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The Liquidity Trap, the Great Depression, and Unconventional Policy: Reading Keynes at the Zero Lower Bound

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Abstract
The developed economies of Japan, the United States, and the Eurozone are currently experiencing very low short-term rates, so low that they are considered to be at the “zero lower bound” of possibility. This effectively paralyzes conventional monetary policy. As a consequence, monetary authorities have turned to unconventional and controversial policies such as “Quantitative Easing,” “Maturity Extension,” and “Low for Long Forward Guidance.” John Maynard Keynes in The General Theory offered a rich analysis of the problems that appear at the zero lower bound and advocated the very same unconventional policies that are now being pursued. Keynes’s comments on these issues are rarely mentioned in the current discussions because the subsequent simplifications and the bowdlerization of his model obliterated this detail. It was only later that his characterization of a lower bound to interest rates would be dubbed a “Liquidity Trap.” This essay employs Keynes’s analysis to retell the economic history of the Great Depression in the United States. Keynes’s rationale for unconventional policies and his expectations of their effect remain surprisingly relevant today. I suggest that in both the Depression and the Great Recession the primary impact on interest rates was produced by lowering expectations about the future path of rates rather than by changing the risk premiums that attach to yields of different maturities. The long sustained period when short term rates were at the lower bound convinced investors that rates were likely to remain near zero for several more years. In both cases the treatment proved to be very slow to produce a significant response, requiring a sustained zero-rate policy for four years or longer.

Keywords: liquidity trap, quantitative easing, zero lower bound, Great Depression, monetary policy, term structure, John Maynard Keynes

JEL classification: B22, B03, E43, E52, G11, G18, N10

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The Liquidity Trap, the Great Depression, and Unconventional Policy: Reading Keynes at the Zero Lower Bound

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Respond to richard.sutch@ucr.edu. This working paper presents ideas I have been nursing for a long time. Over several years, I have benefited from presenting early versions in seminars at Gettysburg College; the University of California, Riverside; the University of Mary Washington; Whitman College; Willamette University; Williams College; and at the Asia-Pacific Business and Economic History Conference, Gakushuin University, Tokyo. I have received valuable advice on this version from Michael Bauer, Susan Carter, John Cochrane, William Collins, Barry Eichengreen, Christopher Hanes, Joshua Hausman, Stephen Marglin, Larry Neal, Haelim Park, and Peter Temin.

Abstract

The developed economies of Japan, the United States, and the Eurozone are currently experiencing very low short-term rates, so low that they are considered to be at the “zero lower bound” of possibility. This effectively paralyzes conventional monetary policy. As a consequence, monetary authorities have turned to unconventional and controversial policies such as “Quantitative Easing,” “Maturity Extension,” and “Low for Long Forward Guidance.” John Maynard Keynes in The General Theory offered a rich analysis of the problems that appear at the zero lower bound and advocated the very same unconventional policies that are now being pursued. Keynes’s comments on these issues are rarely mentioned in the current discussions because the subsequent simplifications and the bowdlerization of his model obliterated this detail. It was only later that his characterization of a lower bound to interest rates would be dubbed a “Liquidity Trap.” This essay employs Keynes’s analysis to retell the economic history of the Great Depression in the United States. Keynes’s rationale for unconventional policies and his expectations of their effect remain surprisingly relevant today. I suggest that in both the Depression and the Great Recession the primary impact on interest rates was produced by lowering expectations about the future path of rates rather than by changing the risk premiums that attach to yields of different maturities. The long sustained period when short term rates were at the lower bound convinced investors that rates were likely to remain near zero for several more years. In both cases the treatment proved to be very slow to produce a significant response, requiring a sustained zero-rate policy for four years or longer. [268 words]
[The *General Theory*] is a purely theoretical work, *not* a collection of wisecracks. *Everything* turns on the mumbo-jumbo.

John Maynard Keynes
to D. H. Robertson
February 1935

But do not be reluctant to soil your hands [with quantitative economic history] ... I think it is most important. The specialist in the manufacture of models will not be successful unless he is constantly correcting his judgment by intimate and messy acquaintance with the facts to which his model has to be applied.

John Maynard Keynes
to R. F. Harrod
July 1938

I beg for an occasional re-reading of what I did say!

