Consols Are Forever: U.S. Treasury Obligations of Perpetual Maturity

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Governments first issued perpetual bonds or "consols"—bonds that never mature—more than 700 years ago and several times since then. Perpetual bonds have much in common with standard bonds in terms of mechanics, price dynamics, taxation, and other factors. Issuing perpetual bonds would offer benefits for macroeconomic management, cost containment, economic efficiency, and creating novel but useful financial information. Although issuers never would repay principal, taxing income and capital gains on perpetual bonds would be much like taxing finite-maturity bonds. Several analogous precedents suggest that market participants would quickly acclimate to investing in perpetual bonds. Whether demand for consols will be robust is an empirical matter that can only be determined through live trials. With the potential for locking in historically low borrowing costs in perpetuity, governments should take the current opportunity to issue perpetual bonds at least in trial amounts. If they succeeded and their market grew substantially, the benefits of perpetual bonds could be of macroeconomic proportions.

Introduction: Why Consider Perpetual Bonds?

Interest rates around the world have reached record low levels in recent years and especially in 2020. Indeed, unprecedented volumes of outstanding debt securities, some $16 trillion of global sovereign debt and $1 trillion of

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corporate debt as early as August 2019, offered negative yields to maturity, that is, with lenders paying for the privilege of lending capital to borrowers.[1] This volume of negative-yielding debt represented about one quarter of the world's outstanding debt securities at the time.[2] In the United States, U.S. Treasury obligations exhibited their lowest yields across the spectrum of maturities in March 2020, the simple average of yields on three-month to 30-year instruments dipping to 0.4 percent. Longer maturities reached their individual record lows in response to the SARS-CoV-2 pandemic, as U.S. Treasury yields fell to 0.43 percent for the 10-year note and 0.86 percent for the 30-year bond. Such low yields in the past have enticed sovereign and corporate borrowers to issue bonds with longer maturities of 50 and 100 years. For example, as described by the *Wall Street Journal*'s editorial board,

> In 2010 Mexico raised $1 billion in what at the time was the world's largest 100-year bond offering. Belgium and Ireland in 2016 raised €100 million with 100-year bonds. Canada floated a 50-year bond in 2014. . . . In 2017 Austria floated a €3.5 billion 100-year bond at a yield of 2.1%. Demand was so hot that Austria offered another 100-year issue this summer [2019] to raise €1.25 billion at a 1.17% interest rate—a mere 50 basis points above the yield on its 30-year bond.[3]

Private issuers have also seen fit to issue these so-called "ultra-long" or "century" bonds. The Walt Disney Company issued $300 million of 100-year bonds as long ago as 1993 with a 7.55 percent coupon, albeit with call options that begin in 2023; the issue took on the moniker "Sleeping Beauty bonds."[4] This bond recently traded at a premium to par of $24 (early March 2020). The Cleveland Clinic issued $400 million of century bonds in 2014 with an Aa2 rating from Moody's,[5] and the University of Pennsylvania issued

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[1] See Joe Rennison, Colby Smith & Richard Henderson, "How Markets Became Curiouser and Curiouser in August" (Fin. Times, Aug. 30, 2019), available at ft.com/content/4e030886-ca97-11e9-af46-b09e8bfe60c0.

[2] See Tommy Stubbington, "Negative Rates: Investors Go Through Looking Glass to Sub-Zero Yields" (Fin. Times, Oct. 3, 2019), available at ft.com/content/820e3aac-ba1a-11e9-8a88-aa6628ac896c.

[3] The Editorial Board, "A 100-Year Treasury?" (Wall St. J., Aug. 22, 2019), available at https://www.wsj.com/articles/a-100-year-treasury-11566515504.

[4] Carliss Y. Baldwin, "Walt Disney Company's Sleeping Beauty Bonds—Duration Analysis," Harvard Business School Exercise 294-038, January 1994. (Revised July 2000.)

[5] See Michael Aneiro, "Cleveland Clinic to Issue Rare 100-Year Bond" (Barron's, Sept. 10, 2014), available at https://www.barrons.com/articles/cleveland-clinic-to-issue-rare-100-year-bond-1410368199.

a 100-year bond at a 3.6 percent yield, just 110 basis points (or 1.1 percentage point) above the 30-Year Treasury bond yield of 2.5 percent at the time.[6]

Seeing the merits of securing long-term financing at very low interest rates, the U.S. Treasury announced in August 2019 and again in March 2020 that it, too, was considering issuing 50-year and 100-year obligations.[7] When Treasury bond yields have remained below 1.5 percent for weeks and seem poised to continue at that trough, it seems sensible for the Treasury to lock in such low financing rates. Arguably, if the Treasury can borrow at rates below the U.S. economy's expected long-run growth rate, it should do so for two reasons. First, from a public policy perspective, such borrowing likely would be optimal for broader economic wellbeing if the government could deploy these funds into programs or capital investments that could be expected to generate economic returns above the borrowing rate. With long-term real (inflation-adjusted) economic growth rates expected to be nearly 2 percent and inflation also expected to be 2 percent,[8] nominal economic growth of approximately 4 percent (real growth and inflation compounded) would be well above a nominal borrowing rate of, say, 2.0 percent or 2.5 percent. Second, if indeed the government could borrow and invest profitably, at least up to some level, it would retain its top credit rating and thus maintain the capacity for this type of borrowing; it would be logical to take advantage of the opportunity.

