

Akram, Tanweer

Working Paper

A note concerning government bond yields

Working Paper, No. 977

Provided in Cooperation with:

Levy Economics Institute of Bard College

Suggested Citation: Akram, Tanweer (2020) : A note concerning government bond yields, Working Paper, No. 977, Levy Economics Institute of Bard College, Annandale-on-Hudson, NY

This Version is available at:

<https://hdl.handle.net/10419/238667>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.



Working Paper No. 977

A Note Concerning Government Bond Yields

by

Tanweer Akram*
General Motors

November 2020

* Tanweer Akram is international economist at General Motors. The author thanks Ms. Mary Rafferty and Ms. Elizabeth Dunn for their editorial support. Disclaimer: The author's institutional affiliation is provided solely for identification purposes. Views expressed are solely those of the author. The standard disclaimer holds.

The Levy Economics Institute Working Paper Collection presents research in progress by Levy Institute scholars and conference participants. The purpose of the series is to disseminate ideas to and elicit comments from academics and professionals.

Levy Economics Institute of Bard College, founded in 1986, is a nonprofit, nonpartisan, independently funded research organization devoted to public service. Through scholarship and economic research it generates viable, effective public policy responses to important economic problems that profoundly affect the quality of life in the United States and abroad.

Levy Economics Institute
P.O. Box 5000
Annandale-on-Hudson, NY 12504-5000
<http://www.levyinstitute.org>

Copyright © Levy Economics Institute 2020 All rights reserved

ISSN 1547-366X

ABSTRACT

This paper relates Keynes's discussions of money, the state theory of money, financial markets, investors' expectations, uncertainty, and liquidity preference to the dynamics of government bond yields for countries with monetary sovereignty. Keynes argued that the central bank can influence the long-term interest rate on government bonds and the shape of the yield curve mainly through the short-term interest rate. Investors' psychology, herding behavior in financial markets, and uncertainty about the future reinforce the effects of the short-term interest rate and the central bank's monetary policy actions on the long-term interest rate. Several recent empirical studies that examine the dynamics of government bond yields substantiate the Keynesian perspective that the long-term interest rate responds markedly to the short-term interest rate. These empirical studies not only vindicate the Keynesian perspective but also have relevance for macroeconomic theory and policy.

KEYWORDS: Money; State Theory of Money; Chartalism; Monetary Theory; Central Bank; Government Bond Yields; Interest Rate; John Maynard Keynes

JEL CLASSIFICATIONS: E12; E40; E43; E50; E58; E60; F30; G10; G12; H62; H63

1. INTRODUCTION

This paper relates John Maynard Keynes's discussion of money, the state theory of money, financial markets, investors' expectations, uncertainty, and liquidity preference to the dynamics of government bond yields for countries with monetary sovereignty. A state with monetary sovereignty almost always retains the operational ability to service its government debt. The central bank can influence the long-term interest rate on government bonds and the shape of the yield curve mainly through the short-term interest rate and other monetary policy measures. Investors' psychology, herding behavior in financial markets, and uncertainty about the future reinforce the effects of the short-term interest rate and central bank's monetary policy actions on the long-term interest rate. Several recent empirical studies on the dynamics of government bond yields document that the strong connection between the current short-term interest rate and the long-term interest rate (after controlling for appropriate macroeconomic and financial variables) substantiate Keynes's contention.

The paper is structured as follows. Section 2 discusses the state theory of money. Section 3 examines what monetary sovereignty means for government debt. Section 4 presents the Keynesian perspective on financial markets, investors' expectations, and interest rates. It also ties Keynes's views to the dynamics of government bond yields. Section 5 reports the findings of several studies that give credence to Keynes's views on the drivers of the long-term interest rate on government bonds. Section 6 sets forth the theoretical and policy implications of the findings from the empirical literature on government yields based on the Keynesian perspective. Section 7 concludes.

2. THE STATE THEORY OF MONEY

For Keynes, understanding money is at the core of monetary theory. He wrote: "Money-of-account, namely that in which Debts and Prices and General Purchasing Power are expressed, is the primary concept of a Theory of Money" (Keynes 1930a, 3).

Keynes (1930a, 3) believed that the origin of money was very much tied to credit and debt. stating: “A Money-of-Account comes into existence along with Debts, which are contracts for deferred payments and Price-List, which are offers of contracts of sale or purchases. Such Debts and Price Lists, ... can only be expressed in terms of a Money of Account.”

Furthermore, Keynes (1930a, 3) claimed:

Money itself, namely that by delivery of which debt-contracts and price-contracts are discharged, and in the shape of which a store of General Purchasing Power is held, derives its character from its relationship to the Money-of-Account, since the debts and prices must first have been expressed in terms of the latter. Something which is merely used as convenient medium of exchange on the spot may approach to being Money, in as much as it may represent a means of holding General Purchasing Power. But if this is all, we have scarcely emerged from the stage of Barter. Money-Proper in the full sense of the term can only exist in relation to a Money-of-Account.

Keynes (1930a, 3–4) drew a distinction between money of account and money as follows: “[T]he money-of-account itself is the description or title and money is the thing which answers to the description.”

An example can illustrate this distinction clearly. Whereas the Queen of the England is the description or title, Elizabeth II is the person that answers to the description (as of November 16, 2020).

Keynes (1930a, 4) understood the importance of the state in monetary affairs. He said: “[I]t is a peculiar characteristic of money contracts that it is the State or Community not only which enforces delivery, but also which decides what it is that must be delivered as a lawful or customary discharge of a contract which has been concluded in terms of the Money-of-Account.”

Keynes argued that the state determines what serves as the money of account as well as dictates what “thing” will be accepted as money. He stated: “The State, therefore, comes in first of all as the authority of law which enforces the payment of the thing which corresponds to the name or description in the contracts. But it comes in doubly when, in addition, it claims the right to determine and declare what thing corresponds to the name, and to vary its declaration from time

to time—when, that is to say, it claims the right to re-edit the dictionary. This right is claimed by all modern states and has been so claimed for some four thousand years at least” (Keynes 1930a, 4).

For Keynes (1930a, 5), modern money is essentially state money. He opined: “The Age of Chartalist or State Money was reached when the State claimed the right to declare what thing should answer as money to the current money-of-account—when it claimed the right not only to enforce the dictionary but also to write the dictionary.”