John Maynard Keynes
to E. W. Gilboy
February 1939
fter a hiatus of nearly three decades, the Keynesian “liquidity trap” – a situation in which low short-term interest rates engineered with monetary policy prove to be ineffective in stimulating an economy in a deep depression – has experienced a revival as a prominent topic among both academic economists and business journalists. The new interest was inspired, first, by the experience of the Japanese economy in the mid- to late-1990s that made monetary policy appear ineffective in reviving the depressed economy or ending deflation. Paul Krugman, the most prominent of many, declared the Japanese situation a modern-day example of an almost-forgotten experience of the United States during the defining moment of the Great Depression.\(^1\)

Second, the collapse of the housing market, the unwinding of collateralized mortgage instruments, and the Lehman Brothers bankruptcy on 15 September 2008 precipitated a credit crisis.\(^2\) The Federal Reserve responded by reducing the federal funds rate target from 2 percent, first to 1.5 percent, and then to 1 percent. The three-month Treasury bill rate, however, fell much lower and remained consistently below those targets through the middle of December. The third event and the one attracting the most attention occurred when the Federal Reserve announced on 25 November 2008 that it would adopt the controversial policy of “Quantitative Easing” and replaced the single-valued federal funds target with a target range between zero and 0.25 percent on 16 December. The three-month Treasury bill rate actually fell to zero two days later and averaged four one-hundredth of one percent (0.04%) for the last two weeks of December 2008.\(^3\)

At that point monetary policy seemed constrained by the “zero lower bound” (ZLB) since short-term rates could go no lower than zero.\(^4\) At the time it was evident that the economy had plunged

\(^1\) Paul Krugman, “It’s Baaack! Japan’s Slump and the Return of the Liquidity Trap” [1998]. Also see Gauti Eggertsson and Michael Woodford [2003]. Krugman has penned an accessible narrative of the Japanese case [Krugman 2009]. For an update see Joshua Hausman and Johannes Wieland [2014]. Some economists, Krugman among them, also expressed doubts that the interest rate cuts of 2001 and 2002 initiated by Alan Greenspan’s Open Market Committee would be effective in reviving the American economy from the then-current recession, for example see Krugman, New York Times, 1 and 4 October 2002.

\(^2\) These events were followed on 29 September by the US Congress’s refusal to pass the Treasury’s $700 billion bailout plan. Congress later reversed itself.

\(^3\) Historical daily data on the constant maturity three-month Treasury bill rate (Series DGS3MO) are available from the St. Louis Federal Reserve Bank. The target federal funds rate is also available from this source (Series DFEDTAR).

\(^4\) John Williams [2014] has a recent discussion of the implications of the ZLB for monetary policy and a review of several policy initiatives since 2008 that were intended to overcome the constraint.
into deep recession. The unemployment rate jumped to 7.3 percent in December [Bureau of Labor Statistics: Series LNS14000000]. With its conventional anti-recession ammunition spent, the Federal Reserve’s innovative policy move was interpreted by many as an attempted end-run around the liquidity trap at the ZLB.⁵

Quantitative Easing (QE) is a policy where the Federal Reserve buys long-term bonds and mortgage-backed securities using newly-created reserve balances. The objective is to stimulate investment spending, home purchases, and possibly consumer durable expenditures by lowering long-term interest rates, making it cheaper for potential investors to borrow the needed financing [Bernanke, CBS News, 60 Minutes, 3 December 2010]. The policy is controversial since there is disagreement about how in theory it should work, whether it will be successful in lowering long-term borrowing rates, and, if so, whether low long-term rates will actually stimulate spending. Whatever one’s belief on these three points might be, one thing is clear. Quantitative Easing is no overnight cure. QE asset purchases have been massive, involving four episodes to date, named QE1, QE2, Twist, and QE3. Figure 1 illustrates the magnitudes involved; by July 2014 the total had reached over 3 trillion dollars split 46-54 between Treasuries over five years to maturity and guaranteed mortgage-backed securities. An additional trillion was held in securities between 1 and 5 years to maturity.⁶ Six years have passed and the American

⁵ When the new policy was announced officials from the Federal Reserve denied that they were pursuing a policy of Quantitative Easing. Their stated goal was “simply to unfreeze the mortgage market.” However, as Edmund Andrews reported “for all practical purposes, the actions lead to similar results” [Andrews, New York Times, 26 November 2008]. When Ben Bernanke, then a Governor of the Federal Reserve, first explored the possibility of unconventional policies, he described them as “nonstandard means of injecting money” [Bernanke 2002]. The Fed now prefers to call its policy one of “large-scale asset purchases.”

