dollars with inflation inertia carrying over to these pervasive paper dollar prices. It is simply too natural to set an electronic dollar price for one's goods if one is a retailer selling predominantly goods purchased almost entirely by credit card, debit card, cheque or electronic funds transfer. And goods in this category are particularly important for the monetary transmission mechanism.

A great advantage of depreciating the paper dollar relative to the electronic dollar as compared to a policy of keeping paper at par but raising the inflation rate is that to provide leeway relative to the zero lower bound, the paper dollar only needs to depreciate gradually (say at 1.1 basis points per day) in periods when the central bank's target rate is negative. When the central bank's target rate is positive, the process can be reversed, with the paper dollar very gradually appreciating back up to par. By contrast, if one insists on keeping paper at par and raising inflation to provide leeway *vis à vis* the zero lower bound, it is not easy to bring inflation back down after one no longer needs higher inflation to provide leeway *vis à vis* the zero lower bound.

### What remains the same about monetary policy

I propose changing one thing: instead of always treating the value of one paper dollar as equal to the value of one electronic dollar, the central bank should sometimes instruct the personnel at the cash window to treat the value of one paper dollar as less than one electronic dollar. This exchange rate at the cash window should change very gradually in order to create a safe nonzero rate of return for paper currency. By 'safe' return I mean a return that is safe in the short-term sense in which investing in the overnight fed funds market or the overnight repo market is safe. It is not necessary that this 'safe' overnight rate be perfectly predictable in the more distant future, any more than it is essential for monetary

policy that the fed funds rate or the overnight repo rate in the more distant future be perfectly predictable.

Everything else about monetary policy can continue in a way very similar to the way things are done now. As under the current system, the interest rate on reserves should be lowered when the target rate is lowered. Also, as under the current system (at least for the US), the interest rate used in the tax system for money carried over between tax years should be lowered along with other interest rates (see Kimball and Kimball, 2015). Optionally, the central bank's lending rate (discount rate in the US) can be lowered along with these other rates. When the target rate is raised, these other rates can be raised as well. The essential new feature of an 'electronic money' system is that when the target rate goes below zero, the effective rate of return for paper currency – the 'paper currency interest rate' – also goes below zero through the depreciation mechanism. And when the target rate goes above zero again, the paper currency interest also becomes positive through gradual appreciation of paper currency relative to electronic money, until paper currency reaches par again.

The one change of having a gradually changing nonpar exchange rate between the paper dollar and electronic dollar may affect the transmission mechanism for those goods and services that are purchased with cash, but the parts of the transmission mechanism from interest rate policy that work through goods and services that are purchased with credit cards, debit cards, cheques or electronic funds transfers remains. That includes most durable goods purchases, most investment goods purchases, and a large fraction of business-to-business purchases. In addition, because international capital flows and other asset market transactions are mostly handled in electronic form, the parts of the transmission mechanism from interest rate policy that involve the international exchange rate and wealth effects remain intact. That is more than enough to provide any needed level of aggregate demand by a large enough change in the target rate, with an accompanying adjustment in the paper currency interest rate, and accompanying adjustments in interest on reserves, the central bank's lending rate, the interest rate for the tax system, and any other government interest rates fixed by government policy that private agents can avail themselves of in a more or less unlimited way (such as the postal savings rate in Japan).

Except for the paper currency interest rate, many nations already make all of these other rates comove closely with the central bank's target rate. Having a nonzero 'paper currency interest rate' that can comove closely

when desired with the central bank's target rate is the new feature in an electronic money system. The nonzero 'paper currency interest rate' needed for such comovement is generated by gradual depreciation or appreciation of the paper dollar relative to the electronic dollar.

As far as I know, very few economists have objected to permanently raising the inflation rate as a way to deal with the zero lower bound *on the basis that this would not, in fact, allow any extra monetary stimulus*. The reason is the fact I started with: standard models say it is the real interest rate that matters. But if it is the real interest rate that matters, lowering the nominal interest rate without raising inflation will stimulate the economy through totally standard mechanisms. It is not necessary to have full agreement on exactly how a lower real interest rate stimulates the economy. For all of those who agree that interest rate policy matters, a cut in the nominal interest rate will have much the same effect as an increase in inflation with the nominal interest rate held fixed. So if an increase in inflation operates through conventional means, so does a cut into negative territory of the full set of nominal government interest rates – target rate, interest on reserves, lending rate, between-tax-year rate, postal savings rate and paper currency interest rate. In that sense, a negative interest rate policy is a conventional monetary policy if having a target inflation rate of 2 per cent or 4 per cent instead of a target inflation rate of zero is a conventional monetary policy. Having a nonzero paper currency interest rate may be a little exotic, but that is only getting paper currency out of the way. Once paper currency is out of the way, the heart of negative interest rate policy is lowering the target rate, which can be done by open market purchases of short-term Treasury bills, the most conventional of all tools.