Keynes, however, took an encompassing and pragmatic view of what constitutes state money based on its acceptability as tax or other payments to the state as well as the state’s commitment to maintain a smoothly functioning payment system and financial stability. He wrote: “I proposed to include as State-Money not only money which is itself compulsory legal-tender but also money which the State or the Central Bank undertake to accept in payments to itself or to exchange for compulsory legal-tender money” (Keynes 1930a, 6).

Keynes’s views on money is based on the state theory of money. Keynes recognized that modern money consists of not just the central bank’s money, but also commercial banks’ money, nonbank financial institutions’ money, and so forth. He held that in advanced capitalist countries, bank money is the *primary* form of money. He ascertained: “[T]he use of Bank-Money is now so dominant that much less confusion will be caused by treating this as typical and the use of other kinds of currency as secondary, than by treating State-Money as typical and bringing in Bank-Money as a subsequent complication” (Keynes 1930a, 31–33).

Kregel (2019a) provides a relevant summary of Keynes’s thoughts on money as it pertains to crucial topics, such as property rights, governance, the payment system, credit creation, financing investment, and capital formation. Kregel (2019b) has also emphasized that Keynes’s conception of money is linked to his notion of liquidity preference. Martin (2014) gives a historic overview of the evolution of money as well as some aspects of monetary theory. Martin argues that money is a social technology that has three characteristics: (1) an abstract unit of value, (2) a system of accounts, and (3) a system of transferable credit that also enables the storing of value.

The state theory of money has a long and distinguished pedigree, including Smith (1832), Innes (1913, 1914), and Knapp ([1926]1973). Keynes's conception of money built on this tradition of the state theory of money. He extended the state theory of money while underscoring ontological uncertainty and liquidity preference, along with the social basis for money, financial assets, and financial markets and institutions.

After Keynes, Lerner (1943, 1947) was the leading proponent of the state theory of money. Lerner (1947, 313) provided a lucid and succinct analysis of the state theory of money when he declared: "[I]n a normal well-working economy, money is a creature of the state. Its general acceptability, which is its all-important attribute, stands or fails by its acceptability by the state."

He advanced the following arguments supporting the claim regarding the role of the state at the genesis of money:

The modern state can make anything it chooses generally acceptable as money It is true that a simple declaration that such and such is money will not do, even if backed by the most convincing constitutional evidence of the state's absolute sovereignty. But if the state is willing to accept the proposed money in payment of taxes and other obligations to itself, the trick is done. Everyone who has obligations to the state will be willing to accept the pieces of paper with which he can settle the obligations, and all other people will be willing to accept these pieces of paper because they know that the taxpayers, etc., will accept them in turn. (Lerner 1947, 313)

In recent decades, the state theory of money has been reinvigorated in modern money theory (MMT). The first articulation of MMT comes from Mosler (1995). Subsequently, Wray ([1998] 2003, 2012) has provided a definitive academic exposition of MMT. Goodheart (1998) contrasted the chartalist conception of money with the "metalist" conception of money—under which the value of money comes from the purchasing power of the commodity, such as gold, upon which it is based—with a prescient application to the eurozone economies.

3. MONETARY SOVEREIGNTY AND GOVERNMENT DEBT

A state is deemed to have monetary sovereignty if it has the following characteristics (Wray 2012, 42–45):

- It issues its own currency;
- It has the legitimacy, the authority, and the capability to tax and spend in its own currency; and
- It has a floating exchange rate system.

The United States has *complete monetary sovereignty*, whereas China has *partial monetary sovereignty* because it does not have a floating exchange rate regime, and Greece has *no monetary sovereignty* because it satisfies none of the three criteria.

A state that issues its own currency and borrows in the same currency always retains the *operational ability* to service its sovereign debt as long as it has the authority and ability to tax residents in its domicile in its currency and enforce its state authority, and it does not have any currency peg. It is highly unlikely that such a state would default on its own debt issued in its own currency. It would be worth reiterating that this claim holds true only for a state with complete monetary sovereignty as defined above. Countries such as Japan, the United Kingdom, and the United States can be regarded as countries with complete monetary sovereignty, whereas countries, states, provinces, and regions, such as Greece, California, or Gujrat, are entities without any monetary sovereignty as based on the criteria mentioned above.

Modern money theorists have emphasized the operational ability of a state with complete monetary sovereignty to service its debt (Mosler 1995; Wray [1998] 2003, 2012). This important point is now recognized by several mainstream macroeconomists and is illustrated by citations from two leading macroeconomists.

Sims (2012, 2013) has argued the following:

1. “[T]he combination of a treasury that issues fiat-currency debt and a central bank that can conduct open market operations provides a uniquely powerful lender of last resort” (2012, 218).
2. “[A] central bank that issues fiat money can make loans denominated in fiat currency without any risk that its liabilities (reserve deposit and currency) might not be payable on demand, since they are only promises to pay fiat money” (2012, 220).
3. “[A] central bank can ‘print money’—offer deposits as payment for its bills. It will not be subject to the usual sort of run, then, in which creditors fear not being paid and hence demand immediate payment. Its liabilities are denominated in government paper, which it can produce at will” (2013, 566).
4. “[N]ominal sovereign debt promises only future payments of government paper, which is always available” (2013, 567).
5. “Nominal [sovereign] debt is (almost) non-defaultable” (2013, 569).
6. “Economists and journalists sometimes treat inflation as a form of default, but it is not. Default is a situation where the contracted payments cannot be delivered, and the contract does not specify what happens in that eventuality” (2013, 569).
7. “[A] central bank, backed by a treasury that can run primary surpluses and issue nominal debt, is an ideal lender of last resort. Because it can create reserve money, it need never default” (2013, 570).

Regarding the debt servicing capability of the state that issues bonds in its own currency, Woodford (2001) has surmised:

1. “[A] government that issues debt denominated in its own currency is in a different situation than from that of private borrowers, in that its debt is a promise only to deliver more of its own liabilities. (A Treasury bond is simply a promise to pay dollars at various future dates, but these dollars are simply additional government liabilities, that happen to be non-interest-earning.) There is thus no possible doubt about the government’s technical ability to deliver what it has promised; this is not an implausible reason for financial markets to treat government debt issues in a different way than the issuance of private debt obligations” (2001, 693).

2. “The other crucial special feature of a national government is that prices are commonly quoted in units of its liabilities, that is, in terms of the national currency” (2001, 696).