⁶ QE1 was named retrospectively. QE2 was announced in November 2010 and QE3 in September 2012. Following QE2 the Fed announced a “Maturity Extension Program” (MEP) in September of 2011. This policy continued the purchases of long-duration Treasury securities (6 to 30 years to maturity) but financed the purchases, not with created reserves, but by selling an equivalent amount of short-term securities (3 years or less) thus lengthening the maturity composition of the Federal Reserve’s balance sheet [Federal Reserve Press Release, 21 September 2011]. This policy, intended to lower long-term rates, recalled a similar “Operation Twist” in 1961 [Modigliani and Sutch 1966, 1967]. Immediately, the financial press renamed it “Twist Again,” honoring Chubby Checker’s hit single of that same year “Let’s Twist Again (Like We Did Last Summer)” [Swanson 2011]. The data plotted in Figure 1 were downloaded from the Federal Reserve Bank of St. Louis, Series TREAS1T5, TREAS5T10, TREAS10Y, and MBS1T5, MBS5T10, MBS10Y.
Liquidity Trap

economy, while steadily improving since the summer of 2009, is still operating below par. Unemployment remains high and inflation is below target.7

Until these recent events the liquidity trap was thought to be merely a theoretical curiosity or – if ever relevant – a short-lived phenomenon of the Great Depression. The Fed’s commitment to an unconventional policy pursued with earnest tenacity for so long has, naturally enough, produced an outpouring of academic literature both theoretical and empirical. Many of these contributions make reference, at least in passing, to the liquidity trap attributed to John Maynard Keynes as described in *The General Theory of Employment, Interest, and Money* [1936]. Yet, while evocative, there has been no attempt to mine the richness of Keynes’s treatment to further the understanding of the Quantitative Easing policy. Keynes not only offered an original analysis of the problem, he actually advocated the very policies now being pursued. His analysis remains surprisingly relevant today. Keynes’s comments on these issues are rarely mentioned in the current discussions because the subsequent simplifications and the bowdlerization of his model obliterated this detail.

**Some Difficulties**

Several difficulties have so far impeded the discussion. First, Keynes is often difficult to pin down. As James Tobin explained, when Keynes discussed a phenomenon he generally offered “a number of possible theoretical explanations, supported and enriched by the experience and insight of the author” [Tobin 1958: 70]. And then, the *General Theory* is a notoriously unreadable book, one that required others to interpret and popularize its message.8 The book’s

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7 Lawrence Summers makes the additional point, not pursued in this paper, that when compared with the long-run potential estimated by the Congressional Budget Office in 2007 the US economy has “made no progress in restoring GDP to its potential” [2014a: 66]. This has revived the old idea of “secular stagnation” and produced a “new secular stagnation hypothesis” that suggests that the ZLB “could indefinitely prevent the attainment of full employment” [Hansen 1939; Summers 2014b: 27; Eggertsson and Mehrotra 2014].

8 John Kenneth Galbraith engagingly told this story of the translation and proselytization of Keynesian theory in *The New York Times Book Review* some fifty years ago [Galbraith 1965: 44]. It is a common observation that the *General Theory* is a tough read even for – perhaps particularly for – economists. Keynes remarked in Stockholm in the autumn of 1936: “It is only to an audience of economists that it is difficult” [Moggridge 1973 Volume 14: 100]. Joan Robinson, on the other hand, remarked in a letter to Keynes after reviewing the page proofs: “I should think it is the most readable book of its weight ever” [Robinson 1935 emphasis in the original]. The best advice, which I shall ignore, is from John Hicks who described Keynes’s style as that of an Impressionist. The *General Theory*, he remarked, “needs to be read at a distance, not worrying too much about details, but looking principally at the general effect. … Criticisms [by economists such as Dennis Robertson] sometimes remind me of a man examining a Seurat
theoretical novelty, its tantalizing promise to solve the puzzle of sustained unemployment, and its practical (but radical for its time) policy advice attracted no shortage of interpreters and interpretations. As a consequence, there is no agreement on the definition of the liquidity trap. There is even a disagreement on whether Keynes believed the United States was in a liquidity trap at any point during the Great Depression.

The problem here is that Keynes did not coin or employ this name for the economic ailment that now flies under the Keynesian flag. That honor belongs to Dennis Robertson who first used the term in 1940 [pp. 34-36]. It was then picked up and popularized by John Hicks who defined the “liquidity trap for saving” as “Mr. Keynes’s doctrine about the difficulty of reducing the rate of interest below a certain minimum level” [Hicks 1942: 56]. So, it is up to the reader of the General Theory to decide which passages describe the “true” concept and which caveats modify or constrain it.