The merits of locking in low-cost borrowing suggest taking the proposal one step further. The U.S. Treasury may currently be in a unique position to issue bonds with maturities greater than 100 years. Indeed, it should be able to issue bonds that *never* mature, that is, perpetual bonds, also known as "consols."[9] The U.S. government enjoys perhaps the single best credit rating of any issuer in the world, public or private. Moreover, the U.S. dollar remains the reserve currency for a large majority of international trade and finance, with most global goods trading in U.S. dollars (for example, crude oil), and many foreign central banks holding the largest fractions of their foreign reserves in U.S. dollars. Finally, the U.S. federal government currently

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[6] See Alexander Saeedy, "100 Year Bonds? Why 'Ultra-Long' Bonds Have Caught on in 14 Countries and Counting" (Fortune, Aug. 23, 2019), available at https://fortune.com/2019/08/23/ultra-long-century-bonds/.

[7] The Editorial Board, supra note 3. Jennifer Jacobs & Saleha Mohsin, "White House Mulls New 50-, 25-Year Bonds to Finance Stimulus" (Bloomberg, Mar. 19, 2020), available at www.bloomberg.com/news/articles/2020-03-19/white-house-mulles-50-year-bond-to-finance-1-3-trillion-stimulus.

[8] See Board of Governors of the Federal Reserve System, "Economic Projections of Federal Reserve Board Members and Federal Reserve Bank Presidents," Summary of Economic Projections Released with the FOMC Minutes (Dec. 11, 2019), available at federalreserve.gov/monetarypolicy/files/monetary20191211a1.pdf.

[9] See Gelfand letter, supra note *.

imposes what are among the lowest income tax rates among all national governments and so, if needed and in principle, has the taxing capacity to support ultra-long debt obligations at high credit ratings.

The remainder of this article discusses the mechanics of consols, the factors suggesting that U.S. government-issued consols would be practical and likely successful, additional reasons why issuing consols would be helpful to markets and the economy as a whole, and tax considerations surrounding consols.

Mechanics of Perpetual Bonds

In most regards, perpetual bonds are like any other bonds. They represent contracts between lenders and borrowers for the former to lend particular sums of money, or principal, to the latter for agreed upon interest or coupon rates. Typically, borrowers would pay coupons to lenders semiannually—that is, half the coupon rate every six months. Borrowers also typically agree to repay principal when the contracts expire, that is, at bond maturity dates. These "maturities" are typically one to 30 years and, as noted, more recently have extended to 50 or 100 years. Perpetual bonds or consols are different in this respect. Instead of repaying principal, perpetual bond issuers agree to pay out coupons *forever* and lenders agree *never* to require the return of principal. (Borrowers might voluntarily buy back perpetual bonds at some point at then-current market prices, but would never be required to do so.)

A bit of notation is useful to describe the dynamics of consol pricing. (For consistency with a useful reference, the notation here borrows from Bierwag.[10]) The price of a consol is designated as P. The coupon amount or cash flow, say, in dollars, is F. The nominal market interest rate per semiannual period is r'. Finally, define the variable b as 1/(1+r'). The variable b is also known as the "discount factor." (Note that the quoted market interest rate per year is r = 2r' since the notational convention used here is based on semiannual periods.) Using the algebra of infinite series, Bierwag shows that a consol's price is as in equation 3A.8 below. (Equation numbers refer to the same equations in Bierwag's Appendixes 3A and 3B. Calculations available on request.)

$$P = F/r' \qquad (3A.8)$$

For example, if the semiannual coupon were $1, and the market interest rate were 2 percent per year, then r' = 0.01 and the price of one consol would be $100. That is, if the coupon yield ($2 on $100 in this case) were 2 percent,

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[10] See Gerald O. Bierwag, "Appendix 3A: The Price of Perpetuities or Consols," and "Appendix 3B: Duration and Its Calculation," in *Duration Analysis: Managing Interest Rate Risk* 71–80 (1987).

and the market yield were 2 percent, the consol would be priced at par, or the notional face value of the bond.

However, seemingly modest changes in going market rates could lead to dramatic changes in consol prices. For example, a half percent decline in market rates to 1.5 percent would lead the price of the 2 percent coupon consol to be P = \$1/0.0075 = \$133.33, a one-third increase in price for a one-quarter decline in the yield. In the opposite direction, if the market yield were to increase to 2.5 percent, then the price of the 2 percent coupon consol would be P = \$1/0.0125 = \$80, a one-fifth price decline for a one quarter yield increase.

This example illustrates that consol price changes are not linear with respect to market yield changes. The so-called "duration" is a measure of the sensitivity of a bond's price with respect to the bond's yield at any given yield. Duration measures this sensitivity as percentage changes in price with respect to percentage change in interest rates. Bierwag shows that the duration d* of a consol is a simple function of its yield:

$$d^* = (1 + r') / r' \tag{3B.14}$$

Note that a consol's duration, unlike conventional bonds, is independent of its coupon rate, par value, and (infinite) maturity. Instead, duration depends only on a consol's market interest rate. Thus, regardless of the issuers involved, all consols trading at the same market interest rate would have the same duration. For example, at a 2 percent annual yield, or r' = 0.01, the duration would be d* = 1.01/0.01 = 101 semi-annual periods or 50.5 years. Similarly, at a 1.5 percent annual yield, the duration would be 1.0075/0.0075 = 134.3 semi-annual periods or nearly 67.2 years. These durations are rather large, indicating that consol prices are highly sensitive to market changes. To put these values into perspective, a 30-year Treasury bond normally would have duration between 10 and 20 years, and at yields in early 2020 of approximately 1.2 percent have had a duration of 25 years, a larger than normal duration because interest rates are historically low. A 10-year Treasury note would normally have a duration of six to nine years and at recent yields near 0.6 percent has had a duration above this typical range. Stated another way, consols have durations on the order of seven to nine times those of T-notes and three to five times those of T-bonds.