However, the fact that a state with monetary sovereignty has the operational ability to service its debt does *not* imply that such a state should necessarily run large fiscal deficits as a share of nominal GDP or have a high government debt ratio. Fiscal deficit ratios and debt ratios are—and should be—outcomes that are a matter of economic conditions and state policy decisions and deliberations, preferably democratic and well-informed public choices that are appropriate for the circumstances of a state in question. Just because a state has complete monetary sovereignty, that is, the operational ability to service its debt, does not necessarily mean it will do so, and does not necessarily imply that it has the *political willingness* to do so. The political willingness to service the state’s debt may not exist, even if the state has the operational ability to service its debt.

4. KEYNES ON THE DYNAMICS OF GOVERNMENT BOND YIELDS

Keynes had unique and insightful perspectives on the dynamics of government bond yields, grounded in his theory of money, investor expectations, uncertainty, and liquidity preference. His insights are based on his astute knowledge of financial markets and institutions, and investors’ behavior. He recognized the central bank’s important role in financial markets, understanding both its scope and limits.

Keynes (1930a, 1930b) underscored the role of the central bank in setting the policy rate for financial markets. He argued:

1. “The efficacy of Bank-rate for the management of a managed money was a great discovery and also a most novel one ... whilst the practical efficacy of bank-rate becomes not merely familiar but an article of faith and dogma, its precise *modus operandi* and the varying results to be expected from its application in varying conditions were not clearly understood and have not been clearly understood ... down to this day” (1930a, 17).

2. “But there is no simple or invariable relation between the effect of an alteration of bank-rate on the price level ... and the associated alteration in the quantity of bank-money” (1930a, 216).

Keynes maintained that monetary policy drives the long-term interest rate on government bonds through the short-term interest rate. He keenly observed the following:

1. “[T]he influence of the short-term rate of interest on the long-term rate is much greater than anyone ... would have expected” (1930b, 315).
2. “[T]here is no reason to doubt the ability of a central bank to make its short-term rate of interest effective in the [government bond] market” (1930b, 324).

Keynes acknowledged it is counterintuitive that the current short-term interest rate is the main driver of the long-term interest rate. He realized: “For whilst it is reasonable that long-term rates should bear a definite relation to the prospective short-term rates, quarter-by-quarter, over the years to come, the contribution of the current three-monthly period to this aggregate expectation should be insignificant in amount—so one might suppose. It may, therefore, seem illogical that the rate of interest fixed for a period of three months should have any noticeable effect on the terms asked for loans of twenty years or more” (Keynes 1930, 352–3).

First, Keynes argued that the empirical evidence shows that not only does the short-term interest rate influence the long-term interest rate, but that the change in the short-term interest rate also influences the change in the long-term interest rate. The empirical basis of the claim originated from statistical analysis of government bond yields in the United States in the 1920s that Riefler (1930) conducted. It is also based on Keynes’s (1930b, 355–56) own analysis of the movement of UK government bond yields during the same period.

Second, Keynes (1930b, [1936] 2007) argued that there is a theoretical basis for the short-term interest rate to influence the long-term interest rate. The theoretical basis of his argument draws from his perspective on investors’ sentiments, animal spirits, expectations, herding in financial markets, ontological uncertainty, and liquidity preference.

The Theoretical Basis of Keynes's Argument

Keynes's believed that in the final analysis, the foundation of interest rates lies in human psychology, social convention, and liquidity preference, even though the central bank's actions—particularly its setting of the policy rate—drive the short-term interest rate that in turn influences the long-term interest rate on government bonds.

Keynes (1930b , 357–58) noted various institutional and financial reasons for the short-term interest rate's decisive influence on the long-term interest rate. When the short-term interest rate is lower than the long-term interest rate, it is profitable to borrow (lend) on a short-term basis and lend (borrow) on a long-term basis, as long as the value of long-term securities do not decline (rise). When the short-term interest rate is high, short-term securities are attractive to investors because of their safety and liquidity. This causes long-term bonds to sell off as investors shift from long-term bonds to short-term securities. However, when short-term interest rates are low, investors are willing to shift to long-term bonds, which causes long-term bonds to rally as investors shift from short-term securities to long-term bonds. Various features of the ecosystem of the financial institutions along with the search for yields, arbitrage opportunities, and investors' behavior cause the short- and long-term interest rates to be well-aligned. These also usually result in the same directional comovements or changes in the short- and long-term interest rates. Keynes believed that a small change in the long-term interest rate could eventually become a larger change in the long-term interest rate because investors fear that they may lose an opportunity to profit.

Ontological uncertainty and liquidity preference are central to Keynes's view of the determinants of the long-term interest rate. Since investors have very little information about the long-term future, it is impossible for investors to have well-formulated mathematical expectations about the future. Investors cannot rely on well-defined expectations of future short-term interest rates because they do have not a reasonable basis to assign probability weights to them or have any reliable forecast of them. Hence, investors in practice resort to “the apparent certainties of the short period, however deceptive” (Keynes 1930b, 361). As a result, even for well-informed investors, decisions about investments tend to be “oversensitive ... to the near future” because “in truth, we know almost nothing about the more remote future. ... [T]he ignorance about ... the

remote future is much greater than knowledge” about the current state of affairs. Hence, investors are “forced to seek a clue mainly here to trends further ahead” (Keynes 1930b, 357-58). Moreover, “as long as a crowd can be relied on to act in a certain way, even if it is misguided, it will be to the advantage of the better-informed professional to act in the same way—a short period ahead” (1930b, 357–58). Keynes (1930b, 359–63) conjectures that investors actually “know almost nothing about the remote future,” and that “the ignorance ... about the more remote future is much greater than his knowledge” about the current condition and the near-term outlook. As a result, investors’ views are influenced by matters and events that are “certain, or almost for certain about the recent past and the near future.” Investors are “forced to see a clue mainly here to trends further ahead.” Investors do not actually have a basis of “valid judgement” about the future outlook. Hence, he maintained that investors are subject to “the prey of hopes and fears easily aroused by transient events and as easily dispelled” (Keynes, 1930b, 359-63).

Keynes held that the long-term outlook is uncertain because there is insufficient information and only limited knowledge about the future, hence, “it would be foolish, in forming our expectations, to attach great weight to matters which are very uncertain.” ([1936] 2007, 148). Keynes conjectured that investors extrapolate current trends in forming their outlook about the future. He asserted: “[I]t is reasonable ... to be guided to a considerable degree by the facts about which we feel somewhat confident, even though they may be less decisively relevant to the issues than other facts about which our knowledge is vague and scant. For this reason, the facts of the existing situation enter, in a sense disproportionately, into the formation of our long-term expectations; our usual practice being to take the existing situation and to project it into the future, modified only to the extent that we have more or less definite reasons for expecting a change” (Keynes [1936] 2007, 148).