On one side are those who define the liquidity trap as synonymous with a situation where the short-term government security (Treasury bills or the overnight rate) has reached the zero lower bound. Paul Krugman represents this now-orthodox interpretation:

America and Japan (and core Europe) are all in liquidity traps: private demand is so weak that even at a zero short-term interest rate spending falls far short of what would be needed for full employment. And interest rates can’t go below zero (except trivially for very short periods), because investors always have the option of simply holding cash. [Krugman, New York Times Blog, 11 April 2013]

Alternatively, Peter Basile, John Landon-Lane, and Hugh Rockoff have proposed a “full-spectrum liquidity trap.”

9 Paul Samuelson, in an obituary for Keynes, described how seductive and transformative the Keynesian analysis proved. “No individual who has once embraced the modern analysis has – as far as I am aware – later returned to the older theories. And in universities where graduate students are exposed to the old and new income analysis, I am told that it is often only too clear which way the wind blows” [Samuelson 1946: 189].

10 Bradford DeLong expresses the standard view in somewhat different terms: “I have always understood ‘liquidity trap’ to mean a situation in which cash is effectively a perfect substitute for Treasury bills and in which as a result open-market operations in their standard form have no effect on anything” [2010, emphasis supplied]. Also see Krugman [1998: 141].
A true liquidity trap requires that the entire spectrum of rates, including rates on long-term government debt and short and long-term private debts, must have reached low sticking points to conclude that the economy had entered a liquidity trap. Finding that rates on short-term governments, or similar private assets, were near zero, in this view, is insufficient to establish a true liquidity trap. [Basile, Landon-Lane, and Rockoff 2011 (2010: 3) emphases supplied]

This difference in definitions is charged with an emotional tinge because of the infamous implication that when the trap is present conventional monetary policy would be ineffective: “the quantity of money becomes irrelevant” [Krugman 1998: 137]. In the context of the 1930s this ineffectiveness corollary meant – in the view of early Keynesians – that “deficit spending was the only policy capable of shortening the Depression.”11 To the Keynesians a “conventional” monetary policy to stimulate the economy involved purchasing short-term securities in the open market to lower short-term rates, obviously impossible to continue at the ZLB.12 Monetarists conceptualize a stimulating monetary policy as involving an expansion of some monetary aggregate however achieved. This action, they point out, is still possible at the ZLB if the Fed is willing to purchase long-term government bonds, corporate bonds, and junk bonds. That is, indeed, precisely what the Federal Reserve is currently doing. However, it is not yet clear whether this unconventional policy works; effectiveness remains an open question.

Milton Friedman once suggested that it might be necessary, when fighting against the zero lower bound, to create money to purchase “such assets as durable and semi-durable consumer goods, structures and other real property.” Friedman even included houses, automobiles, furniture, household appliances, and clothing in the range of assets that could be targeted by open market operations [1971: 28-29]. Such a view, it seems to me, blurs the distinction between monetary and fiscal policy. Even rigid Keynesians would agree that

11 This characterization of the ineffectiveness corollary is quoted from Basile, Landon-Lane, and Rockoff [2011 (2010: 3)]. I should emphasize that this expresses the view of early Keynesians rather than, as we shall see, that of Keynes or (need I add?) Basile, Landon-Lane, and Rockoff. It is probably fair to add that the early Keynesians were probably influenced more by the observation that low interest rates (“easy money”) failed to induce a recovery from the long depression of the 1930’s than by the logic of the liquidity trap [Bach 1963:3].

12 For many years conventional monetary policy was constrained by the “bills only doctrine.” This policy, formally adopted by the Federal Reserve in 1953, limited open market operations exclusively to short-term securities. The policy was ended in 1961 with the first Operation Twist. But a few years later the Federal Reserve effectively returned to “bills preferably.” Dudley Luckett [1960] critically discusses the policy. Ralph Young and Charles Yager [1960] defend it. Milton Friedman and Anna Schwartz provide a description of the portfolio rebalancing that would take place after the Fed purchases bills thus transmitting the reduction in interest rates to other assets with different maturities, liquidity, and risk [1963b: 60-61].
purchases of automobiles and structures would directly contribute to aggregate demand, put unemployed workers in the industries targeted back to work, and jump start the economy.

There is one other point that will prove an obstacle to attempts to gage the impact of the unconventional policies, estimating the “outside lag.” Even if one grants the theoretical potential of purchases of long-term assets to stimulate the economy, there is an issue of how long it would take for such purchases to restore full employment. I will argue, following Keynes, that the speed of the response is determined, not by the size and timing of the current Fed policy, but rather by the market’s anticipated path of short-term rates into the future – what the people expect to happen with Fed policy. Changing expectations may take a long time – several years – to accomplish. In some instances political and humanitarian impatience may require a faster acting policy, such as deficit spending.