Precedents for Perpetual Bonds

That consols never require borrowers to repay principal and have extreme sensitivity to market yield changes might suggest that these instruments would be impractical or undesirable. On the contrary, consols have numerous precedents, both historically and recently. The first record of government issuance of perpetual bonds dates back 760 years to the towns of Douai and Calais in France in 1260 and the city states of what is now Italy—Venice, Florence and

others—in 1262.[11] The English government issued "perpetual annuities" as early as 1722 and ensuing years, some 300 years ago. The English government again issued perpetual debt, in this next instance called "consolidated annuities" or "consols," in 1749 in order to refinance or consolidate almost all of its then-outstanding fixed-maturity debts, which had higher coupon rates. This issue traded actively for more than 200 years. Coincidentally, the English issued their original perpetuals and the follow-on consols with coupon rates of essentially 3.0 percent, not far from rates that might prevail on new issues today, although other issues of 1762 and later offered 4 percent coupons and additional consideration.[12] As recently as 2014, roughly £2 billion or more of British consols remained outstanding.[13] Among the U.S. government's earliest debt issues were two perpetual bonds that Congress approved in 1790 and which then-Secretary of the Treasury Alexander Hamilton floated from 1791 to 1794. One issue offered a 6 percent coupon but only after 1800 while the other issue offered a 3 percent coupon. Interestingly, the U.S. government was not the best American credit at the time. The state of Massachusetts held that favored position and was able to borrow at lower interest rates than the federal government.[14]

Fiat currency has a long history; everyone in modern life is familiar with fiat currency in the form of balances in their bank accounts and cash in their wallets. Fiat currency is nothing more or less than a perpetual obligation of its sovereign issuer. A sovereign government can use cash or physical currency to pay its debt, while the public is willing to accept such payments, to hold the instruments as stores of value, and to accept the instruments in payment of debts of other members of the public. Fiat money is a perpetual government obligation which the government never needs to redeem. Although a significant difference between money and consols is that fiat money has a zero interest rate, some forms of "inside" money—bank deposits and shares in money market mutual funds—pay short-term levels of interest. Thus, virtually the entire world population has daily experience with sovereign perpetual instruments which are in that respect quite similar to consols. The American public is also familiar with U.S. Postal Service "forever stamps," which also pay no interest, but which rise in value approximately with the rate of inflation. In other words, forever stamps earn

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[11] See John H. Cochrane, "A New Structure for U. S. Federal Debt," in *The $13 Trillion Question: Managing the U.S. Government's Debt* 91–139 & 143–46 (David Wessel ed., 2016) [hereinafter Wessel].

[12] See Sydney Homer & Richard Sylla, *A History of Interest Rates* 159–60 (3d ed. 1991).

[13] See "UK Bonds That Financed First World War to Be Redeemed 100 Years Later" (The Guardian, Oct. 31, 2014), available at theguardian.com/business/2014/oct/31/uk-first-world-war-bonds-redeemed.

[14] See Homer & Sylla, supra note 12, at 293–96.

a modest return, and have use value ever after, albeit for a specific purpose: to mail letters and packages.

Another precedent for consols is corporate-issued preferred stock, which currently and in the aggregate has a significant amount of value outstanding. Although different types of preferred stock or "preferreds" appear in the market, one particular type is closely similar to perpetual bonds. Preferreds that are perpetual, non-callable, and cumulative for all intents and purposes are a form of perpetual fixed income. They pay dividends at fixed percentages of par value, typically on the order of 4 percent or more, and never mature. Preferred stock differs from perpetual bonds in a number of ways. Preferred stock is senior in a corporation's capital structure to common stock but as a type of equity is junior to the company's debt obligations. Therefore, preferred stock is more risky from a credit perspective. Second, preferred stock's periodic cash payments come in the form of dividends and are therefore contingent on the issuer's profitability rather than coming in the form of a coupon that is contractually fixed in amount and timing. Thus, if profits were too low to cover preferred dividends, the issuing corporation could skip the dividend partially or entirely. However, for cumulative preferred shares, once profits returned, the corporation also would have to pay all preferred dividends that were in arrears and that were currently due before paying dividends to common shareholders. Thus, preferred shareholders should receive all their dividends eventually, unless the corporation were to go bankrupt. Also note that a delay of cumulative dividends would not be an event triggering default whereas missing a coupon payment on a bond would be a form of default. Third, many preferred securities trade thinly, while others are exchange traded. Finally, preferred equities may be favored from a tax perspective since corporate investors may exclude from taxable income the dividends they receive from other corporations, whether on common stock or on preferred stock. Despite these differences, preferred stocks remain a familiar precedent for perpetual debt. Both are fixed-income instruments with periodic cash payouts that are pre-defined percentages of their face amounts. Neither instrument ever matures, expires, or requires repayment of principal.