Keynes (2007 [1936], 149) emphasized ontological uncertainty due to “the extreme precariousness of the basis of knowledge” regarding the calculation of prospective yields of investments in the future. He stated: “Our knowledge of the factors which will govern the yields of an investment some years hence is usually very slight and often negligible. ... In fact those who seriously attempt to make any such estimates are often so much in the minority that their behavior does not govern the market” (Keynes [1936] 2007, 150).

Regarding financial markets, Keynes (2007 [1936], 151) shrewdly observed that “certain classes of investment are governed by the average expectation of those who deal on the Stock Exchanges as revealed in the prices of shares, rather than by the genuine expectations of the professional entrepreneur”. Keynes recognized that investors often “fall back on what is ... a convention”; when investors depend “on the maintenance of the convention ... the only risk ... is that of a genuine change in the news *over the near future*,” as long as the investor can assume that there is “no breakdown in the convention” (152–53). However, Keynes noted that “a conventional valuation which is established as the outcome of the mass psychology ... is liable to change violently” particularly during “abnormal times” when the prospect of “continuance of the existing state of affairs is less plausible.” In such circumstances, “the market will be subject to waves of optimistic and pessimistic sentiment, which are unreasoning and yet in a sense legitimate where no solid basis exists for a reasonable calculation” (154).

Keynes ([1936] 2007, 161) pinpointed that “a large portion of our positive activities depend on spontaneous optimism rather than on a mathematical expectation.”, claiming that “our decision to do something positive ... can only be taken as a result of animal spirits—of a spontaneous urge to action rather than inaction, and not as the outcome of a weighted average of quantitative benefits multiplied by quantitative probabilities.” He cautioned that this does not imply that “everything depends on the waves of irrational psychology.” Keynes (163) asserted that “human decisions affecting the future, whether personal or political or economic, cannot be dependent on strict mathematical expectation, since the basis for making such calculations does not exist,” rather, “it is our innate urge to activity which makes the wheels go around.”

Keynes compared security selection in financial markets to beauty contests sponsored by British tabloids where the public does not choose the prettiest face but instead the one who they think everyone else regards as the prettiest. He recognized that investors’ expectations are not derived from any type of mathematical expectations but rather have a flimsy and weak foundation characterized by uncertainty, noting that “by uncertainty I do not mean the same thing as ‘very importable’” (Keynes 2007 [1936], 148). He meant that there is there no reliable statistical and mathematical basis to assign probability weights to events that are ontologically uncertain. Investors instead rely on tacit conventions, rules of thumb, beauty contests, and current

information. This can sometime lead to herding, leading Keynes ([1936] 2007, 148) to declare that investors' "usual practice" is "to take the existing situation and to project it into the future, modified only to the extent that [there are] ... more or less definite reasons for expecting a change."

The ontological uncertainty regarding the future compels investors to rely on the current economic outlook as a gauge for the future outlook. This can serve to keep the long-term interest rate largely aligned with the short-term interest rate. Similarly, factors that cause a change in the short-term interest rate also cause a change in the long-term interest rate. The same arguments hold regarding other crucial variables, such as core inflation, economic growth, earnings, credit risks, and loss given default.

Keynes's view on investors' expectations is different from rational expectations or efficient market formulations. However, it is not inconsistent with broader conceptions of rationality as articulated in Arrow (1951, 1986, 1994), the literature on bounded rationality (Simon 1957, 1978, 1984) and barriers to rationality (Foley 1998), and behavioral economics (Akerlof and Shiller 2009; Schwartz 1998). Arrow (1986, S385) noted that "rationality is not a property of the individual alone ...[r]ather it gathers not only its force but also its very meaning from the social context in which it is embedded." Furthermore, Arrow (1994) remarked that "individual behavior is always mediated by social relations," and "social variables, not attached to particular individuals, are essential in studying the economy or any other social system." The literature on bounded rationality and barriers to rationality has furnished ample evidence showing the limitations of informational and computational capabilities that affect human decision making. These findings bolster Keynes's hypothesis that investors' view of the future is based on analysis of past and current conditions rather than on perfect foresight or mathematical expectation of a future that is ontologically uncertain. Mathematical probabilities of unforeseen events in an ontologically uncertain future invariably cannot be estimated.

Keynes's views on the role of the central bank in influencing the long-term interest rate is reinforced in the Post-Keynesian theoretical literature. Fullwiler ([2008] 2017), Lavoie (2011), Kregel (2011), and Wray ([1998] 2003, 2012) maintain that the central bank has a crucial role in influencing the long-term interest rate.

Liquidity Preference, Interest Rate, and the Central Bank

Liquidity preference is central to Keynes's theory of interest and money, as Kregel (2019b) reiterated. For Keynes ([1936] 2007):

1. "[T]he rate of interest at any time, being the reward for parting with liquidity, is a measure of unwillingness of those who possess money to part with their liquid control over it" (167).
2. "Liquidity-preference ... fixes the quantity of money which the public will hold when the rate of interest is given" (168).

While classical economists regarded the interest rate as "the reward for not-spending," Keynes ([1936] 2007, 174) regards the interest rate as "the reward for non-hoarding," where hoarding means "the actual holding of cash" including bank money. Even though he initially states that "the rate of interest is a highly psychologically phenomenon" (202), Keynes reformulates this view insisting that actually "the rate of interest is a highly conventional, rather than a highly psychological, phenomenon" (203).

The main question for Keynes ([1936] 2007, 168) is: "Why should anyone prefer to hold his wealth in a form which yields little or no interest to holding it in a form which yields interest?" He answers this with "the existence of uncertainty as to the future rate of interest, i.e., as to the complex rates of interest of varying maturity which will rule at future dates."