Outline of the Argument

This essay has three tasks. First I review and reinterpret the theory of the liquidity trap as presented by Keynes in the General Theory. My hope is to persuade you that my interpretation has some advantage for considering QE policies in the presence of the zero lower bound. Paul Krugman has also made the case that there is inspiration and insight to be found in Keynes, but he cautions that “What matters is what we make of Keynes, not what he ‘really’ meant” [Krugman 2011].

Second, I employ a narrative approach to examine the impact of Federal Reserve and Treasury policies during the Great Depression with the General Theory as an organizing devise and a guide.13 The year 1932 is given particular emphasis since Keynes suggested that the “crisis of liquidation” of October and November of that year was evidence that conventional monetary policy could become powerless to stimulate recovery during a deep depression [Keynes 1936: 207-208]. I also give attention to the periods April 1934-December 1936 and April 1938-December 1939; periods when monetary expansion was continued despite the fact that short-term rates were at the ZLB [Hanes 2006]. This look back at the historical case has two justifications. I

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13 The narrative approach, which details the sequencing of events, cannot establish causation [Kareken and Solow 1963: 16; Hoover and Perez 1994]. Nor, in the context of business cycles can it firmly establish the superiority of one theory over another, say Milton Friedman’s theory over Keynes’s [Tobin 1970]. I use historical narrative to illustrate Keynes’s analysis and to establish its plausibility. Keynes also relied on narrative economic history for similar purpose in his Treatise on Money [1930: volume 2, chapter 30, “Historical Illustrations”].
think it helps to support my interpretation of Keynes’s liquidity trap model. As Keynes noted “the object of a model is … to develop a logical way of … understanding the time sequences to which [transitory or fluctuating factors] give rise in particular cases” [Keynes 1938: 296-297]. Also, as Lucrezia Reichlin recently suggested, “much remains to be done to understand the transmission mechanism of Quantitative Easing. The analysis of historical cases …, as well as of the experience of other countries, is the way to go” [Reichlin 2011: 195].

For the third task, I compare the policies of the 1930s to those being debated today. I suggest that Quantitative Easing probably played a role in December 2008 in preventing a collapse into a second Great Depression. Both in the late 1930s and during the recovery from the Great Recession, unconventional monetary policy appears to have lowered mid-term interest rates relative to the very long-term rate. I suggest that in both in the Depression and the Recession the primary impact on interest rates was produced by lowering expectations about the future path of rates rather than by changing the risk premiums that attached to yields of different maturities. The long sustained period when short term rates were at the lower bound apparently began to convince investors that rates were likely to remain near zero for several more years. In both cases the treatment proved to be very slow to produce a significant response, requiring a sustained zero-rate policy for four years or longer.¹⁴

Part I: The Theory

In June 1931, in a series of lectures delivered in Chicago, John Maynard Keynes articulated most of the essential ingredients of the macroeconomic model he later described in the General Theory [Keynes 1931, 1936]. This early version included the inadequacy of effective demand as the cause of business downturns and the existence of sustained unemployment as an argument supporting the need for government intervention. At that time, however, Keynes suggested that government should place primary reliance upon monetary policy as a cure for the on-going depression. “It may not be easy and a large change may be needed, but there is no other way out” [365]. About fiscal policy he had this to say in 1931:

Theoretically, it seems to me, there is everything to be said for action along these lines. For the government can borrow cheaply and need not be deterred by overnice calculations as to the prospective return. ... The difficulty about government programmes seems to me to be essentially a

¹⁴ There is also the issue of whether lower long-term rates will actually have a strong stimulating impact on new investment. The evidence on this point remains unclear.
practical one. It is not easy to devise at short notice schemes which are wisely and efficiently conceived and which can be put rapidly into operation on a really large scale. Thus I applaud the idea and only hesitate to depend too much in practice on this method alone unaided by others. [Keynes 1931: 364]

Less than five years later, when the General Theory appeared, Keynes had added a new feature to his macroeconomic model which led him to disregard his practical objections to increased government spending with borrowed money. The Keynes of 1936 announced he was “somewhat sceptical of the success of a merely monetary policy directed toward influencing the rate of interest.” Fiscal policy – “a somewhat comprehensive socialisation of investment” – was the only cure for the deep economic depression of the mid-1930s compatible with the preservation of “capitalistic individualism.” The fluctuations in the demand for capital were “too great to be offset by any practicable changes in the rate of interest” [Keynes 1936: 164, 378, and 381, emphasis supplied]. The new theoretical ingredient, inspired I believe by the 1932 “crisis of liquidation,” was a liquidity trap at the zero lower bound of short-term rates.