Perhaps the earliest record of the issuance of preferred shares dates back to 1886 when the state of Maryland adopted a law to provide financing to the Chesapeake and Ohio Canal and the Baltimore and Ohio Railroad.[15] This capital was issued in the form of equity—that is, without maturity—and for a dividend at a fixed rate in preference over dividends payable to common equity owners. The fixed rate was 6 percent. More than 130 years later, some 400 different issues of preferred stock from 11 different countries with a market

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[15] See George Heberton Evans, Jr., "The Early History of Preferred Stock in the United States," 19 Amer. Econ. Rev. 43 (Mar. 1929).

value of nearly $175 billion are outstanding in U.S. and international markets according to two market indices.[16] Moreover, these two indices might not represent the entire universe of available preferred shares, suggesting the current float could be noticeably larger.

In summary with respect to precedents, there is a long history of, and great breadth and depth of experience with, financial instruments that actually were, are now, or closely parallel the characteristics of, perpetual bonds.

Market Considerations: Build It. Will They Come?

Potential participants in the market for perpetual bonds understand the mechanics of these bonds quite well in terms of cash flows, valuation, and pricing dynamics such as the duration illustrated earlier. The industry and academia also understand very well other dimensions of bond market pricing and dynamics that apply to consols but which are beyond the scope of this article.[17] The practicality of perpetual bonds thus is not a matter of creating the instruments—that is, supply—but rather of demand. If governments were to issue consols, would investors want to own them?

A few features of perpetual bonds suggest that demand could grow to robust levels over time. As mentioned earlier, any consol with the same market yield from the same issuer would have the same cash flows per dollar of principal paid, the same duration or sensitivity to interest rates, and therefore the same price dynamics in other, more complex dimensions as any other consol. Thus, any one government issuer—the U.S. Treasury, say—need only have one specification of its consol forever after issuing its first one, a consol with a particular coupon rate versus par.[18] Thus, any time the Treasury wished to borrow more funds, it could issue the same coupon security time and time again, which we now may refer to as "the U.S. consol" or simply "the consol." This uniformity would enhance the issue's liquidity over time even if initial issuance was relatively small in amount. The uniformity thus would deepen the market demand. Arguably, knowing that the consol's future

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[16] The data are as of November 2019. See "S&P International Preferred Stock Index Fact Sheet," S&P Dow Jones Indices LLC, available at us.spindices.com/indices/fixed-income/sp-international-preferred-stock-index; "S&P U.S. Preferred Stock Index Fact Sheet," S&P Dow Jones Indices LLC, as of November, available at https://us.spindices.com/indices/fixed-income/sp-us-preferred-stock-index.

[17] For a discussion of the multiple dimensions of price reactions to interest rates changes, see Cochrane, supra note 11.

[18] The government and investors might prefer to have coupon payments that match the current convention—that is, the 15th of February, May, August, and November. One alternative might be to issue one form of consol with quarterly coupons or two distinct consols, the "even month" consol with payments in February and August, and the "odd month" consol with coupons in May and November. Having two consols would require minor changes in the arguments of this article.

liquidity eventually would be ample might encourage early adopters and thus the instrument's initial liquidity.

Adding further to the consol's liquidity is the potential for stripping its coupons and trading each such cash flow as a zero-coupon or discount bond. Discount bonds pay no cash interest but rather accrue interest over time until the underlying cash flow of, say, $1 per $100 of the consol's par value comes due at the coupon's due date or, equivalently, the zero's maturity. The discounted price attached to this cash flow at any time would reflect that specific cash flow's yield to maturity. The market for stripped Treasury instruments is already quite robust and includes several hundred different maturity dates beginning at the next occurring February, May, August, or November and extending at roughly quarterly intervals to the maturity of the longest-dated 30-year Treasury bond.[19] Thus, stripping the consol would enable it to participate in an already established market, and would complement that market with even longer-dated coupons of, say, 40, 50, and 100 years or longer.

Forward Consols. If there were no demand for stripped coupons beyond, say, 50 or 100 years, then the remaining coupons 51 or 101 years hence and beyond would need to be sold as a package. Although such an instrument might seem odd, and therefore difficult to sell and of low liquidity, two important features of these remainder instruments could support demand and liquidity. Note, for example, that the series of coupons 51, 52, 53 years from now and forever beyond then is simply another consol with the same coupon rate as the currently available consol, the only difference being the coupons for this remainder instrument would commence many years from now.[20] Moreover, in every successive period, when another coupon could be stripped, say the 51st year's coupons a year from now, the new remainder at that point also would be the same longer-dated consol as it was before, but with cash flows that would begin 52 years down the road from now. Described another way, the remainder of long-run future cash flows would be a forward contract for delivery in 51 or 101 years from now for the identical consol as would trade today or, said yet another way, the "forward consol." Furthermore, under the presumption that a reasonably robust market for 50- or 100-year zero-coupon STRIPS developed, then there would need to be a source for these STRIPS. The source every period would be the next available coupon of the forward consol. And given the year-to-year demand for new stripped coupons, in all likelihood bond dealers would find it worthwhile

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[19] For a description of this market, the so-called Separate Trading of Registered Interest and Principal of Securities or "STRIPS," see the U.S. Treasury's web page at https://www.treasurydirect.gov/instit/marketables/strips/strips.htm.