Keynes ([1936] 2007, 205) argued that "in any given state of expectation" in which the public's liquidity preference is fixed, the central bank's policy stance will be a primary driver of investors' price actions. As a result, the central bank has the ability to establish "a determinate rate of interest or, more strictly, a determinate of a complex rate of interest for debts of different maturities." Specifically, if it is "prepared to deal both ways on specified terms in debts maturities" and "debt of varying degrees of risk," then "the relationship between the complex of

rates of interest and the quantity of money would be direct” (205). Hence, “a complex offer by the central bank to buy and sell at stated prices gilt-edged bonds of all maturities, in place of the single bank rate for short-term bills, is the most important practical improvement which can be made in the technique of monetary management” (206). Keynes stated that the effectiveness of the central bank’s actions may vary, that there are asymmetrical effects of large-scale asset purchases and sales, and that most central banks generally tend to focus on short-term securities and risk-free sovereign debt to influence the short-term interest rate rather than long-term securities and riskier debts. He realized the long-term interest rate was not merely a function of the current stance of monetary policy but also reflects investors’ expectation of the path of future policy (202). He acknowledged that “the short-term rate of interest is easily controlled” by the central bank while the long-term interest rate may prove to be “more recalcitrant” when “it has fallen to a level which ... is considered ‘unsafe’ by representative opinion” (203). Thus, the credibility of the central bank is paramount for achieving its objectives. Though Keynes did not specifically mention it, coordination between the Treasury and the central bank is often essential to setting and maintaining the interest rate target and other monetary policy objectives.

Keynes was acutely aware of the potential of the central bank’s balance sheet policy. He recognized the central bank’s ability to influence long-term interest rates and the shape of the yield curve well before Ben Bernanke. However, by the time Keynes wrote the *General Theory*, he was deeply convinced that direct employment creation through state actions and fiscal policy measures are more effective and efficacious responses to a chronic shortfall in aggregate demand. Thus, he viewed monetary policy as a supplementary rather than the primary means for achieving full employment, price stability, sustained economic growth, and financial stability (Kregel 2011).

Government Fiscal Variables and the Long-Term Interest Rate

The standard view, which is based on the loanable funds theory, is that higher government deficit and debt, as a share of nominal GDP, leads to higher government bond yields. This occurs because higher government spending and borrowing reduces the volume of funds available for the private sector’s borrowing and lending in the loanable funds market. In the standard view, the interest rate reflects the marginal productivity of capital, investors’ time preference, and risk

premiums. Keynes rejected the loanable funds theory and its implications. Following Keynes, the proponents of MMT (Wray [1998] 2003, 74–96; 2012, 110–47) and endogenous money theory (Lavoie 2014), and the experts on the analysis of actual operational realities of the Treasury, the central bank, and financial system (Bindseil 2004; Fullwiler 2008, 2016) reject the loanable funds theory.

The alternative perspective on the relationship between the long-term interest rate and government fiscal variables, such as government spending or taxation, is described below.

If a treasury purchases goods and services from the private sector, then it pays from its account at the central bank. As a result, there is an increase in the bank deposits of the private sector and in the banking system's reserve in the central bank. Such an increase in reserves leads to downward pressure on the policy rate and the short-term interest rate. If the short-term interest rate falls, financial institutions search for long-term Treasury securities with higher yields. But this creates downward pressure on long-term interest rates.

Likewise, when the private sector pays taxes or fees to the state, the treasury's account at the central bank is credited with reserves. As a result, there is a decrease in bank deposits and the banking system's reserves at the central bank. Such a decrease in reserves leads to upward pressure on the policy rate and the short-term interest rate. If the short-term interest rate rises, financial institutions seek to reduce their holding of long-term Treasury securities with lower yields. This creates upward pressure on the long-term interest rate.

Models of the Long-Term Interest Rate Based on the Keynesian View

The Keynesian perspective provides a basis for modeling the dynamics of government bond yields. Formal models of government bond yields, based on an interpretation of Keynes's views, are developed in Akram and Das (2014) and Akram and Li (2016, 2017). A simple two-period version of these models appears in Akram and Das (2019a). In these models, the long-term interest rate depends on the current short-term interest rate and an appropriate forward rate. The basic mechanism of these models is briefly described here.

There are two different views on what drives the forward rate. The Hicksian view is that the forward rate is driven solely by the pure (mathematical) expectation of future short-term interest rates (Hicks [1939] 2001, 141–70). The Kaleckian view is that the forward rate is driven not just by the pure expectations of future short-term interest rates, but also by a margin of safety (Kalecki [1954] 2010, 73–88). In most models in financial economics, the forward rate is based on expected short-term interest rates in the future and the term premium, which is defined as some added compensation required to induce investors to hold long-term government bonds. If the central bank follows the Taylor (1993, 2007) rule, the expected future short-term interest rates and the term premium would mainly depend on the expected inflation and growth rates. In a world characterized by rational expectations, the expected rates of inflation and growth would respectively amount to the mathematical expectations of the possible growth and inflation rates. However, in a world characterized by ontological uncertainty (Davidson 2011, 2015), the probability of unknown events is incalculable. Investors are much more sensitive to current conditions than to the distant future. Hence, investors are forced to take cues about the expected inflation and growth rates from the current conditions. The current inflation rate provides the best guess for the expected inflation rate. Similarly, the current estimate of potential growth rate provides the best cue for the expected growth rate.

If the Keynesian view of expectations is correct, and if investors are mainly guided by animal spirits, the forward rate would depend on the current inflation and growth rates rather than the future inflation and growth rates because investors do not have any reliable information about the future. This implies that the long-term interest rate is based on the current short-term interest rate, current inflation, and the current growth rate. This also implies that the change in the long-term interest rate is based on the change in the short-term interest rate, the change in current inflation, and the change in the growth rate.

If the government's current fiscal variable is thought to affect the long-term interest rate—perhaps through influencing the forward rate—then this variable could be incorporated in the model. The long-term interest rate would depend on the short-term interest rate, current inflation, the current growth rate, and the government fiscal variable. Similarly, the change in the long-term interest rate would depend on the changes in these variables. The short-term interest rate is

the sum of the policy rate set by the central bank and a spread. Likewise, the change in the short-term interest rate is the sum of the change in the policy rate and the change in the same spread. The government fiscal variable can be some appropriate measure of the government's position, such as fiscal balance as a share of nominal GDP or the government's gross or net debt as a share of nominal GDP.

5. FINDINGS ON GOVERNMENT BOND YIELDS

The standard neoclassical view is that higher government deficit and debt ratios lead to higher government bond yields, increased inflation, currency depreciation, and an increase in the probability of debt default (Elmendorf and Mankiw 1998). Moreover, the standard view is that investors in financial markets are concerned about currency depreciation, runaway inflation, or hyperinflation and that investors will become worried about debt default by sovereign authorities if government deficit or debt ratios rise. This view is epitomized in Reinhart and Rogoff (2009). It has also been articulated by economists in various empirical studies, such as Baldacci and Kumar (2010), Cebula (2014), Das et al. (2010), Gruber and Kamin (2012), Hansen and İmrohoroglu (2013), Horioka, Nomoto and Terada-Hagiwara (2014), Hoshi and Ito (2013, 2014), Lam and Tokuoka (2013), Poghosyan (2014), Tokuoka (2010), Tkačevs and Vilerts (2019), and many others. However, if (1) Keynes's view that the central bank controls or influences the long-term interest rate on government bonds and (2) Keynes's arguments have empirical support, then the obsession with higher debt or deficit ratios and worry about government debt default in its own currency are largely misplaced. This is *not* to claim that debt or deficit ratios are unimportant or economically irrelevant. Under certain circumstances, higher debt ratios can be inflationary and lead to exchange rate depreciation. Nevertheless, there is no reason to doubt that a state with monetary sovereignty can service its debt. Moreover, the central bank can influence the long-term interest rate through the short-term interest rate and various monetary policy tools, including asset purchases.

A spate of recent literature on the dynamics of government bonds supports the Keynesian perspective. This literature provides empirical models of government bond yields for different

countries and regions. Akram and Li (2016, 2017, 2020a) and Akram and Das (2019b) modeled Treasury yields for the United States. Akram and Das (2014) and Akram and Li (2018,2020b) examine the dynamics of Japanese government bonds, while Akram (2014, 2019) and Akram and Li (2019) provide economic analysis on the impact of the Bank of Japan's monetary policy on government bond yields. Akram and Das (2017) investigates the behavior of government bond yields for several eurozone countries. Akram and Das (2015, 2019a) analyze government bond yields for India. Akram and Das (2020) explore the bond yields for the commonwealth of Australia. Simoski (2019) considers the dynamics of several Latin American countries, including Brazil and Mexico.

This literature on government bonds from the Keynesian perspective addresses three key questions:

1. What drives government bond yields in countries with monetary sovereignty?
2. Does the short-term interest rate, after controlling for key variables, explain the long-term interest rate on government bonds?
3. Do debt and/or fiscal deficit ratios matter?

The main findings of this literature on government bond yields are as follows:

- The most important driver of the long-term interest rate on government bonds is the short-term interest rate. High (low) short-term interest rates lead to high (low) long-term interest rates.
- Other variables, such as inflation and industrial production, sometimes matter, but not always. Usually, high (low) inflation is associated with higher (lower) government bond yields. Similarly, the expansion (contraction) of industrial production is often associated with high (low) government bond yields. The effects of inflation and industrial production on government bonds is mitigated because the short-term interest rate rises (declines) when inflationary pressures or the pace of activity rises (declines). The central bank raises (lowers) the policy rate in anticipation of upward (downward) inflationary pressure and industrial activity. Thus, the effect of inflation and industrial production can sometimes be indirect rather than direct.

- The effect of fiscal variables, such as the debt and fiscal deficit ratios, on the long-term interest rate is mixed. The conventional view that a higher debt ratio would lead to higher government bond yields does not necessarily hold. Indeed, a higher debt or deficit ratio is often associated with lower government bond yields. For example, in Japan, higher debt and deficit ratios are associated with lower government bond yields, contrary to the standard view (Akram and Das 2014; Akram and Li 2017, 2020b).

The findings from two recent empirical analyses merit mention:

- Levrero and Deledi (2019) report that the Federal Reserve's monetary policy permanently affects the long-term interest rate in the United States.
- Malliaropulos and Migiakis (2018) report that large-scale asset purchases and liquidity provision to major central banks following the global financial crisis have contributed to a significant and permanent decline in long-term yields globally.

The overall findings from several empirical studies shore up evidence for the Keynesian perspective, even though the predominant opinion is that in the final analysis, higher fiscal deficit and government debt ratios would have adverse consequences, such as elevated bond yields, runaway inflation, markedly depreciated currency, or outright debt default. The value of the empirical literature from the Keynesian perspective is that it raises skepticism about the standard view that higher debt or deficit ratios necessarily lead to higher government bond yields because it shows the questionable empirical basis of such assertions.

6. POLICY IMPLICATIONS

If the empirical findings in the literature on government bond yields based on the Keynesian perspectives are valid and sound, then there are definite implications that are pertinent for macroeconomic theory and policy.

First, in countries with monetary sovereignty, the central bank's policy rate and other actions have a decisive effect on long-term government bond yields. A higher (lower) short-term interest

rate is associated with higher (lower) long-term interest rate. By keeping the short-term interest rates high (low) by setting the policy rate, the central bank can keep the long-term interest rate high (low). The central bank can influence the long-term interest rate on government bonds through the policy rate, open market operations, purchases of long-duration government bonds and other securities, calendar-based and information-contingent conditional forward guidance, yield curve control, and policy announcements.

Second, the central bank in countries with monetary sovereignty can control government bonds' nominal yields and the shape of the yield curve, irrespective of the ratios of government debt and deficit to nominal GDP. Interest payments on the government debt, as a share of nominal GDP, are—at the very least—a partial outcome of the central bank's policy stance.

Third, there is no necessary connection between the central bank's policy rate and the size of its balance sheet with the pace of core inflation in the economy. The size of the balance sheet and the quantity of outstanding reserves balances are mainly determined by the central bank's stance regarding its policy rate and other aspects of monetary policy.

Fourth, a state with monetary sovereignty has the operational ability to service its debt and meet its interest payment obligations without any operational hurdles. A state with (almost) *complete monetary sovereignty* is quite different from other entities, such as businesses, households, and state and municipal governments, because the state issues debt that is repayable in its own liabilities, whereas other entities issue debt that is repayable primarily in terms of state-money (and/or bank money) liabilities, as defined by Keynes (1930a, 6). Hence, in conjunction with its central bank, a state with monetary sovereignty can exercise substantial control over government bond yields through setting the policy rate and assorted monetary policy actions.

7. CONCLUSION

Keynes's view on the dynamics of government bond yields is based on his analysis of money, the state theory of money, financial markets and financial institutions, investors' expectations, ontological uncertainty, liquidity preference, and the general theory of interest rates. Keynes argued that the central bank can influence the long-term interest rate on government bonds through setting the policy rate and various monetary policy measures. He believed that the central bank's policy rate determines the short-term interest rate, which in turn influences the long-term interest rate. The Keynesian perspective provides a useful framework for analyzing government bond market dynamics. It can serve as a framework to discern and interpret the empirical regularities in the government bond market and assess the effects of the central bank's policy, the government's fiscal stance, and other variables on government bond yields. A state with complete monetary sovereignty has substantial policy space, contrary to widely held belief, because the treasury and the central bank can—and indeed most often do—engage in monetary-fiscal coordination.

Keynes's assertion that the short-term interest rate is a primary driver of the long-term interest rate is well supported by the empirical evidence for many economies with monetary sovereignty. This empirical regularity is quite relevant for contemporary policy discussions and controversies in economic theory regarding the effectiveness of fiscal stimulus, the monetary transmission mechanism, fiscal-monetary coordination, and government debt management. Further theoretical and empirical research based on the Keynesian perspective can contribute meaningfully to advancing policy debates and macroeconomic theories related to fiscal policy, monetary policy, the fiscal theory of price, functional finance, financial markets, and chartalism.

REFERENCES

- Akerlof, G., and R. Shiller. 2009. *Animal Spirits: How Human Psychology Drives the Economy, and Why It Matters for Global Capitalism*. Princeton, NJ: Princeton University Press.
- Akram, T. 2014. “The Economics of Japan’s Stagnation.” *Business Economics* 49(3): 156–73.
- . 2015. “The Malady of Low Global Interest Rates.” Levy Institute Working Paper No. 852. Annandale-on-Hudson, NY: Levy Economics Institute of Bard College.
- . 2019. “The Japanese Economy: Stagnation, Recovery, and Challenges,” *Journal of Economic Issues* 53(2): 403–10.
- Akram, T., and A. Das. 2014. “Understanding the Low Yields of the Long-Term Japanese Sovereign Debt.” *Journal of Economic Issues* 48(2): 331–40.
- . 2015. “A Keynesian Explanation of Indian Government Bond Yields.” *Journal of Post Keynesian Economics* 38(4): 565–87.
- . 2017. “The Dynamics of Government Bond Yields in the Eurozone.” *Annals of Financial Economics* 12(3): 1750011-1–1750011-18.
- . 2019a. “The Long-run Determinants of Indian Government Bond Yields.” *Asian Development Review* 36(1): 168–205.
- . 2019b. “An Analysis of the Daily Changes in US Treasury Security Yields.” Levy Institute Working Paper No. 934. Annandale-on-Hudson, NY: Levy Economics Institute of Bard College.
- . 2020. “Australian Government Bonds’ Nominal Yields: A Keynesian Perspective.” *Annals of Financial Economics* 15(1): 2050003-1–2050003-20.
- Akram, T., and H. Li. 2016. “The Empirics of Long-Term U.S. Interest Rates.” Levy Institute Working Paper No. 863. Annandale-on-Hudson, NY: Levy Economics Institute of Bard College.
- . 2017. “What Keeps Long-Term U.S. Interest Rates So Low?” *Economic Modelling* 60: 380–90.
- . 2018. “The Dynamics of JGBs’ Nominal Yields.” Levy Institute Working Paper No. 906 (May). Annandale-on-Hudson, NY: Levy Economics Institute of Bard College.
- . 2019. “The Impact of the Bank of Japan’s Monetary Policy on Japanese Government Bonds’ Low Nominal Yields.” Levy Institute Working Paper No. 938. Annandale-on-Hudson, NY: Levy Economics Institute of Bard College.

- . 2020a. “An Inquiry Concerning Long-Term U.S. Interest Rates Using Monthly Data.” *Applied Economics* 52(24): 2594–621.
- . 2020b. “JGBs’ Chronically Low Nominal Yields: A VEC Approach.” *Applied Economics* 52(53): 5873–5893.
- Arrow, K. J. 1951. *Social Choice and Individual Values*. New York: Wiley.
- . 1986. “Rationality of Self and Others in an Economic System.” *The Journal of Business* 59(4): S385–99.
- . 1994. “Methodological Individualism and Social Knowledge.” *American Economic Review* 84(2): 1–9.
- Baldacci, E., and M. Kumar. 2010. “Fiscal Deficits, Public Debt, and Sovereign Bond Yields.” IMF Working Paper No. 10/184. Washington, DC: International Monetary Fund.
- Bindseil, U. 2004. *Monetary Policy Implementation: Theory, Past, and Present*. Oxford and New York: Oxford University Press.
- Cebula, R. 2014. “An Empirical Investigation into the Impact of US Federal Government Budget Deficits on the Real Interest Rate Yield on Intermediate-Term Treasury Issues, 1972–2012.” *Applied Economics* 46(28): 3483–93.
- Das, U. S., M. Papaioannou, G. Pedras, F. Ahmed, and J. Surti. 2010. “Managing Public Debt and Its Financial Stability Implications.” IMF Working Paper 10/280. Washington, DC: International Monetary Fund.
- Davidson, P. 2011. *Post Keynesian Macroeconomy Theory*. Second edition. Cheltenham, UK, and Northampton, MA: Edward Elgar.
- . 2015. *Post Keynesian Theory and Policy: A Realistic Analysis of the Market Oriented Capitalist Economy*. Cheltenham, UK, and Northampton, MA: Edward Elgar.
- Elmendorf, D. W., and N. G. Mankiw. 1998. “Government Debt.” NBER Working Paper No. 6470. Cambridge, MA: National Bureau of Economic Research.
- Foley, D. K. 1998. “Introduction.” In P. S. Albin (ed.), *Barriers and Bounds to Rationality*. Princeton, NJ: Princeton University Press.
- Fullwiler, S. T. 2016. “The Debt Ratio and Sustainable Macroeconomic Policy.” *World Economic Review* 7: 12–42.
- . (2008) 2017. “Modern Central Bank Operations: The General Principles.” In L.-P. Rochon and S. Rossi (eds.), *Advances in Endogenous Money Analysis*. Northampton, MA: Edward Elgar.