Although the General Theory was a “purely theoretical work,” Keynes clearly intended it to be an interpretation of the Great Depression; and the liquidity trap, I believe, was intended to describe the situation following the events of 1932. The reader, when we come to Part II, I hope will thus appreciate making an “intimate and messy acquaintance with the facts.” 15 Keynes’s analysis of monetary policy during the Depression contains two distinct theoretical arguments.

1. The collapse of the investment demand schedule had been so great that the long-term interest rate would have to be reduced to very low levels before the quantity of investment demanded would be adequate to restore full employment.

2. Orthodox monetary policies failed to reduce the long-term interest rate sufficiently because – under depressed conditions – there was an effective floor to long-term lending rates.

The first phenomenon, the collapse of investment demand, I take to be the defining characteristic of a “Keynesian depression,” that is, a depression caused by inadequate aggregate demand induced by a perception that investment opportunities were exhausted and characterized by a loss of business confidence [Keynes 1936: 315-317]. The second phenomenon is commonly called the “liquidity trap” but it is important to note that the floor to long-term lending rates is predicated on

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15 Keynes characterized the General Theory as a “purely theoretical work,” in a pre-publication exchange with Dennis Robertson [Mogridge 1973 Volume 13: 520]. His call for an acquaintance with quantitative economic history was in a post-publication letter to Roy Harrod [Mogridge 1973 Volume 14: 300].
the requirement that the short-term rate is at the lower bound. To be clear, we should call this the “zero bound trap,” or ZLB trap for short.

The ZLB Trap According to Keynes

Keynes suggested three theoretical reasons why an effective floor to long-term interest rates might be encountered at the depth of a depression. These describe three potential problems that are in principle independent.

(1) Since the term structure of interest rates will rise with maturity when short-term rates are low, a point might be reached where continued open-market purchases of short-term government debt would reduce the short-term rate to zero before producing a sufficient decline in the risk-free long-term rate [Keynes 1936: 201-204 and 233].

(2) It is, at least theoretically, possible that the demand for money (called “liquidity preference” by Keynes) could become “virtually absolute” at a sufficiently low long-term interest rate and, if so, then increases in the money supply would be absorbed completely by hoarding [Keynes 1936: 172 and 207-208].

(3) The default premiums included as a portion of the interest charged on business loans and on the return to corporate securities could become so great that it would prove impossible to bring down the long-term rate of interest relevant for business decisions even though the risk-free long-term rate was being reduced by monetary policy [Keynes 1936: 144-145].

When introducing the first problem, Keynes suggested, for reasons I will come to, that “the rate of interest is a highly psychological phenomenon.” I shall label this impediment “term structure rigidity.” The second argument Keynes described as the problem of “absolute liquidity preference.” Many treatments of the liquidity trap isolate this ingredient and ignore the other two. It is important to my interpretation that discussions of the Keynesian liquidity trap consider all three elements.

The first two elements in this list are often confused and conflated because of a tendency in the post-Keynesian literature to drop short-term assets from the Keynesian model, leaving money, bonds, and physical capital as the only assets. This may be acceptable for a textbook

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16 Keynes did not consistently hold to the distinction between cash and short-term assets perhaps because when short-term rates are effectively zero there is no need to distinguish cash and short-term assets [Keynes 1936: 167 (note 1)]. Subsequent interpreters felt free to drop the short-term asset for the sake of simplification. One such simplified model is the familiar IS-LM framework introduced by John Hicks.
simplification, but not, I submit, for an application to the economic history of the Great Depression or a clear-eyed view of the current situation in the United States.

The third element of Keynes’s proposition he called the problem of “lender's risk.” As far as I am aware, only scant attention has been given to this phenomenon in either post-war textbook treatments of the Keynesian system or the empirical work on investment, interest rates, and monetary policy. For that reason, I shall discuss this phenomenon at some length. I do not anticipate, however, that my treatment will prove particularly controversial though I submit it does put an insightful light on the macroeconomic history of the Great Depression.

In addition to the three general theoretical arguments I have mentioned, Keynes added several specific institutional reasons that contributed to establishing a floor to interest rates.

(4) The existence of transactions costs would compel a bank to “charge its customers 1½ to 2 per cent., even if the pure rate of interest to the lender is nil.”

(5) The monetary authorities may limit their open-market activities to “debts of a particular type.” In the Great Depression case that meant short-term debts.