[20] Cochrane, supra note 11, highlights this feature of consols that are stripped of their shorter-term coupons.

to hold forward consols in inventory in order to continue supplying the market for stripped securities or synthetic securities.[21]

Experience From Introducing TIPS. Several observers have been critical of proposals for the Treasury to issue consols, and even of the Treasury's current exploration of 50- and 100-year bonds, on grounds of illiquidity or lack of demand.[22] However, the Treasury successfully navigated through a similar challenge when it began issuing so-called TIPS or "Treasury Inflation Protected Securities" in 1997. Despite initial skepticism that sounds similar to the criticisms of ultra-long bonds, the market for inflation-adjusted securities in the United States has grown to be highly liquid, robust, and familiar. In its first full year, 1998, only $900 million of TIPS traded daily. This volume increased to more than $8 billion after 10 years, and then doubled after another 10 years in 2018 to nearly $17 billion per day, and increased further to a record $18 billion in 2019.[23] As of year-end 2019, the value of outstanding TIPS was more than $1.5 trillion, or approximately 9 percent of all U.S. Treasury debt held by the public.[24]

Just before the Treasury started issuing TIPS, John Campbell and Robert Shiller summarized the encouraging signs for and benefits of the incipient U.S. market.[25] Many precedents for issuing inflation-indexed sovereign debt were well established by the time the Treasury gave serious consideration to issuing TIPS. Notably, in 1780, the state of Massachusetts issued debt indexed to a bundle of specific commodities, although they refinanced this debt using nominal bonds in 1786. In modern times, Finland issued indexed bonds as early

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[21] Although the U.S Treasury sanctions the STRIPS market, the Treasury does not supply STRIPS directly. Rather, according to the Treasury's web site, see supra note 19, "STRIPS can be purchased and held only through financial institutions and government securities brokers and dealers." In addition to simple STRIPS, dealers could offer packages of coupons tailored to the specific needs of customers—that is, synthetic securities—and thus could find a broader market for their services and have more of an incentive to hold forward consols in inventory. For example, for some idiosyncratic reason, a customer might desire a bond with constant coupons and a payoff of principal at some odd date, say, 57, 61, or 79 years later.

[22] See Darrell Duffie, "Comment on 'A New Structure for U. S. Federal Debt,'" in Wessel, supra note 11, at 139; Alan Rappeport & Matt Phillips, "Treasury Considers 50-Year Bonds as Deficit Tops $1 Trillion" (N.Y. Times, Sept. 12, 2019), available at nytimes.com/2019/09/12/us/politics/treasury-50-year-bonds.html?auth=login-email&login=email.

[23] See Securities Industry and Financial Markets Association (SIFMA), "Treasury Inflation-Indexed Securities, Average Daily Trading Volume," table, available at sifma.org/resources/research/us-treasury-trading-volume/.

[24] See U.S. Dep't of the Treasury, Bureau of the Fiscal Service, "Schedules of Federal Debt," November 2019, available at https://www.treasurydirect.gov/govt/reports/pd/feddebt/feddebt_dec19.pdf.

[25] See John Y. Campbell & Robert J. Shiller, "A Scorecard for Indexed Government Debt," in 11 *NBER Macroeconomics Annual 1996*, at 155 (Ben S. Bernanke & Julio J. Rotemberg, eds., 1996).

as 1945 and over the course of the next 50 years another 12 countries issued such bonds. By 1994, the State of Israel had issued US$25 billion worth of indexed bonds, representing 86 percent of its outstanding debt. By that same year, Great Britain had issued nearly US$57 billion worth of inflation-linked bonds representing 15 percent of that nation's marketable debt, while average trading volume in British "linkers" exceeded US$250 million per day.[26] Thus, by the time the United States decided to issue TIPS, several successful precedents were in place, as would be the case for perpetual bonds.

Campbell and Shiller argued that issuing TIPS would have beneficial effects on the real economy, noting that "creating indexed bonds . . . may enable the market to provide important kinds of new information, and . . . may help people with different risk tolerances to share their risks better."[27] And in part because of the real value of these two benefits, the Treasury had the potential for lowering its borrowing costs either currently or in the long run. All three of these benefits would accrue to perpetual bonds. Just as TIPS provide market-based information about expectations of inflation in the near and long term, perpetual bonds would provide information not available currently about the time value of money for horizons beyond 30 years. Given well-understood relationships among interest rates of different maturities, the yield curve, and yield curve dynamics, a yield curve of infinite time horizon derived from the availability of perpetual U.S. government bonds would provide market-based information about expectations of interest rates at all possible time horizons. Perpetual bonds also would enable better risk sharing among households and institutions, just as TIPS enable these actors to hedge inflation risks. Pension plans, insurance companies, and young households could prepare for and hedge their ultra-long liabilities (pension and insurance benefits and households' expected retirement expenditures) by accumulating portfolios of perpetual bonds. While 50- and 100-year bonds could provide similar services, as argued before, the Treasury has the potential for saving on costs of issuance and creating greater liquidity by issuing identical perpetual bonds from time to time.