- Goodheart, C. A. E. 1998. "Two Concepts of Money: Implications for the Analysis of Optimal Currency Areas." *European Journal of Political Economy* 14(3): 407–32.
- Gruber, J. W., and S. B. Kamin. 2012. "Fiscal Positions and Government Bond Yields in OECD Countries." *Journal of Money, Credit, and Banking* 44(8): 1563–87.
- Hansen, G., and S. İmrohoroglu. 2013. "Fiscal Reform and Government Debt in Japan: A Neoclassical Perspective." *Review of Economic Dynamics* 21: 201–24.
- Hicks, J. R. (1939) 2001. *Value and Capital*. Second edition. Oxford: Clarendon Press.
- Horioka, C. Y., T. Nomoto, and A. Terada-Hagiwara. 2014. "Why Has Japan's Massive Government Debt Not Wreaked Havoc (Yet)?" *The Japanese Political Economy* 40(2): 3–23.
- Hoshi T., and T. Ito. 2013. "Is the Sky the Limit? Can Japanese Government Bonds Continue to Defy Gravity?" *Asian Economic Policy Review* 8(2): 218–47.
- . 2014. "Defying Gravity: Can Japanese Sovereign Debt Continue to Increase Without a Crisis?" *Economic Policy* 29(77): 5–44.
- Innes, A. M. 1913. "What is Money?" *The Banking Law Journal* 30(5): 377–408.
- . 1914. "The Credit Theory of Money." *The Banking Law Journal* 31(2): 151–68.
- Kalecki, M. (1954) 2010. *Theory of Economic Dynamics: An Essay on Cyclical and Long-Run Changes in Capitalist Economy*. Paperback edition. London and New York: Routledge.
- Keynes, J. M. 1930a. *A Treatise on Money, Vol. I: The Pure Theory of Money*. London: Macmillan.
- . 1930b. *A Treatise on Money, Vol. II: The Applied Theory of Money*. London: Macmillan.
- . (1936) 2007. *The General Theory of Employment, Interest, and Money*. New York: Palgrave Macmillan.
- Knapp, G. F. (1926) 1973. *The State Theory of Money*. Clifton, NY: A. M. Kelley.
- Kregel, J. 2011. "Was Keynes's Monetary Policy *À Outrance* in the Treatise, A Forerunner of ZIRP and QE? Did He Change his Mind in the General Theory?" Levy Institute Policy Note No. 2011/4. Annandale-on-Hudson, NY: Levy Economics Institute of Bard College.
- . 2019a. "Democratizing Money." Levy Institute Working Paper No. 928. Annandale-on-Hudson, NY: Levy Economics Institute of Bard College.

- . 2019b. “MMT: The Wrong Answer to the Wrong Question.” *Real-World Economics Review* 89: 85–96.
- Lam, R. W., and K. Tokuoka. 2013. “Assessing the Risks to the Japanese Government Bond (JGB) Market.” *Journal of International Commerce, Economics and Policy* 4(1): 1350002-1-1350002-15.
- Lavoie, M. 2014. *Post-Keynesian Economics: New Foundations*. Cheltenham, UK and Northampton, MA: Edward Elgar.
- Lerner, A. P. 1943. “Functional Finance and the Federal Debt.” *Social Research* 10(1): 38–51.
- . 1947. “Money as a Creature of the State.” *American Economic Review* 37(2): 312–17.
- Levrero, E. S., and M. Deleidi. 2019. “The Causal Relationship Between Short-and Long-Term Interest Rates: An Empirical Assessment of the United States.” MPRA Paper No. 93608. Munich: Munich Personal RePEc Library at the Munich University Library.
- Malliaropulos, D., and P. Migiakis. 2018. “Quantitative Easing and Sovereign Bond Yields: A Global Perspective.” Bank of Greece Working Paper No. 253. Athens: Bank of Greece.
- Martin, F. 2014. *Money: The Unauthorised Biography*. London: Vintage Books.
- Mosler, W. 1995. “Soft Currency Economics.” Available at: <http://moslereconomics.com/wp-content/uploads/2018/04/Soft-Currency-Economics-paper.pdf>
- Poghosyan, T. 2014. “Long-Run and Short-Run Determinants of Sovereign Bond Yields in Advanced Economies.” *Economic Systems* 38(1): 100–14.
- Reinhart, C. M., and K. S. Rogoff. 2009. *This Time is Different: Eight Centuries of Financial Folly*. Princeton, NJ: Princeton University Press.
- Riefler, W.W. 1930. *Money Rates and Money Markets in the United States*. New York and London: Harper & Brothers.
- Schwartz, H. 1998. *Rationality Gone Awry? Decision Making Inconsistent with Economic and Financial Theory*. West-ort, CT: Preager.
- Simon, H. A. 1957. *Models of Man: Social and Rational*. New York, NY: Wiley.
- . 1978. “Rationality as Process and Production of Thought,” *American Economic Review* 68(2): 1–16.
- . 1984. “On the Behavioral and Rational Foundations of Economic Dynamics.” *Journal of Economic Behavior and Organization* 5(1): 35–55.

- Simoski, S. 2019. “A Keynesian Exploration of the Determinants of Government Bond Yields for Brazil, Colombia, and Mexico.” Master of Science thesis, Levy Economics Institute of Bard College. Annandale-on-Hudson, NY: Bard College.
- Sims, C. A. 2012. “Gaps in the Institutional Structure of the Euro Area.” *Banque de France Financial Stability Review* No. 16 (April) 217–23.
- . 2013. “Paper Money,” *American Economic Review* 103(2): 563–84.
- Smith, T. 1832. *An Essay on Currency and Banking*. Philadelphia: Jesper Harding.
- Taylor, J. B. 1993. “Discretion versus Policy Rules in Practice.” *Carnegie-Rochester Conference Series on Public Policy* 39: 195–214.
- . 2007. *Monetary Policy Rules*. Chicago: University of Chicago.
- Tkačevs, O., and K. Vilerts. 2019. “The Impact of Government Borrowing Costs on Fiscal Discipline.” *Kyklos* 729(3): 446–71.
- Tokuoka, K. 2010. “The Outlook for Financing Japan’s Public Debt.” IMF Working Paper No. 10/19. Washington, DC: International Monetary Fund.
- Woodford, M. 2001. “Fiscal Requirements for Price Stability.” *Journal of Money, Credit and Banking* 33(3): 669–728.
- Wray, L. R. (1998) 2003. *Understanding Modern Money: The Key to Full Employment and Price Stability*. Cheltenham, UK, and Northampton, MA: Edward Elgar.
- . 2012. *Modern Money Theory: A Primer on Macroeconomics for Sovereign Monetary Systems*. New York: Palgrave Macmillan.