(6) The monetary authorities might show themselves to be unwilling to conduct an effective monetary policy for political or other reasons [Keynes 1936: 207-208].

These institutional features have some relevance to the history of the Great Depression and will be discussed briefly in what follows.

**Did Keynes Believe in a Liquidity Trap?**

Before jumping in, there is an issue that I should clear up. Some economists doubt that Keynes believed a liquidity trap was encountered during the Great Depression. I think they have misread Keynes. Trap deniers quote the *General Theory.*

There is the possibility … that, after the rate of interest has fallen to a certain level, liquidity-preference may become virtually absolute in the sense that almost everyone prefers cash to holding a debt which yields so

[1937: 147-159]. For alternative discussions of the role of short-term assets in the Keynesian model see Franco Modigliani [1968] and Axel Leijonhufvud [1968: Chapter 2].

17 The two best-selling textbooks written after the *General Theory* were *Economic Analysis* by Kenneth Boulding [1941] and *Economics: An Introductory Analysis* by Paul Samuelson [1948]. Neither mentions the possibility of a rising default risk in a depression when describing the Keynesian model. On the evolution of the Textbook Keynesian Model see Kerry A. Pearce and Kevin D. Hoover [1995].
low a rate of interest. In this event the monetary authority would have lost effective control over the rate of interest. But whilst this limiting case might become practically important in future, I know of no example of it hitherto. [Keynes 1936: 207 emphasis supplied]

This passage refers to the problem of absolute liquidity preference. I suggested in the previous section that the impotence of monetary policy analyzed by Keynes was potentially the consequence of three obstacles. Absolute liquidity preference was only one of them. Keynes pointed out in the paragraphs immediately following the one just quoted that the other two impediments were operating even if this particular one was not.

In the postwar literature an important misconception took hold. Absolute liquidity preference came to be thought of as the only ingredient in Keynes's argument about monetary policy during the depression. Bowdlerized to retain only that single element, the so-called Keynesian liquidity trap was a popular piece of textbook apparatus in the 1960s, but it was rejected by monetarists, who were probably troubled by the ineffectiveness corollary on theoretical grounds. And, absolute liquidity preference was rejected by most macroeconomists sometime in the 1970s on the strength of time-series econometric evidence. Before the recent round of textbook revisions, the liquidity trap rarely appeared in modern textbooks and when mentioned it was almost always dismissed as an unlikely possibility.

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18 According to Keynes, monetary policy can affect the economy in the short run only by operating through the interest rate. Monetarists suggested that in the long run money held by the public might also stimulate consumption operating through the “Pigou Effect” [Pigou 1943; Patinkin 1948]. For the short period Milton Friedman and Anna Schwartz rejected absolute liquidity preference on, to me mysterious, grounds: “The failure of repeated attempts by central banks to peg interest rates at low levels has made that proposition untenable” [1982: 55 and Friedman 1971: 26]. I find this statement puzzling since (1) the Federal Reserve was highly successful in pegging Treasury rates at very low levels from 1942 through 1951 – World War II, unlike previous wars, was after all “the 2-per-cent war” [Samuelson 1945: 26] – and (2) if Keynes were correct about an effective floor to long-term bond yields and private market rates it would, indeed, be impossible to peg rates below that floor.

19 Several journal articles reported the conclusion that absolute liquidity preference did not occur after examining time-series relationships estimated with US data. The most influential were Martin Bronfenbrenner and Thomas Mayer [1960], Allan Meltzer [1963], and David Laidler [1966]. Laidler, however, notes that his results test only the absolute liquidity version of the trap and that they cast no light on the other elements of Keynes’s ZLB trap [1966: footnote 11, p. 551].

20 Pearce's Dictionary of Modern Economics says: "When originally suggested by Keynes in the General Theory this appeared to be an important qualification of the effectiveness of monetary policy. However in practice there is no empirical evidence to support the existence of a liquidity trap" [1981: 252]. Even some textbooks that appeared after the appearance of zero interest rates in Japan are equivocal. N. Gregory Mankiw in the fifth edition of Macroeconomics has a boxed insert on the liquidity trap that mentions the situation in Japan but which also presents the concept as debatable with “no consensus about the answers”
Another point that should be emphasized is that in the simplified version of the Keynesian model the dynamic relationship between short-term and long-term interest rates and the relationship between riskless rates (like those earned by government bills and bonds) and the borrowing rates for new investment were forgotten and the structure of interest rates was collapsed to an ill-defined concept known as *the* interest rate. “The rate of interest” specified in the passage from the *General Theory* quoted above is the long-term borrowing rate faced by potential investors. The reason why Keynes knew of no example hitherto was “owing to the unwillingness of most monetary authorities to deal boldly in debts of long term” [Keynes 1936: 207]. This point is important because the other two obstacles facing monetary policy makers specifically involve the dynamics of the entire structure of rates and the zero-lower-bound problem. But with those elements absent in their models, the trap deniers threw the baby out with the bath water.