At the time TIPS were under consideration but not yet issued, critics made similar arguments against them as critics now pose with respect to perpetual bonds. Chief among the objections were the lack of demand, illiquidity, and potential for the Treasury to balkanize markets for its debt or, in other words, to cannibalize demand for its other debt issues. Campbell and Shiller countered these arguments and, given the subsequent success of the TIPS market, proved to be correct in their defense:

> [W]e find it hard to understand why such balkanization costs are expected to be very large. The Treasury already has issued many different kinds of

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[26] Id. at 155–58.

[27] Id. at 162.

> debt in terms of maturity and coupon, and the introduction of Treasury strips was a major innovation. In fact, there is perhaps reason to think that the balkanization costs are negative: so long as there is some clientele that is interested in indexed bonds, the optimal thing to do, from a borrowing-cost perspective, is to satisfy that clientele.[28]

A similar argument should apply to perpetual bonds: if some investors would have an interest in buying ultra-long maturity bonds, then the Treasury could save on borrowing costs by satisfying that demand.

Current Structure of U.S. Treasury Obligations. During the last decade, the U.S. Treasury has auctioned more than 900 different coupon issues, or 90 different issues per year, ranging in size from one note at a mere $25 million to another note garnering $63 billion of demand. The average and median auction sizes were $25 billion and $26 billion, respectively. Smaller issues, that is, the first through tenth percentiles in auction sizes, ranged between $7 billion and $13 billion. Virtually every one of these 900 different issues was and remains unique, with its own coupon rate and maturity date, with exceptions for occasional re-issues of securities on high demand. Thus, the Treasury could issue perpetual bonds in rather small auction sizes, say $6 billion to start, in order to test the waters. This small of an issue would hardly be extraordinary. Moreover, such an issue need not be unique since the identical perpetual bond could be reissued repeatedly given that its maturity never would ebb. If the Treasury reissued this consol, say once per quarter, its cumulative float would reach the average size of a Treasury issue of $25 billion or so after one year and would be among the largest specific issues after 10 quarters. Of course, if demand proved to be more robust, and that would be an empirical matter, the Treasury could increase reissue auction sizes accordingly. Recall that TIPS grew to become more than a trillion dollar market after 20 years. If the Treasury were to issue only $6 billion per quarter of consols for years to come, by the time the next on-the-run 30-year bond matured in February 2050, the market for consols would grow to half the size of today's significant TIPS market. The $750 billion of float would seem to be a reasonably robust supply fostering a reasonable amount of liquidity. Of course, this projected timeline assumes that new demand for consols would continue, albeit at only a very modest level. As market participants added to their experience with consols, it would seem likely that demand would at least remain steady if not grow, again an empirical matter.

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[28] Id. at 181.

Cochrane points out that the availability of a U.S. consol would be highly likely to improve the Treasury market's liquidity rather than to cannibalize it:

> The spread in yields between on-the-run (newly issued) and off-the-run (older) [consol] issues would disappear, as all [consol] securities would be on-the-run. Arbitrage spreads between bonds with different coupon levels . . . would disappear. Bid-ask spreads would likely tighten, and the price impact of trading large blocks likely evaporate.[29]

The larger the share of the Treasury market that consols represented, the more likely these liquidity improvements, or narrowing spreads, would appear.

Benefits of Consols

This article has so far considered the feasibility of governments issuing perpetual debt obligations and the potential for robust demand for such debt while only alluding to the benefits of doing so. This section focuses on these benefits, which include macroeconomic effects, cost savings, and informational value.

Macroeconomic Benefits. Macroeconomic benefits include reduced rollover risk, the closely associated improved management of government debt, and better control of the effects of monetary policy. As mentioned before, once the government issued perpetual bonds, the government never again would need to refinance this principal amount of debt, although it then would commit to specific coupon payments forever. Thus, at least for this portion of debt, the government would eliminate rollover risk, that is, the risk of needing to refinance debt at higher interest rates. This is not to say the government could avoid ever needing to finance additional new debt as the economy grew, and potentially at higher rates. But refinancing risk at least could be eliminated for then-outstanding perpetual debt. If perpetual debt grew to represent a significant portion of total sovereign debt, the rollover risk that was thus eliminated also could improve the government's credit rating. Put another way, the risk that the government would default on its debt servicing obligations could decline more or less in proportion to the portion of its debt that was perpetual. In turn, and all else equal, these effects should help to lower the interest rates at which the government could issue debt. In all, the improved credit risk, lower interest rates, and avoidance of rollover risk should help to lower debt servicing requirements, dollar-for-dollar, and thus improve budgeting at least incrementally.

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[29] Cochrane, supra note 11, at 107.

Currently, when central banks such as the U.S. Federal Reserve (the Fed) wish to implement changes in monetary policy, that is, alter the supply of money or the interest rates at which borrowing might occur throughout the economy, they have dual operational tasks. One task is to decide upon the overall money supply and commensurately how much government debt (or, nowadays, private debts) the central banks absorb into or release from their balance sheets, that is, their "open market operations." The other task is to decide which maturities of government (and other) debt instruments they should use for such operations. Prior to the Great Financial Crisis in 2007–2009, the vast majority of U.S. open market operations used very short-term government obligations—for example, U.S. Treasury bills which have maturities of less than one year. These traditional open market operations would reduce short-term interest rates to stimulate the economy or raise rates to slow an economy that might be growing too rapidly, in either case leaving longer-term maturity interest rates relatively stable. Occasionally, central banks decidedly wished to manage the pattern of interest rates across different maturities as well as the overall level of rates in particular ways. The banks thus would conduct operations using particular selections of longer-term instruments, but only occasionally.

During the last decade, major central banks—the Fed, the European Central Bank, the Bank of England, the Bank of Japan, and others—have engaged in so-called Quantitative Easing or "QE," a coined term for very large open market operations. The qualitative differences between QE and traditional monetary policy operations have been twofold. First, central banks have added long-term maturity instruments to their balance sheets for long periods of time, in some cases until the instruments mature. Second, as alluded to earlier, the monetary authorities have employed non-government debt instruments—in the case of the Fed, residential mortgage backed securities and, in the case of the ECB, corporate bonds. The common characteristic of open market operations and QE is that they both involve central banks buying and selling instruments of fixed maturities, which necessarily would comprise different cash flows across the maturity spectrum. Traditional operations focus only on cash flows within one year and avoid transacting in cash flows scheduled beyond one year. Broader operations might use many different instruments, but then the scheduled coupon and principal payments associated with the government (and other) debt could be quite uneven over time. In either case, the operations would interfere intentionally or otherwise with the pattern of interest rates across maturities—that is, the yield curve.

Conducting open-market operations or QE with consols would be different. Since all consols would have identical cash flows every quarter forever—that is, their constant coupon payments—central banks could conduct operations approximately neutrally with respect to cash flows over time and hence with respect to supply effects on the shape of the yield curve.

To the extent a central bank wished to influence the shape of the yield curve, it could be more deliberate about it by using short-term bills and zero-coupon or discount bonds with specific maturities to shift interest rates attached to any given maturity relative to the rest of the yield curve. The bank also could employ such pinpoint operations to influence market conditions for very specific maturities when liquidity demands create shortages at particular points. The repurchase agreement ("repo") liquidity crunch during the fall of 2019 represents such an episode.[30]

Lower Cost of Issuance. One of the core principles of economics and finance is that the greater the variety of instruments, goods, and services that markets can trade, including instruments defined by time and contingencies—for example, insured risks—the more efficiently markets distribute resources.[31] Thus, if a constituency were to demand a financial instrument having particular characteristics, but that instrument did not exist, buyers would attempt to bundle a set of other financial instruments to mimic as closely as possible the characteristics of the desired instrument. However, if a seller can offer that specific instrument, then buyers should be willing to pay a premium for it. In particular, if investors have a demand for ultra-long bonds for any reason, borrowers who issue such bonds could borrow at lower interest rates than by issuing short- or intermediate-term bonds repeatedly over time, all else equal. Such instruments already exist, but their maturities are limited to 50 and 100 years and are as yet unavailable from the U.S. government. Moreover, the vast majority of currently available ultra-long instruments carry noticeably greater credit risk than U.S. government instruments carry. Thus, if there is demand for credit-risk-free instruments with maturities greater than 100 years, the U.S. Treasury could issue securities to meet this specific demand and do so at lower interest rates than by issuing short- or intermediate-term bonds repeatedly over time. As said earlier, whether robust demand for such instruments would develop is an empirical matter and could only be determined by testing the market.

Another potential savings for the Treasury would be the reduced administrative costs of repeatedly issuing new bonds as old bonds matured. As noted earlier when discussing rollover risk, upon the Treasury issuing a consol, it would never again need to refinance that amount of debt and so would pay the administrative costs of that consol's issuance once and never again. Moreover, the government could permanently lower its interest burden by issuing consols during episodes of low interest rates, typically recessions,

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[30] See Sam Schulhofer-Wohl, "Understanding Recent Fluctuations in Short-Term Interest Rates" (Chicago Fed Letter No. 423, 2019), available at https://www.chicagofed.org/publications/chicago-fed-letter/2019/423.

[31] Campbell & Shiller, supra note 25, and Cochrane, supra note 11, touch on this point.

but also currently while the global demand for risk-free long-term and ultra-long-term debt is high. Once issued at, say, 2 percent, 3 percent, or 4 percent rates, the Treasury never would have to pay out greater amounts of dollars on coupons than on that amount of consols issued. That is not to say effective market rates could not go higher if the consol were to trade at market prices lower than issue prices. However, changes in market rates still would leave (nominal) dollar amounts of coupon payments fixed as they were.[32]

Market Information. Just as TIPS yields provide market-based estimates of prospective inflation, consol yields would provide market-based readings of current ultra-long-term interest rates in "spot" markets and on expected interest rates in the future—that is, "forward" rates or "forward curves." Such rates are now available from corporate and non-U.S. sovereign bonds. However, except for a limited amount of British consols, these ultra-long-term debts only extend to 50- or 100-year maturities, less any passage of time since their issuance, and these debts carry credit risk. Moreover, these securities are unlikely to be stripped. The combination of lumpy cash flows—that is, large differences between periodic coupons and principal payments at maturity—and yield premiums due to credit risk, limits the information these bonds can provide about long-term rates generally and forward rates specifically. Were the U.S. Treasury to issue 50- or 100-year bonds, they could be stripped and the market yields on the resulting discount instruments, also called "spot" yields, would be helpful in estimating forward curves, but only as far as 99 years out. (Forward spot rates can only be estimated to a time horizon one period less than the longest available discount instrument.) If the Treasury were to issue consols, and consol coupons were stripped, one could in principle estimate forward spot rates and the forward spot curve for virtually any time horizon. This ultra-long-term spot curve in turn might be useful in enabling more accurate estimates of the value of long-lived assets and liabilities such as pension and insurance liabilities and common and preferred stocks.

Tax Considerations

For the benefit of readers of this journal, it behooves us to consider the tax treatment of consols. Although the workings of consols might seem novel, their characteristics should be quite familiar from the perspective of taxation. Four aspects of taxing perpetual bonds warrant consideration:

1. Coupons;
2. Realized capital gains and losses upon trading in secondary markets;

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[32] Cochrane, supra note 11, discusses the merits of issuing inflation-indexed perpetual bonds for which the real coupon would remain fixed but actual dollars paid out each period would be indexed to inflation so that nominal coupons would be changeable.

3. The "phantom" or notional aspect of par value; and
4. The closely related accrual of unrealized income on discounted bonds.

First, taxing perpetual coupons would be as usual for conventional bonds. Periodically, consols would pay out fixed nominal amounts of dollars, which should count as ordinary income and be taxed as such at the federal level while being exempt from state and local taxes. Similarly, nothing extraordinary about secondary trading and the realization of capital gains or losses would appear; such gains would be subject to taxes at the short-term or long-term capital gains tax rate depending on holding periods. Realized losses could serve to offset realized gains from other capital asset holdings, or to carry forward to apply against future gains.

The novel aspect of consols is that they have no par amounts of principal although they do have notional par amounts or face values that form the basis of computing coupon payments. When purchased at discounts to par, the accretion of value toward par might engender accrued income that could be taxable at ordinary income tax rates if the discounts and accretions were large enough. Such accretions, if present, also would increase the cost basis of purchase values used to compute realized capital gains subject to tax upon sale of consols in secondary markets. In fact, given the formulation of the De Minimis Rule under U.S. federal tax law, no discount perpetual bond could or would accrue interest income other than what is forthcoming from coupons. The De Minimis Rule states, "If the market discount is less than ¼ of 1 percent of the stated redemption price of the bond at maturity multiplied by the number of complete years to maturity (after the taxpayer acquired the bond), then the market discount shall be considered to be zero."[33] Even assuming there were a redemption price, the time to maturity would be infinite, and one-quarter of 1 percent of that number would still be infinite, so no discounted perpetual bond could fall outside of this *de minimis* exemption.

Tax effects related to the notional values of perpetual bonds might seem strange but, again, there is a precedent. Futures and options also have only notional face values. Indeed, although options have premium prices per contract that one could use to value the contracts, futures have no such unit prices. A futures contract's value is based on the gain or loss of the notional value at settlement. Yet, the U.S. tax code imputes short-term and long-term capital gains or losses on these instruments as of the end of each year, and recalculates the cost basis each year, assuming 60 percent of the year's unrealized gains are long-term and 40 percent are short-term for that year's tax purposes.

One further aspect of taxation of perpetual bonds may be worth considering: how such bonds would be categorized should a corporation issue

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[33] IRC § 1278(a)(2)(C).

them—as debt or equity? While corporations successfully issuing perpetual bonds seems unlikely, it is conceivable they could do so for two reasons. First, recall that corporations issue, and there is a substantial market for, perpetual, non-callable, preferred equity. In some respects perpetual bonds and preferred equity are quite similar since both are perpetual maturity securities that pay investors pre-determined amounts of fixed income periodically. Second, if the government were able to create a robust market for perpetual bonds, corporations might soon enter the market too.

Corporations may not deduct dividend payments on equity, including dividends on preferred equity, from taxable corporate income, but may deduct from taxable income interest paid on borrowings. Would perpetual bonds qualify as debt? On the one hand, they are, as said, rather similar to preferred equities and never return principal. The two points suggest that perpetuals are really a form of equity. On the other hand, corporate-issued perpetual bonds presumably would be senior to common and preferred equity in a corporation's capital stack. Relatedly, a corporation could forgo or postpone paying dividends on preferred stock if low earnings or operating losses warranted so doing, and without legal or contractual penalties. That decision is a prerogative of the board of directors. Again, presumably, perpetual bonds would be different. Forgoing interest payments would be acts of default on the terms of such bonds. Moreover, perpetual bonds likely would be governed by covenants that investors would demand, while preferred equity would have looser covenants if any at all. The stricter terms related to such corporate perpetual bonds suggest they would behave more like debt than equity. We leave this question about hypothetical circumstances moot for the time being.

Conclusions

As exotic as they might sound, perpetual bonds in fact have much in common with more traditional types of bonds in terms of their mechanics, price dynamics, taxation, and other factors. Moreover, issuing perpetual bonds would engender several benefits in terms of macroeconomic management, cost containment, economic efficiency, and the generation of novel but useful financial information. Although gauging the demand for ultra-long-term bonds is difficult in the abstract, experience from several analogous precedents suggests that market participants would quickly acclimate to investing in perpetual bonds. The cost of issuing them initially in small amounts to test the markets should be relatively small. Should demand grow to even modestly robust volumes, the benefits of government-issued perpetual bonds would become evident, while greater familiarity could add further to the demand for such bonds, to their liquidity, and to the derived benefits. Only through such market testing will we ever know whether issuing perpetual bonds would have been worth the try. Should they succeed, the benefits could be of macroeconomic proportions.