It is worth noting that short-term Treasury bills are quite useful in explaining negative interest rates and the zero lower bound. Since a three-month Treasury bill only has a payment at the end of the three months, a negative interest rate for a three-month Treasury bill is simply a price for the Treasury bill above the face value that will be paid in three months. If one has to pay a higher nominal price than what one gets three months later, the nominal value of one's money shrinks over those three months. The zero lower bound can then be expressed as the fact that (ignoring paper currency storage costs) few people would pay, say \$10,100 for a Treasury bill with a face value of \$10,000 to be paid in three months when one can obtain \$10,000 three months from now for \$10,000 now simply by storing the \$10,000 in paper currency for those three months.

The difference in an electronic money system is that in this situation it would take paper currency with a face value of \$10,100 to be worth \$10,000 in electronic money three months from now. Even though what was initially \$10,100 worth of paper currency would still have a face value of \$10,100 three months from now, the exchange rate at the cash window of the central bank would make it worth less than its face value – not just because it could only be deposited for that amount, but also because anyone able to use the cash window of the central bank could withdraw \$10,100 face value worth of paper currency at a cost of \$10,000 in electronic money three months from now.

Cutting interest rates within the negative range is likely to have some effects on financial stability just as cutting rates within the positive range. (I can see two important differences: the side effects on the expected rate of repayment until traditional debt contracts adjust and the effect of the crumbling of the zero lower bound on financial market worries about 'secular stagnation'.) In any case, the policy prescription I would offer is the same: a dramatic increase in equity requirements for financial firms and in equity requirements for individual mortgages through mortgage reform that leads to investors other than the homeowner putting up some of the equity for a mortgage. Financial firms will resist the loss of their implicit bailout subsidy, but from a social point of view, the only important downside to higher equity requirements is through aggregate demand effects. But when central banks become comfortable with negative interest rate policy, that can provide more than enough aggregate demand; since interest rates can go as low as needed, aggregate demand will no longer be scarce. Thus, negative interest rate policy and high equity requirements are highly complementary policies: the negative interest rates easily provide the aggregate demand that might be impaired somewhat by higher equity requirements, while the dramatically higher equity requirements provide in abundance the financial stability that might be somewhat impaired by negative interest rates.

Through experience, I know there are three aspects of this system that at first can be hard to wrap one's head around. First, for some people, it seems very unnatural to take the electronic dollar as numéraire rather than the paper dollar. A numéraire is not the same thing as a unit of account: a numéraire serves as the yardstick only for a particular piece of economic analysis; a unit of account serves as the yardstick for real world accounting and transactions. I discussed issues involving the real-world unit of account at length above. If everyone is thinking

correctly, changing the numéraire one uses to think about an electronic money system cannot change the implied real-world bottom line. However, while equivalent, the story ends up sounding much more complex if one insists on using the paper dollar as numéraire. Making the same analysis as above, but expressing it in terms of a paper dollar numéraire, the carrying over of inflation expectations to electronic dollar prices means that the inflation rate for electronic dollar prices – *expressed in terms of paper dollars* – goes up when the electronic dollar is made to appreciate gradually relative to the paper dollar by how electronic dollars are treated at the cash window of the central bank. Then the anchoring of inflation expectations for electronic dollar prices means that the inflation rate for electronic dollar prices – expressed in terms of paper dollars – can be brought down by making the electronic dollar depreciate gradually back to par with the paper dollar. Once the electronic dollar is back at par, leaving it there makes the inflation rate for both paper dollar and electronic dollar prices – as converted into paper dollar prices – again the same.

Second, it is hard for many to see how it is possible to avoid a financial arbitrage opportunity that subverts the system – akin to the opportunity to save in paper currency that creates the zero lower bound in the current system. By construction, if the rate of return on paper currency is always equal to the target rate, there can be no arbitrage relative to the target rate. Then, leaving aside storage costs, exactly the same thing would happen to the value of one's funds in the fed funds market or the repo market as if one's funds were entirely in paper currency. How can that be, when the paper currency continues to have the same face value, while electronic account statements are showing lower and lower numbers due to negative interest rates? The answer is that while interest rates are negative, or when paper is below par after a negative interest rate episode, the number of electronic dollars each paper dollar is worth is varied to keep the value of a pile of paper dollars equal to exactly what one would have if one kept the money in the fed funds market or the repo market. This is possible because an initial value for the exchange rate between paper dollars and electronic dollars, plus a stipulation that the rate of return for paper currency expressed in terms of an electronic dollar numéraire equal the target rate, yields a differential equation that implies an equivalent value for funds subject to compound interest in an electronic account and funds in paper currency subject to a time-varying exchange rate when their value is converted into an electronic dollar equivalent. And that equivalent value of the paper currency is not a fiction; it is exactly what the central bank would give for that amount of paper

currency deposited at the cash window, and exactly the price in electronic dollars the central bank would ask for a withdrawal of that amount of paper currency. Keeping the rate of return for paper currency equal to the target rate while away from par leaves no degrees of freedom in the path away from and back to par. There is only one way to do it. But there *is* a sedate path for the exchange rate that does it.

Third, many people think that an electronic money system requires a change in what is 'legal tender'. This is a misunderstanding of what 'legal tender' means. Once paper currency is long established, most countries do not feel the need to require that retailers accept paper currency. 'Legal tender' can have the much more limited meaning that paper currency can be used to settle debts at face value. But one does not have a 'debt' to a retailer until the retailer has agreed to sell a good, and the retailer can refuse to sell a good for an inconvenient means of payment, including paper currency if that is inconvenient. Indeed, I have been on more than one plane flight in which the crew clearly announced that they would only accept credit or debit card payment – not paper currency – for the food they were selling on the flight. In US law, 'legal tender' also means that, in theory, one can pay the government with paper currency. But there are many cases in which it would not, in practice, be easy at all to pay in paper currency. Try telling the tax authority that you would like to pay your income taxes in paper currency. You might ultimately be able to force them to accept the paper currency, but you would have a long and arduous battle before you succeeded. The reason that the ability to pay off debts in paper currency is a very real option is that it is the creditor that must take a debtor to court to enforce payment of a debt. So in the case of a debt, it is the creditor that pays the costs of pursuit. By contrast, at a minimum, even should the law be on his or her side, anyone trying to insist on a right to pay a resistant retailer or a resistant government agency in paper currency would pay the costs of pursuit.

The right of private agents to pay off a debt in paper currency may create an undesirable side effect of a below-par value of paper currency, but it does not create a zero lower bound. It doesn't create a zero lower bound, because the right to pay off debt in below-par paper currency is limited to the value of one's debts – and indeed only to the value of the payments one is able to make on one's debts (including any prepayment option) *during the time paper currency is below par*. It is not an unlimited arbitrage. Analytically, if one ignored extra paper currency handling costs and assumed that all debt

payments during the time paper currency was below par were made in paper currency, everyone who had debts would be at a corner solution, unable to pay off more debt in paper currency because every possible way to do so was already exhausted. The option to prepay an entire mortgage in paper currency is definitely big enough to be interesting, but the importance of the prepayment option for mortgages during times of declining interest rates is already so great that we know the system does not break down simply because of a flood of mortgage refinancings. In the overall scheme of things, adding a few per cent to the benefit of refinancing because of the option to pay off the mortgage with below-par paper currency is a modest wrinkle on the large benefits to refinancing that could arise simply because of the likely mortgage interest rate changes that would be engendered by the temporary negative interest rate policy.

Similarly, if the tax authority did have to accept payments in below-par paper currency, this would be an effective reduction in the tax rate, and an undesirable side effect also because of socially wasteful paper currency handling costs, but it would not create a zero lower bound. Once someone had paid all his or her taxes in paper currency, the opportunity would be exhausted.

### **The politics of negative interest rates**

Although the economics of cutting interest rates in negative territory are essentially the same as the economics of cutting interest rates in positive territory with a higher inflation rate, with a few wrinkles from what it takes to get paper currency out of the way, the politics of negative interest rates could be quite different from the politics of positive interest rates. One should not go overboard in saying this, however, since we now know that the mild negative interest rates in the euro zone, Switzerland, Denmark and Sweden have not unleashed a firestorm of political protest. To compare distinct events just to get an idea of political magnitudes, at the moment, people in the euro zone, Denmark and Sweden are much more concerned about the flood of refugees from the Middle East than they are incensed about central banks daring to have a nominal interest rate below zero. And in the past few years, the referendum that could have tied the Swiss National Bank's hands was one meant to keep the Swiss National Bank from piling up too large a stock of foreign assets, not a referendum to prevent it from imposing negative interest rates.

Many of the people who argue most strenuously against negative interest rates are likely to be the same people who tend to argue for higher target rates and tighter monetary policy in other dimensions in almost every situation.

However, monetary 'hawks' in this sense might be able to get regular people more concerned about cutting interest rates into the negative region than a similar cut in interest rates in the positive region – even if different inflation rates in the two situations made the economics essentially equivalent.

There are some basic arguments that can be used to defend negative interest rate policy. The first – and perhaps the most important – is to explain to people repeatedly, ideally long in advance of when negative interest rates are actually needed, that the economics of negative interest rate policy are entirely conventional, except for a few details about how paper currency would be handled.

Second, it is worth saying over and over again that even for savers, deep negative interest rates for a short time during a serious recession, bringing speedy economic recovery, are better than zero nominal rates that are 2 per cent below inflation for years and years, accompanied by a lagging economy for that longer time.

Third, the focus on savers, while deeply entrenched in political thought, should be put into perspective by pointing out the benefits of negative interest rates to borrowers.

Fourth, it should be noted that – except when the new policy looked like the current system – people who use paper currency would be earning the same effective interest rate as people who kept their money in electronic accounts, and so would not be treated unfairly. Moreover, the fact that paper currency would earn the same as money in electronic accounts would mean that there would be no incentive to underuse paper currency.

Fifth, it may be useful to point out that the central bank can easily subsidise the provision of zero interest rates to small checking and saving accounts by tying such provision to the amount of a bank's reserves that is exempted from negative interest rates. (In addition to reducing political costs by encouraging banks to shield small accounts from negative interest rates, this can avoid undesirable effects on financial stability or bank lending from the strain on banks' profits and balance sheets that might result from banks choosing to shield small accounts from negative rates for customer relations reasons despite the absence of any subsidy.)

Sixth, many of those who argue for higher interest rates also want lower inflation. With the zero lower bound vanquished, the target rate for inflation can be lowered,

since inflation in the electronic unit of account is not necessary in order to steer away from the zero lower bound.

Also, for countries that, for good or ill, rely in an important way on seignorage revenue, seignorage revenue can be obtained by a paper currency interest rate *below* the target rate, regardless of the inflation rate in the electronic unit of account. Thus, inflation in the unit of account is not necessary for seignorage, removing one temptation towards higher inflation.

In the context of discussing seignorage, it may be worth trying to insist that a negative paper currency interest rate is *not* a tax if it simply equals the target rate. It is only a paper currency interest rate below the target rate that is a tax. Though we are used to it, a zero paper currency interest rate is a tax if the target rate is positive; but a negative paper currency interest rate is not a tax if the target rate is equally negative.

Seventh, the possibility of deep negative interest rates means that aggregate demand is no longer scarce. Thus – except perhaps for the nine-month or so lag before monetary policy takes hold – there is no need for any other means of affecting aggregate demand. With negative interest rates in play, fiscal policy can focus on the long run and getting good deals for taxpayers rather than aggregate demand stimulus. That in turn removes one important force leading to higher national debt. The possibility of deep negative interest rates makes quantitative easing unnecessary for aggregate demand management. And the possibility of negative interest rates means that many other things that people justify in part because they add to aggregate demand must stand on other merits, aside from any effects on aggregate demand.

Finally, the benefits of economic stabilisation should be emphasised. The Great Recession was no picnic. Deep negative interest rates throughout 2009 – somewhere in the –4 per cent to –7 per cent range – could have brought robust recovery by early to mid 2010. The output gaps the world suffered in later years were all part of the cost of the zero lower bound. These output gaps not only had large direct costs, they also distracted policymakers from attending to other important issues. For example, the later part of the Great Recession that could have been avoided by negative interest rate policy led to a relatively sterile debate in Europe between fiscal stimulus and austerity, with supply-side reform getting relatively little attention. And the later part of the Great Recession that could have been avoided by negative interest rate policy brought down many governments for whom the

*political* benefits of negative interest rate policy would have been immense. And for central banks, it looks good to get the job done.

## NOTE

- 1 As Ruchir Agarwal and I paraphrased in Agarwal and Kimball (2015), “Preliminary evidence for the pass-through and demand for cash at negative interest rates comes from Denmark (Danmarks Nationalbank, 2015). Since Feb 6, 2015 Danmarks Nationalbank’s rate of interest on certificates of deposit has been –0.75 per cent. The interest rate on certificate of deposits was lowered into negative territory to defend the Danish fixed exchange rate policy under which monetary policy rates are set solely to maintain a fixed exchange rate of the krone against the euro. The Danmarks Nationalbank study finds that the negative interest rates have not weakened the pass-through from Danmarks Nationalbank’s interest rates to money market rates. Moreover, consistent with the discussion above, they find that the negative interest rates have not been fully passed through to bank deposit and lending rates to households. However, large deposits from firms and institutional investors are extensively paying negative interest rates. Lastly, they find no evidence of any substantial change at the current level of interest rates in the way banknotes and coins (currency) in circulation are being used.”
- 2 The overtones of Bitcoin and its ilk in the phrase “electronic money” are a mostly unfortunate distraction analytically, but are a plus in popularising this proposal for eliminating the zero lower bound.

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