Keynes was certainly aware that in late 1932 the United States had reached the ZLB and encountered a policy trap. In the paragraph immediately following the passage that trap deniers are fond of quoting, he noted that “in the United States at certain dates in 1932 there was … a crisis of liquidation, when scarcely anyone could be induced to part with holdings of money on any reasonable terms” [Keynes 1936: 207-208]. I will come back to this episode in due course.

**Nominal or Real?**

Keynes envisioned the demand schedule for new fixed investment as a function of the nominal long-term interest rate [1936: 222-229]. Some textbooks teach today’s undergraduates to graph investment demand against *real* interest rates. Such a transformation may seem straightforward from a theoretical point of view, but it is problematic from the empirical perspective. The real rate of interest is the nominal long rate corrected for expected inflation over the long period, but expectations about future prices are not only unobservable in practice, they also will differ from person to person. The commonplace practice of subtracting the current rate of inflation from the nominal rate to derive a “real rate” doesn’t help matters. That involves

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[2003: 303]. The Google N-gram of “liquidity trap,” after recording a small number of references in 1943-1949, rises linearly from zero in 1955 to a peak in 1975 (the heyday of textbook Keynesianism) and then declines linearly until 1993, just before the call rate in Japan approached the lower bound.

21 Axel Leijonhufvud claimed that Keynes “explicitly repudiated” the liquidity trap notion [Leijonhufvud 1968: 158 and 161]. This is surely not correct as I point out in the addendum.
crediting a naïve and nearsighted model of expectations. It assumes that everyone imagines it impossible for the rate of inflation to change from its current pace for many years to come.

Keynes preferred to embed all of the uncertainties about the returns to new investment, including the uncertain expectations about inflation, into the demand schedule. He emphasized the instability of expectations, swings in confidence, and the appearance and disappearance of “spontaneous optimism,” all of which he captured with the term “animal spirits” [1936: 161-162]. The instability of animal spirits makes Keynes’s investment demand subject to volatility and prone to collapse. The textbook demand for investment, the one that is a function of real interest rates, will also be unstable, but less so if – as appropriate – the future expected returns to investments are put into real terms. That adjustment, however, defies calculation. “Human decisions affecting the future … cannot depend on strict mathematical expectation, since the basis for making such calculations does not exist” [Keynes 1936: 162-163].

The Collapse of Investment, 1929-1933

In Keynes’s formulation, with nominal demand and nominal rates, each potential investor – whatever his or her expectations about the future, whatever degrees of optimism and confidence are held about those expectations – makes a guess about the benefits to come from a proposed enterprise. The aggregation of all those guesses is the macroeconomic demand for investment as function of the expected rate of return. Taking on the voice of an investor, which of course he was, Keynes remarked

it is our innate urge to activity which makes the wheels go round, our rational selves choosing between the alternatives as best we are able, calculating where we can, but often falling back for our motive on whim or sentiment or chance [Keynes 1936: 163].

“We should not conclude,” Keynes warned, “that everything depends on waves of irrational psychology” [1936: 162]. It is the essence of macroeconomics that aggregate behavior is more regular and predictable than the behavior of any single member of the group. One investor’s optimism is often cancelled by another’s pessimism. The instability of the aggregate investment demand schedule comes when a visible event, say the failure of Lehman Brothers, influences many prudent investors to turn cautious or pessimistic at the same time or when herd behavior overtakes the psychology of many causing “panic” or “irrational exuberance” as the case may be [Shiller 2000 (2005)]. For a real-time narrative of the sense of panic in September of 2008 see Joe Nocera’s reporting [New York Times, 2 October 2008: A1].
To make a distinction between a Keynesian depression and economic downturns of any other sort is not standard. I choose to make it here because the liquidity trap problem becomes relevant only if a substantial fall in the nominal interest rate is required to restore full employment. To illustrate the distinction, consider the case of monetary policy applied in the absence of a Keynesian depression. Suppose aggregate final sales decline and unemployment rises not because of a downward shift in the demand for investment but because of a fall in demand arising from consumption spending, the government, or the foreign trade sector. