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The War on Cash: A Review of Kenneth Rogoff's *The Curse of Cash*

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LINK TO ABSTRACT

Central bankers and mainstream monetary economists have recently become intrigued with the idea of reducing or even entirely eliminating hand-to-hand currency. The most comprehensive defense of this proposal is Kenneth S. Rogoff's recent book *The Curse of Cash* (2016a).[2] Rogoff, a former chief economist at the International Monetary Fund and now a professor of economics at Harvard University, has for two decades been putting forward this idea, and it has already been partly implemented in some countries, particularly Sweden. *The Curse of Cash* is written in a way that is accessible to the intelligent layman but nonetheless incorporates sophisticated economic arguments, along with a wealth of fascinating facts. Rogoff qualifies his proposals with cautions and caveats. But even at its most careful and scholarly, his case for eliminating nearly all currency is, when not entirely mistaken, extremely weak.

Throughout the book, Rogoff confines the term 'cash' exclusively to paper money. In developed countries, he would phase out over a decade or more all large-denomination notes: in the United States, for instance, first $100 and $50 bills and then $20 bills and perhaps $10 bills. For small transactions, he would leave in circulation smaller-denomination notes, although he considers eventually replacing even these with "equivalent-denomination coins of substantial weight" to make them "burdensome to carry around and conceal large amounts" (2016a, 94, 96). To put this in perspective, $1, $2, and $5 notes comprise less than 2 percent of the value of U.S. notes, or a little over 3 percent if we add in $10 bills.[3] For less

1. San Jose State University, San Jose, CA 95192. I have received helpful comments from David R. Henderson and Ross Levatter, but the usual caveat applies.
2. Among Rogoff's many other writings on this subject are Rogoff (2014; 2016b; 2016c).
3. If we add Treasury coins to both total notes and to the notes Rogoff would leave in circulation, those percentages rise to 5 percent and 5.3 percent respectively. For the data, see the Board of Governors of the Federal Reserve System's "Currency in Circulation: Value" (2017).

developed countries, Rogoff concedes that it is "far too soon" to "contemplate phasing out their own currencies," yet still "there is a case for phasing out large notes" (2016a, 205).

Rogoff's argument proceeds along two prongs. Because cash is widely used in underground economic activity, he believes the elimination of large-denomination notes would help to significantly diminish such criminal activities as tax evasion, the drug trade, illegal immigration, money laundering, human trafficking, bribery of government officials, and even possibly terrorism. Suppressing such activities, he contends, would have the additional advantage of increasing government tax revenue. The second prong of Rogoff's argument relates to monetary policy. He believes that future macroeconomic stability requires that central banks have the ability to impose negative interest rates not only on bank reserves but on the public's money holdings as well. Although Rogoff generally makes his case thoughtfully and with attention to obvious objections, he sometimes enlivens it with alarmist and strident rhetoric.

The underground economy

In pursuing the first prong of his argument, Rogoff promises to demonstrate "that the overall social benefits to phasing out currency are likely to outweigh the costs by a considerable margin" (2016a, 8). But in reality, he significantly understates the social benefits of cash by essentially tossing off his hat as a positive economist to assume the role of an efficiency expert for the State. Starting off with a nice, brief survey of currency's history, Rogoff then looks at the current size and composition of global currency supplies. As of the end of 2015, not counting U.S. currency held in bank vaults, there was roughly $4,200 in cash per person in the United States, 80 percent in $100 bills. *The Curse of Cash* reviews estimates of how much of that currency is held abroad: between 45 and 60 percent. Once Rogoff gets to discussing the underground economy in the United States, however, he several times conveniently omits this detail. For instance, when reporting on diary surveys that suggest only one in twenty adult consumers holds $100 bills, he writes that this "is not quite the same as explaining why everyone isn't carrying around at least 34 of them" (ibid., 51). But if most of the U.S. currency held abroad is in the form of $100 bills, then he needs to explain only why U.S. residents seem on average to be holding around 12 of them. Although that is still a large amount, this omission illustrates just one of many instances where Rogoff slips into exaggeration.

No one denies that a lot of cash circulates within the U.S. underground economy, which is composed of both criminal activity and activity that is unreported but otherwise legal. Relying on IRS estimates of the legally earned but unreported taxes in 2006 and extrapolating forward to 2015, Rogoff approximates a net tax gap of $500 billion, of which at least half derives from cash transactions. By assuming that the elimination of most cash could close the entire gap by at least 10 percent, Rogoff puts the potential gains to the national government at $50 billion annually (or less than 0.3 percent of GDP), along with approximately another $20 billion gain for state and local taxation. He points out that "this calculation does not take into account the efficiency costs of tax evasion" (2016a, 61). But on the other side of the ledger, Rogoff does not mention the potential deadweight loss from taxing previously underground economic production. If he were really interested in doing a genuine welfare analysis, he would have given at least some consideration to the social costs of forcing what is productive unreported activity from a marginal tax rate of zero into marginal rates as high as 30 to 40 percent. Particularly revealing of this statist bias is a related aside where Rogoff mistakenly refers to legal tax *avoidance* through tax havens as tax *evasion* (ibid., 66).

The relative size of the underground economy in other countries, whether rich or poor, is almost universally larger than in the United States. Here are some of Rogoff's size estimates, as a percent of GDP, covering ostensibly only unreported activity that is otherwise legal: 7.1 percent for the U.S.; 9.2 percent for Japan; 10.6 percent for the UK; 12.3 percent for Canada; 15.3 percent for Sweden; 22.3 percent for Italy; and 28.9 percent for Turkey (2016a, 63). Indeed the high percentages for some of these countries (including developed countries such as Greece, Italy, Spain, and Portugal, to say nothing of less-developed countries) suggest that the underground sector is where a large fraction of their ordinary citizens live and survive. Rogoff concludes that the GDP "share of Europe's shadow economy is more than double" that of the U.S. (ibid.), and he admits that this probably stems from higher tax levels and more burdensome regulation in Europe. But rather than reaching the obvious economic conclusion that the deadweight loss in Europe from inhibiting these activities would therefore be considerably larger than in the U.S., Rogoff instead touts "the benefits of phasing out paper currency" in Europe "in terms of higher tax revenues" (89).

When Rogoff gets to criminal activities such as illegal drugs, corruption, and human trafficking, he descends primarily into lurid anecdotes to buttress his claim that eliminating cash would curtail these activities.[4] But here again, the only reason that drug cartels generate such huge profits is that they provide products

4. A more systematic study of the use of high-denomination notes in criminal activity (as well as in tax evasion) is Sands (2016). Like Rogoff, Sands extols the potential revenue gains for government but provides few estimates of how significant those gains would be, and when he does, the estimates are more limited in scope than Rogoff's and the projected gains are smaller. For instance, looking at only the self-employment tax in the U.S., Sands projects a revenue increase of a mere $10 billion. Sands also looks for some numbers about the magnitude of potential crime reduction but ultimately is forced to conclude

that supply something that consumers demand. Rogoff as an individual may paternalistically disapprove of such preferences, but Rogoff as an economist should at least include in his welfare analysis the lost consumer surplus from any further hindrance to serving those preferences. To be fair, he offhandedly mentions legalization of marijuana as a simpler approach for at least that part of the illegal drug trade, but he otherwise does not attach much weight to the enormous enforcement costs and human toll from ruined lives of the largely unsuccessful war on drugs.

Particularly bizarre are Rogoff's repeated casual references to illegal immigration as "exploitation of migrant workers" (2016a, 67, 74, 75). His extenuating affirmation that "countries have a sovereign right to control their borders" is scarcely relevant to any welfare analysis (ibid., 75). And despite asserting that he "strongly favor[s] allowing increased legal migration into advanced economies" (76), Rogoff clearly taints as among the exploiters the employers that pay wages high enough to attract illegal immigrants, in spite of all the other obstacles illegal immigrants face. When he champions his scheme as "far more humane and effective" than "building huge border fences" (p. 2), he reveals his scant concern for the welfare of such immigrants. As for corruption and bribery, Rogoff admits that they are really serious only in poorer countries—precisely where he also concedes that a premature elimination of cash would have devastating economic consequences. Ending his analysis of criminal activity are sections on terrorism, counterfeiting, and the health hazards of disease transmission through currency, but he concludes that eliminating cash would have at best trivial impacts on any of these, in part because the last two are minor concerns to begin with.

The one major cost that Rogoff does take seriously is the lost government revenue from issuing cash, what economists refer to as 'seigniorage.' But here he plays somewhat of a bait and switch on his readers by comparing one of his estimates for annual U.S. seigniorage (0.3 percent of GDP) to the IRS estimate of the total level of tax evasion within the U.S. (2.7 percent of GDP) (2016a, 83), rather than to his own previously estimated tax gain from eliminating cash (which happens also to be 0.3 percent of GDP). By thus looking at the total federal tax gap of $500 billion rather than a possible $50 billion tax gain from eliminating cash, he asserts "that the potential gains from reducing tax evasion should *at least* offset the forgone costs of seigniorage" (ibid., 89, my emphasis), an assertion he continues to repeat throughout the book.[5] Even if we take $50 billion as merely Rogoff's lowest

"there is scant empirical evidence" and "it is impossible to be definitive about the scale of impact on tax evasion, financial crime and corruption" (2016, 39, 43).

5. E.g., "I have also argued…that the entire amount of seigniorage revenue loss is likely canceled out by indirect benefits due to higher tax revenues from the underground economy" (Rogoff 2016a, 202).

guess, that still does not make close to reasonable his use of the $500 billion tax gap for comparison. He himself pointed out that as much as half the total gap does not involve cash at all.

Moreover, as Rogoff goes on to explain, 0.3 percent represents annual lost seigniorage from only *future* increases in U.S. currency. But to phase out cash, the U.S. government would also have to replace *existing* currency with more government interest-bearing debt. Rogoff admits that "[i]f the US government had to issue bonds to buy back the entire supply of dollar paper currency, it could add more than 7% of GDP to the national debt" (2016a, 217). Adding this amount generates his highest reckoning of the combined *annual* cost of eliminating both existing and future U.S. currency: $98 billion, or over 0.5 percent of GDP.[6] At one point he throws in a counter-example: if 50 percent of U.S. currency still remained in circulation it would provide the Federal Reserve and therefore the government with $35 billion a year in seigniorage, as the remaining proportion of cash continued to grow at past rates (ibid., 85). This scenario is peculiarly incongruous with Rogoff's proposal, given that 80 percent of U.S. currency is in $100 bills, which he wants to eliminate entirely, and that about 50 percent of U.S. currency is held abroad. Later he more realistically conjectures that only 10 to 20 percent of currency would remain in circulation (still considerably more than the 5.3 percent constituting all the other currently circulating coins and bills up to $10, which Rogoff would not eliminate). Yet none of these further speculations reduce the lost revenue to an amount below Rogoff's projected minimum tax gains from phasing out currency, even if we add his estimated $20 billion gain to state and local taxes to his estimated $50 billion gain to federal taxes.

True, other developed countries without a foreign demand for their currency have much lower rates of seigniorage than the U.S., such as Canada and the UK

6. Rogoff's derivation of this amount can be confusing. He correctly points out that "there are two ways to think of seigniorage in a modern context": monetary seigniorage and opportunity cost seigniorage (2016a, 81ff.). Monetary seigniorage is the expenditure gain from the government issuing currency. Opportunity cost seigniorage is the ongoing interest the government would have had to pay if it had financed those same expenditures through issuing debt rather than currency. But in long-run equilibrium they are just two ways of estimating the same seigniorage, since the present value of the infinite stream of interest government does not have to pay on currency should equal the total value of the currency outstanding. Rogoff also properly excludes from his cost estimates that part of seigniorage arising from bank reserves, both because those reserves would not be eliminated by his proposal and because nowadays it is partly offset by the interest that central banks pay on reserves. But Rogoff appears to add the two ways of calculating the same number together when he states: "At a 4% average interest rate on debt and 2% percent inflation rate, a real burden of $28 billion per year would be added to the $70 billion a year that the government would forgo in monetary seigniorage for a total of $98 billion per year" (ibid., 87). What he in fact is doing is using "opportunity cost seigniorage" to determine the annual cost of substituting interest-bearing debt for existing currency and "monetary seigniorage" to determine the annual cost of no longer issuing more currency in the future.

(0.18 percent of GDP for both), and therefore government losses if those countries eliminated cash would be less severe. But for the United States at least, Rogoff has failed to make a credible case that his proposal to phase out most cash would create a net gain for the government, much less a net benefit for society overall. His promise that such tax gains will leave the government "in a position to collect less taxes from everyone else" (2016a, 217) turns out to be not only politically gullible but also at odds with some of his own estimates.

Seigniorage itself arises from an implicit tax on people's real cash balances, with an associated deadweight loss. Yet the fact that people continue to demand and use hand-to-hand currency demonstrates that it still brings net benefits. (For the U.S., the only exception is pennies and nickels, which cost more to manufacture than their face value and therefore generate negative seigniorage.) After all, many alternatives to cash exist already—checks, debit cards, credit cards, Automated Clearing House transactions, mobile payment devices—and at the margin people are taking considerable advantage of them. In the future, entrepreneurs will undoubtedly come up with innovations and cost cuts that make these alternatives even more attractive. But to prematurely force people into digitized, electronic payments by eliminating nearly all cash, rather than allowing this transition to proceed through a spontaneous market process, would cause still another welfare loss from Rogoff's scheme (White 2017).

Rogoff acknowledges "the world's mountains of cash are not going to fade anytime soon, unless governments actively move to phase out paper currency" (2016a, 281). He also implicitly recognizes that the cost of such a transition is far from slight, when he advises that "any plan to drastically scale back the use of cash needs to provide *heavily* subsidized, basic debit card accounts for low-income individuals and perhaps eventually smartphones as well" (ibid., 2–3, my emphasis). If the government takes the cheaper option, by merely providing 80 million free, basic electronic-currency accounts for low-income individuals, Rogoff puts the bill at $32 billion per year. He tries to wave away this expense by again invoking inflated tax gains as well as alleged "collateral benefits in fighting domestic inequality" (99). But he realizes that even this subsidy might not be sufficient to make people abandon cash willingly. So he also toys with more "aggressive" coercive inducements such as setting "a date after which large notes expire" (95), restricting "the maximum size of cash payments," or "introducing charges for very large deposits (or groups of deposits) of small bills" (115).

Only toward the end of *The Curse of Cash* does Rogoff get around to discussing how his proposal would affect those employing the approximately 50 percent of United States currency held abroad. He realizes that "some would argue that large U.S. notes are a powerful force for good in countries like Russia, where paper dollars give ordinary citizens refuge from corrupt government officials"

(2016a, 203). But he then goes on to claim, without citing a shred of quantitative evidence, that "for every case where dollar or euro paper currency is facilitating a transaction that Americans might somehow judge morally desirable, there are probably many more cases where they would not, for example, human trafficking in young Russian and Ukrainian girls to France and the Middle East" (ibid.). Even if this bold claim were remotely close to accurate, it would still ignore the poor outside the United States who rely on dollars. Would he have the U.S. government provide them with basic debit-card accounts or smartphones as well? And how could this even be accomplished in poor countries lacking adequate banking sectors?

Rogoff simply ignores negative effects on countries that have completely dollarized (Panama, Ecuador, El Salvador, East Timor, the British Virgin Islands, the Caribbean Netherlands, Micronesia, and several small island countries in the Pacific) or partially dollarized (including Uruguay, Costa Rica, Honduras, Bermuda, the Bahamas, Iraq, Lebanon, Liberia, Cambodia, and Somalia, among others), unless you count his oblique and curt dismissal of any "foreign policy argument" as "extremely dubious" (2016a, 203). He does mention the Zimbabwe hyperinflation and how the U.S. dollar helped bring that to an end, but then conveniently forgets about this episode when considering the impact on the rest of the world of eliminating all but the smallest denominations of U.S. currency. This is just another instance of Rogoff's disdain for a complete cost-benefit analysis. As Pierre Lemieux, in a critical review of *The Curse of Cash*, succinctly puts it: "the economist venturing into normative matters would normally attach the same weight to a foreigner's welfare as to a national's" (2017, 51).

In fact, a full and complete welfare analysis might arrive at the opposite of Rogoff's conclusion: there may be too little currency in circulation rather than too much. After all, government already biases people's decision against use of paper currency with its monopoly, which generates seigniorage well above costs. Larry White (2016) has pointed out that "we can withdraw all the denominations that the Federal Reserve and the Treasury issue so long as we let competing private financial institutions issue dollar-redeemable notes and token coins in any denominations they wish." Kurt Schuler (2001) has discovered that within the United States the legal restrictions on private banknotes have already been repealed inadvertently by Congress. In all likelihood federal authorities would come down hard on any bank that tried to take advantage of this unintended legal loophole, and the private minting of coins is still prohibited. Moreover, debit cards have made bank deposits nearly as easy to spend as banknotes once were. Yet if economists like Rogoff were more willing to promote such an enhancement of monetary freedom, rather than further restrict it, then as White states, "we will have a market test and not mere hand-waving regarding which denominations are worth having in the eyes of their users."[7]

Negative interest rates

The second prong of Rogoff's argument for phasing out currency is that it would facilitate imposition of negative interest rates. The idea that a negative return on money might sometimes be desirable is not entirely new. It dates back at least to the work of a German economist, Silvio Gesell, in the 1890s, and it was flirted with during the Great Depression by Irving Fisher (1933; see Champ 2008; Gatch 2009) and John Maynard Keynes (1936, 353–358). In its current incarnation, the potential need for imposing negative interest rates is grounded in New Keynesian macroeconomic theory. The reasoning is as follows. When an economy sinks into a depression, the central bank should stimulate aggregate demand by lowering interest rates. But if interest rates are already extremely low, in what is alternately termed the 'zero lower bound' or a 'liquidity trap,' central banks are constrained in their ability to do this.

Central banks can charge a negative interest rate on the reserves that commercial banks and other financial institutions hold as deposits at the central bank. Those of Denmark, Switzerland, Sweden, the Eurozone, and Japan, have already started to do so. The practice in turn puts pressure on the private banks to charge negative rates on their own depositors. If the monetary authorities push negative rates too far, however, the public can just flee into cash with its zero nominal return. Banks can also do the same by replacing their deposits at the central bank with vault cash. Elimination of cash would close off this way of avoiding negative rates, making negative rates truly comprehensive and effective.

The term 'negative interest rates' actually obscures somewhat the nature of what Rogoff contemplates. Reserve requirements on banks used to be common, but several central banks today—although not yet the Federal Reserve—have abandoned them, in part responding to the observation of economists that required reserves represent an indirect tax on banks, making them hold more non-interest earning assets than otherwise. So another way of thinking about negative rates on reserves is as a direct rather than indirect tax on banks. If the negative rates can be extended to the general public, they in effect represent a *direct* tax on the public's cash balances, or more precisely monetary balances, since most cash would be gone. In fact, Rogoff frequently describes negative rates as a tax on money. The one exemption from this near-universal levy that Rogoff considers is for "accounts

7. For how a system of competitive note issue would operate, see Selgin 1988.

up to a certain amount (say, $1,000–$2,000)" (2016a, 99). Inflation, of course, already imposes an *implicit* tax on real cash balances. Negative rates thus reverse the causal chain of traditional monetary theory, which focuses on the money stock. To the extent monetary expansion increases spending, it causes higher inflation with its implicit tax on money. Negative interest rates, in contrast, would directly tax money in order to cause increased spending with higher inflation. I explore the importance of this difference below.

Rogoff starts off his plea for negative rates with another exaggeration, stating that "the zero bound has essentially crippled monetary policy across the advanced world for much of the past 8 years" (2016a, 4). Yet when he gets to the meat of his analysis, he more cautiously concludes that "the rapidly evolving academic literature is far from unanimous in concluding that the zero bound is a big problem for conventional monetary policy" (ibid., 135). We therefore need to address four questions about directly taxing money with negative rates. (1) Is the policy needed? (2) Will the policy work? (3) Is the policy more effective than alternatives for achieving the same goal? (4) Does the policy avoid additional downsides that would make it risky or dangerous? Rogoff deals in some detail with each of these questions, finding in the affirmative for all four. Let us see why his answers are largely unconvincing.

Is the policy needed?

Are negative interest rates needed? If we take a long look back over the last three quarters of a century, even the most enthusiastic proponents of negative rates, including Rogoff (2016a, 118), can identify only three cases when negative rates arguably might have helped: the Great Depression, Japan's lost decade, and the financial crisis of 2008. Also quite a stretch is Rogoff's claim that the zero bound has "crippled monetary policy" ever since the financial crisis (ibid., 4), merely because interest rates and inflation remain low and growth remains slow. Economists are far from having reached a consensus about the causes of these trends. Among the competing explanations, several of which *The Curse of Cash* discusses, the secular stagnation thesis of Lawrence Summers (2014; 2016) does leave room for a more expansionary monetary policy.[8] But those who contend that slow growth results from declining innovation, such as Tyler Cowen (2011) and Robert Gordon (2016), give monetary policy almost no role. And Steve Hanke (2014), applying the concept of regime uncertainty (Higgs 1997), suggests that the possibility that activist monetary policy might even be part of the problem (see also Calomiris 2017).

8. For a compelling critique of the secular stagnation thesis, see Bernanke (2015b).

A more fundamental issue, however, is whether the zero bound constrains monetary policy at all. Allegedly very low interest rates make money demand so elastic that any increases in the money stock are locked up in people's cash hoards and banks' reserves, rather than being spent. Yet Ben Bernanke back in 2000, and again in 2002, looking at Japan's experience with low interest rates, pointed out that a central bank through merely increasing the monetary base can ultimately buy up everything in the entire economy—except that sometime before it has done so, people will certainly start spending and drive up inflation (Bernanke 2000; 2002; see also Selgin 2016g). This scenario is sometimes referred to as a 'helicopter drop,' and it supposedly failed to work when the Federal Reserve, under Bernanke's leadership, engaged in quantitative easing.

A close examination of the Fed's quantitative easing, however, discloses that Bernanke's policies never involved authentic monetary expansion. Because of concerns about inflation, as Bernanke (2015a) divulges in his memoirs, the Fed sterilized its bailouts of the financial system during the early phase of the financial crisis, selling off Treasury securities to offset any impact on the monetary base. When in October of 2008 the Fed finally orchestrated its large-scale asset purchases, it did so mainly by borrowing the funds, through a special supplementary financing account from the Treasury, through reverse repos, and most important, through paying interest on bank reserves for the first time (Hummel 2011; Beckworth 2015). When the Fed thus borrows the money that it then re-injects into the economy, it is not in any real sense creating new money.

Interest-earning reserves in particular encourage banks to raise their reserve ratios rather than expand their loans to the private sector. This newly implemented monetary tool (acting as a substitute for minimum reserve requirements) therefore ended up lowering the money multiplier at the same time the Fed was increasing the monetary base. Looked at from another angle, the Fed became the preferred destination for a lot of bank lending, borrowing with interest-earning deposits in order to purchase other financial assets. Almost the entire explosion of the monetary base constituted this kind of *de facto* borrowing. In this way, the later phase of Bernanke's policies transformed the Fed into a giant government intermediary that merely reallocates credit. Such financial intermediation can have no more impact on the broader monetary aggregates than can the pure intermediation of Fannie Mae or Freddie Mac. In short, quantitative easing hardly entailed "massive 'money printing,'" as Rogoff (2016a, 136) characterizes it (Hummel 2014a; Selgin 2015; 2016a; b; 2017).

Other central banks that dabbled in so-called quantitative easing did so later than the Fed and with similar impediments. The European Central Bank (ECB), being particularly concerned about inflation at the outset of the financial crisis, initially conducted an even tighter monetary policy than the Fed. Only with the

European debt crisis did the ECB in 2010 begin its first round of quantitative easing, at a time when it was still continuing its longstanding policy of paying interest on reserves.[9] When the ECB initiated its second round of quantitative easing in January 2015, it was applying negative rates, but only on excess reserves. And the ECB did not drop the positive interest on its required reserves to zero until March 2016 (ECB 2002; Bernhardsen and Lund 2015; Cœuré 2014). By then, the newly imposed Liquidity Coverage Ratio of Basel III had already gone into effect. The Liquidity Coverage Ratio is more complicated than reserve requirements, but it too can induce banks to hold more reserves than otherwise (Hummel 2015a; 2016). In sum, it is far from true that after the financial crisis drastic monetary expansion was tried and failed. Instead, it was not actually tried.

Will the policy work?

Will negative interest rates work? As Stephen Williamson (2017), formerly at the St. Louis Fed, points out in a review of *The Curse of Cash*, the results of early trials with negative rates have not been promising: "the central banks that have experimented with negative nominal interest rates…appear to have produced very low (and sometimes negative) inflation." But I agree with Rogoff; these early experiments have been too few and too tentative to provide definitive conclusions. They have been almost entirely confined to negative rates on bank reserves, and usually only excess bank reserves. The Bank of Japan even grandfathered in excess reserves acquired before the new policy with a positive return of 0.1 percent. To determine how well negative rates might work, we must take up more theoretical issues.

Rogoff believes that, with a few minor adjustments, "cutting interest rates in negative territory (e.g., from −1.0% to −1.5%) works pretty much the same way as interest rate cuts in positive territory does (e.g., from 1.5% to 1.0%)" (2016a, 127). But on the contrary, this symmetry clearly does not hold at the operational level. To the extent that central banks affect interest rates in positive territory, they do so with open-market operations or their equivalent, resulting in changes to the monetary base and bank reserves. But the very reason the zero bound is considered a problem is that these tools presumably do not work as well, if at all, in negative territory. Negative rates, in contrast, can be imposed and managed simply by taxing bank reserves. They therefore require no concomitant open-market purchases or

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9. The most direct evidence about the ECB's past monetary policies is available on its website (2017). The page offers an interactive chart of the ECB's consolidated balance sheet, which displays the changing size of either ECB assets or liabilities over time. The page also has links to the ECB's "Annual Reports" and "Weekly Financial Statements."

sales and therefore place no automatic market constraints on how far down the monetary authorities push negative rates.

At first glance, this operational asymmetry would seem to make taxing money more powerful than open-market operations. Yet the operational asymmetry between the two leads to an asymmetry in how they bring about changes in spending. Unlike open-market operations that affect the *supply* of money, negative interest rates affect the *demand* for money. They are designed to increase money's velocity. In contrast to constant money growth, which can generate *sustained* inflation, any increase in velocity induced by plunging into negative rates should have only a *level* effect, generating at best a one-shot rise in the price level. Admittedly, if the rate at which money balances are taxed continually rises, the central bank could in theory produce sustained inflation. But neither Rogoff nor other advocates of taxing money appear to have in mind a policy that continually pushes negative rates lower and lower.

This difference suggests that negative rates should have weaker effects than monetary growth. Rogoff expects that negative rates might need to be in place "for a year or even two" (2016a, 181) for them to achieve even this limited impact on spending. A sustained velocity boost does occur during hyperinflations, but that is only because the government, starved for tax revenue, continually increases the rate of monetary growth to maintain the real level of its seigniorage after each jump in velocity. Once monetary growth is under control, velocity boost always ceases. To be truly effective at bringing up the *rate* of inflation, rather than just an unsustained spending bulge, a negative-rate policy would likewise require accompanying monetary expansion. But if monetary expansion is doing the real work anyway, why is a tax on money needed at all?

There are other perspectives from which to challenge the efficacy of negative interest rates. Williamson in his review of Rogoff's book accepts the neo-Fisherian approach of John Cochrane (2014a; b; Williamson 2016), believing that "that central bankers have the sign wrong" (Williamson 2017). Invoking the long-run Fisher effect, in which higher expected inflation drives nominal interest rates up and vice versa, Williamson contends that a negative "nominal interest rate reduces inflation, even in the short run."[10] I believe that the neo-Fisherians get the causality backwards—running from the nominal interest rate to the rate of inflation rather than the other way around—*except* in the very case of taxing money holdings, in which the negative rate can indeed be entirely divorced from what is happening to the money stock.

The confusions about the symmetry between positive and negative interest-rate policies, as well as the misconceptions about quantitative easing mentioned

10. For critiques of the Neo-Fisherian approach, see Rowe (2016) and Sumner (2016).

above, stem from the current focus on interest rates as the sole target and indicator of central bank policy. As George Selgin (2016c) has incisively expressed it: "it seems to me that in insisting that monetary policy is about regulating, not money, but interest rates, economists and monetary authorities have managed to obscure its true nature, making it appear both more potent and more mysterious than it is in fact."[11] However one ultimately resolves these captivating theoretical debates about the channels through which monetary policy actually works, they certainly call into question whether taxing money will achieve the macroeconomic goals that Rogoff prophesizes.

Is the policy more effective than alternatives for achieving the same goal?

Are negative interest rates more effective than alternatives for achieving the same goal? One of the best parts of *The Curse of Cash* is its detailed examination of alternative ways of dealing with the zero bound (if only Rogoff had wielded the same skepticism with respect to his own scheme). I will not repeat his often penetrating assessments of forward guidance (another policy that, like negative rates, attempts to influence the demand rather than the stock of money), higher inflation targets, fiscal policy, Marty Feldstein's plan to stimulate spending with a value-added tax, Silvio Gessel's stamp tax on money, and the dual-currency schemes of Robert Eisler, Stephen Davies, Willem Buiter, Ruchir Agarwal, and Miles Kimball.

Although Rogoff by no means demonstrates that all these alternatives are worse than taxing money, he is persuasive that none is simultaneously attractive and effective. Forward guidance, for instance, is unobjectionable but not by itself very potent. I only strongly disagree with Rogoff regarding two additional alternatives he critiques: nominal GDP targeting and helicopter money. He does raise some transitional problems for targeting nominal GDP. But given Rogoff's belief that central banks have become too wedded to inflation targeting, you would expect him to be more enthusiastic about nominal GDP targeting. It would make for a significant improvement in how central banks handle supply-side shocks, and indeed inflation targeting was one factor making responses to the financial crisis so muted.

My other dispute is with Rogoff's understanding of Milton Friedman's well-known thought experiment with a helicopter drop of money (Friedman 1970). In deference to today's technology, Rogoff restyles this as 'drone money' and assumes

11. See also Selgin (2016f) and Hummel (2017). Earlier, more popular presentations of the same argument are given in Hummel (2014b; 2013).

it requires "some other institutional change" (2016a, 155–156). What he essentially has in mind is coordination with fiscal policy. Bernanke (2016b), beginning with his papers on Japan, is actually responsible for this misinterpretation, because he coupled the projected monetary expansion with either a tax cut or some government expenditure to distribute the money. But Friedman in his classic chapter on "The Optimum Quantity of Money" never linked his helicopter drop with any fiscal initiative, nor is there any reason whatsoever that it has to be linked.

We noted above when explaining the apparent impotence of quantitative easing that, so long as the central bank expands the monetary base with newly created money rather than recycling funds through financial intermediation, it can eventually hit any inflation target it chooses. Although we can imagine circumstances in which the desired expansion would exceed the supply of Treasury securities available for open-market purchases, central banks can purchase and have purchased other financial assets or made other types of loans. The Fed has already purchased mortgage-backed securities, and other central banks have extended their acquisitions still more broadly, some even purchasing equities. Though far from ideal, such limited and hopefully temporary expansion of central-bank involvement in credit markets would be less invasive than an untested, all-embracing money tax.[12]

Does the policy avoid additional downsides that would make it risky or dangerous?

Do negative interest rates avoid any additional downsides that would make them risky or dangerous? Although some (e.g., Fairless and Neumann 2016; Bernanke 2016a) have raised concerns over the impact of negative rates on lending generally and on the viability of such financial institutions as banks, pension funds, and money market funds, these concerns mostly derive from negative rates imposed only on bank reserves, with cash still widely available.

Far more complex is the ultimate world Rogoff envisions, with all but the smallest denominations of currency gone and therefore most money held as deposits at financial institutions or in some other electronic form. Presumably in this world the money tax would impinge on nearly all lenders and borrowers across the board, except those with small exempt accounts or who are holding the remaining cash and coins. No one to my knowledge has systematically worked out how financial intermediation would function in this world, either in the short or long run. It is even unclear whether nominal interest rates generally would turn negative. In the range of positive rates, lenders and borrowers respond to infla-

12. Selgin (2016d) suggests a limited way of making open-market operations more flexible.

tion's implicit tax on cash balances by *raising* market-determined nominal rates. What is to prevent the same outcome from an explicit tax on money that is more akin to a near-universal service fee for deposit balances? This is a broad topic too daunting for this review, and outside of a few stray observations about how certain financial practices or institutions might adapt, *The Curse of Cash* does not take up the challenge.[13]

Rogoff does, in an unusual display of epistemic humility, offer an instructive analogy between policymakers who "wade deeper into negative interest rate territory" and a person "who ventures slowly into the water. … As she wades in deeper," she may "encounter sharp rocks, barnacles, and jellyfish" or be "swept out to sea by an underwater ocean current" (2016a, 175). But then Rogoff unaccountably proceeds to focus primarily on such secondary complications as the effect on central bank independence and monetary rules. He is particularly worried about undermining the independence of central banks. I can only reply that my hope is that the abolition of cash with negative rates would do just that. Whatever the current benefits of central bank independence, they pale in comparison to an unelected regulatory body having discretionary power to tax money. Surely such an encompassing tax, if it is imposed at all, should be under the control of the legislature.

The one deep theoretical complication Rogoff considers, primarily in an appendix, is whether a cashless economy would leave the price level indeterminate. The possibility was once raised by Neil Wallace (1981), in a conjecture about the role of legal restrictions in a fiat money regime, but Rogoff also brings into this discussion the fiscal theory of the price level and the frequently resurrected Chicago Plan for imposing 100-percent reserves on banks. He concludes, citing Michael Woodford's *Interest and Prices* (2003), that "price stickiness" will "allow the government to control inflation, even without having a currency to control" (Rogoff 2016a, 226). But Woodford's influential tome never discusses the impact of negative interest rates on a cashless economy. Instead his models assume that "it is infeasible to pay negative interest on currency" and that "an attempt to pay negative interest on central-bank balances would lead to zero demand for such balances" (Woodford 2003, 75 n.9).

All considered, it is hard to be consoled by Rogoff's almost self-contradictory complacency about negative rates in a cashless economy: "One's gut instinct is that shifting to electronic currency will be a fairly smooth process, though

13. One avenue that may be worth exploring is analyzing a universal service fee on deposits as similar to the interest-rate caps on deposits in the U.S. prior to financial deregulation. Those operated like an explicit tax on deposits during high inflation. As they were phased out during the Volcker years, they assisted his disinflation by increasing money demand.

it is simply not possible to definitely rule out the possibility that it will upset social conventions and expectations and lead to an outcome that is quite different than planned. This is the kind of 'known unknown' that government must plan for in making a transition" (2016a, 227). This blasé reliance on government planning to resolve any unexpected difficulties brings us to our next subject.

The public-choice dimension of a war on cash

Let us grant for a moment that the phasing out all but small-denomination notes would accomplish what Rogoff has failed to convincingly substantiate: that it would bring about not just a small but a marked reduction in crime, particularly bona fide predatory acts such as extortion, human trafficking, and violence associated with the drug trade. Would it still be desirable? Not necessarily. We first must consider the welfare of those who use cash for perfectly legitimate or benign reasons. We have already seen above that Rogoff does not come close to quantitatively estimating the welfare loss to these users of cash, except for his estimate of a minimum of $32 billion to subsidize debit-card accounts for the poor, which we can take as the lower bound. But there are further political-economy considerations that go beyond a strict cost-benefit analysis. Even when gains appear to be greater than losses, we should still hesitate about policies that punish or severely inconvenience the perfectly innocent.

Lemieux (2016) trenchantly points out: "Criminals are probably more likely than blameless citizens to invoke the Fifth Amendment against self-incrimination, or the Fourth Amendment against 'unreasonable search and seizures.' … But that is not a valid reason to abolish these constitutional rights." These are necessary institutional constraints on State power, not just protecting the innocent but proscribing barriers that protect a free society more generally. And as Lemieux goes on to argue, the underground economy itself is another such constraint. "As regulation increases, more people—consumers, entrepreneurs, unfashionable minorities—move to the underground economy. Thus, government cannot regulate past a certain point." Cash in other words enables people not only to escape harmful or misguided government intrusions, but also, in an indirect but effective way, to express their political concerns. As Frédéric Bastiat (1998/1850) put it: "The safest way to make laws respected is to make them respectable."

Indeed, one could argue that the underground economy is often a more effective check on government abuses than voting itself. Voting encounters well-established free-rider problems, fostering rational ignorance about political choices, all of which is amplified by confronting voters with at best a packaged bundle of usually unrelated policies. The underground economy, in contrast, allows citizens to focus their grievances on particular government interventions that they understand from firsthand experience. And the fact that the risk associated with their illegal transactions imposes a real cost dramatically demonstrates their genuine preferences, in stark contrast to pulling a lever or checking a box in a voting booth, which is virtually costless and inconsequential on an individual basis. Would alcohol prohibition in the U.S. have been repealed without widespread evasion by countless Americans? Would the U.S. be belatedly moving to marijuana legalization without the escape mechanism of the underground economy?

Harold Demsetz (1982, 119–123) recognizes this "equilibrating process" fostered by the underground economy. He describes it as a system of "internal checks and balances," in which "current developments seem to be making underground sectors more important."[14] Obviously none of these considerations excuse human trafficking and other forms of violence or brutality that are also within the underground economy. But as noted above, Rogoff offers no more than emotionally charged impressions about the magnitude of these acts compared to harmless or beneficial uses of cash, and even grants that "on the scale of global cash holdings, terrorism is a relatively minor factor" (2016a, 77). One should be very cautious about drastic government impositions that indiscriminately impinge on almost the entire population, no matter how deplorable the outrages they are intended to curb. Careful consideration should be given to alternative legal remedies that do not cast their web so widely. Yet judging from *The Curse of Cash*, Rogoff believes that as long as laws are on the books, every effort should be made to ensure they all are strictly and implacably enforced.

Rogoff's faith in government is so strong that he evinces no discernible unease about the possible abuse of even his proposed interventions. To be sure, he cushions his proposal with qualifications and constraints. "The long timeline is intended to give people and institutions time to adjust and to help policymakers navigate unforeseen problems" (2016a, 9). He would leave in circulation small-denomination notes or coins (albeit without proposing any adjustment for their declining relative importance as inflation erodes their real value). He concedes that there just might be some threats to privacy: "When phasing out paper currency, the most fundamental and difficult issue is how to balance an individual's privacy rights with the government's need to enforce laws, collect taxes, and combat terrorism" (ibid., 100). Occasionally he exhibits some pro-market sentiments: his inclination to legalize marijuana; his favoring increased legal immigration; his proviso that "central banks just tiptoe into negative rates," lest a "technical problem interferes with normal market functioning" (158); and his admission that negative rates are

14. Elert and Henrekson (2017) go further, arguing that "evasive entrepreneurship" within the underground economy helps to bring about significant and desirable institutional innovations.

"no panacea" and no substitute for "market-friendly reforms" (196). Notice, however, that Rogoff is entirely willing to rely on policymakers to "navigate unforeseen problems."

Now consider the battery of ancillary coercive regulations that Rogoff thinks might be vital to ensure the success of his proposal. In addition to the aggressive inducements to get people to turn in their cash already mentioned above (expiration date on large notes, restrictions on the maximum size of cash payments, and charges for very large deposits of small bills), Rogoff's supplemental interventions include "a regulatory regime for cryptocurrencies [such as Bitcoin and Etherium] that allows only relatively small anonymous transactions" (2016a, 214); "more forceful steps…to pull the plug on money market funds, which in the current environment remain a regulatory end-around" (ibid., 86); lowering cash limits on anti-money-laundering regulations (201); "stopping casinos from laundering wholesale quantities of euros" (201); redoubling of "efforts to discourage" prepaid cards "as an alternative for moving large sums anonymously" (97); and banning "large-scale currency storage" or imposing "a tax on storage over a certain amount" (160–161). Rogoff is also quite comfortable with the Swedish government's requirement of "certified cash registers with a special control unit (black box) attached to the register" that "downloads all sales, and the data can be read directly (only) by the Swedish tax agency" (107).[15]

And if this barrage of interventions proves insufficient, Rogoff is certain that the government will be "vigilant about playing Whac-a-mole as alternative transaction media come into being" in order to make any alternative currencies "impossible for financial institutions to accept" and "difficult to use in ordinary retail establishments" (2016a, 9). He predicts that "[t]o the extent that new approaches to financial transactions are developed to evade government efforts to root out their sources, they will be met with a stiff hand" (ibid., 214). After all, "it is hard to stay on top of the government indefinitely in a game where the latter can keep adjusting the rules until it wins" (208). Rather than considering this government capacity a chilling concern, Rogoff enthusiastically embraces it.[16]

The Curse of Cash appeared before India's economically chaotic currency swap, in which Prime Minister Narendra Modi announced on November 8, 2016, that the country's two highest denomination notes (the 500 rupee, worth about \$7.50, and the 1000 rupee, worth about \$15) would cease to be legal tender at midnight. In a move designed to reign in tax evasion, people were given slightly

15. For an illuminating despite generally favorable personal impression of Sweden's steps toward a cashless economy, see Heller 2016.
16. Selgin (2016e) makes the additional observation that Rogoff is oblivious to how regulations designed to inhibit market innovations that Rogoff doesn't like could have the unintended consequence of inhibiting market innovations he would consider desirable.

less than two months to exchange these notes, with restrictions, for new ones. On the one hand, Modi's decree, which applied to 86 percent of the value of cash in circulation, was inconsistent with Rogoff's strictures that phasing out cash should be very gradual and that doing so was currently inappropriate for emerging economies. Nor was the experiment even a phaseout of high-denomination currency but instead an exchange, in which a larger 2000-rupee note was introduced. Nonetheless, India's experience should serve as a warning about potential government mismanagement and high-handedness. But Rogoff (2016d), in a blog post pointing out the inconsistences with his own plan, praises the "motivation" behind India's approach, predicting that, despite "short run costs," the "long-run effects on India may well prove more than worth them." In other words, what does it matter if we break a few eggs; we are making an omelet. Here we begin to discern the elitist hubris of a central planner.[17]

The United States has already experienced the unfortunate consequences of two crusades to stamp out behavior considered by some to be illicit: alcohol prohibition and the ongoing war on drugs. These crusades have shared some of the same justifications that Rogoff employs for phasing out cash. Even nowadays, estimates are that alcohol is involved in about a third of violent crimes (Cannon and Carmona 2006, 7–8). And just as the war on drugs has extended outside the borders of the U.S., inflicting untold damage, Rogoff hopes the elimination of most cash will become an international campaign as well. What guarantees can he give us that his war on cash will not have results similar to those of these other crusades? When commenters have raised these objections, Rogoff dismisses them as cranks, offering crude caricatures of their fears: "some believe that phasing out currency will bring untold evil into the world," and others "believe that negative interest rate policy will undermine civilization" (2016a, 219). This is a bit uncharitable on his part, given his own overwrought rhetoric about crime and tax evasion. But more important, his dismissal is belied by the enormous range of discretionary powers he is so cavalierly willing to grant to the State.

Can central banks manage a cashless economy?

The Curse of Cash takes up several additional topics that are somewhat tangential to Rogoff's arguments for phasing out cash and negative interest rates. I

17. Wolf (2017) provides useful details about India's experiment but shares Rogoff's positive spin. For a compilation of critical perspectives, see Kapila 2017.

will treat only one of them: his biased account of the performance of the U.S. economy under the gold standard. He denounces "the idea that the gold standard produced spectacular stability" as a "fantasy and false image," charging that the period "was punctuated by deep recessions (the recession of 1893 was in some ways almost as profound as the Great Depression of the 1930s)" (2016a, 193). Really? What ways were those? The National Bureau of Economic Research dates the 1893 recession as lasting only 17 months, as compared with 43 months to the trough of the Great Depression in 1933. The recent research of J. R. Vernon (1994) shows unemployment during the 1893 recession peaking at a little over 8 percent, compared with 25 percent for the Great Depression. Rogoff seems to have overlooked the work of Christina Romer (1986a; b; c; 1989), who has documented that less reliable data series from the gold-standard period have exaggerated the past volatility of the U.S. economy.

Admittedly the classical gold standard was not perfect. But neither is the long record of monetary policy under the Federal Reserve. Nearly all economists agree that the Fed exacerbated if not caused the Great Depression, when the U.S. was still on the gold standard, and it was responsible for the Great Inflation of the 1970s, when the dollar lost its last, vestigial link with gold. The Fed also contributed to the recession of 1937, in the midst of high unemployment lingering from the Great Depression. During World War I the Fed generated the highest rate of inflation in the country's history—outside of the two hyperinflations of the American Revolution and the Civil War (in the Confederacy). This inflation was promptly followed by the U.S.'s highest annual deflation rate in 1920–1921, so severe that it makes the mild, benign deflation of the pre-Fed gold standard look like price stability by comparison. Then, during World War II, the Fed generated another inflation severe enough to inspire comprehensive wage and price controls and government rationing. And let's not overlook the financial crisis of 2007–2008.[18]

Until the most recent panic during the financial crisis, affecting mainly investment banks and other components of the so-called shadow banking system, the period since the Great Depression has seen the elimination of contagious bank runs. But the timing suggests that this change owes more to the introduction of deposit insurance than to the Fed. Also worthy of note is the fact that bank panics, with their widespread temporary suspensions of cash payments, did not always result in major numbers of outright bank failures. Charles Calomiris and Gary Gorton (1991, 154) report the failure of only six national banks out of a total of 6,412 during the Panic of 1907, or less than 0.1 percent, and that was the panic that inspired the Fed's creation in 1913. Since then, the economy has experienced

18. For comparisons of the performance of the Fed and the pre-Fed gold standard, see Selgin 1997; Selgin et al. 2012; and Hummel 2015b.

two periods with significant numbers of bank failures unassociated with panics or depressions: the rural failures of the 1920s and the savings and loan crisis of the 1980s. During the pre-Fed period, the U.S. suffered outbreaks of numerous bank failures only three times: 1819–1824, 1839–1841, and 1890–1896. Thus, more such episodes occurred in the century under the Federal Reserve than in the century before, with the Fed presiding over the most serious case of all: again, the Great Depression.

In fact, there are only three periods during the entire century of the Fed's existence when one can plausibly claim that it performed satisfactorily: during the 1920s, when the price level was stable; during the low inflation of the long 1950s, despite its three garden-variety recessions; and during the two decades beginning in the mid-1980s, a spell whose low inflation and two minor recessions earned the sobriquet 'the Great Moderation.' Some critics would even question how satisfactory the Fed's record was during those three periods. By any objective standard, this is hardly an impressive enough record to generate confidence in the ability of the Fed, or any other central bank, to successfully administer either a cashless economy or negative interest rates. Yet nothing seems able to undermine Rogoff's credulous reverence for government management of the economy.

Conclusion

The Curse of Cash is a well-written and engaging book with many intriguing claims and occasional insights. But in the final analysis, the book fails to demonstrate any bountiful gains from phasing out hand-to-hand currency in large denominations. Despite Rogoff's evangelical fervor, even his own estimates fail to definitively demonstrate any net increase in revenue for the U.S. government from such a major transition. Nor does he attempt a genuine welfare analysis of the underground economy, including the underground economy's important benefits as well as costs. Rather than provide a realistic assessment of whether the elimination of nearly all cash would actually constitute an improvement, he simply expects readers to automatically share his subjective distaste for most underground economic activity. As a result, he appreciably oversells any advantages from his scheme and ignores or understates the extensive disadvantages.

I suppose Rogoff might have been able to argue successfully that coupling the phasing out of cash with negative interest rates might together enhance government revenue. But that is an argument he never makes, in part because he does not fully appreciate all the implications of the fact that negative rates would essentially entail a comprehensive tax on money holdings. His primary concern is with how negative interest rates could improve macroeconomic stability, but here again he is unable to make a strong case that the policy is even needed, much less that it would work. Moreover, throughout his analysis he entirely ignores the public-choice dynamics of his proposal's myriad supplemental regulations, unreflectively adopting what Harold Demsetz (1969) characterizes as the "nirvana approach" to public policy. Rogoff remains willing to rely entirely upon the benevolence and foresightedness of policymakers, having apparently learned no cautionary lessons from the numerous and repeated policy failures of the past.

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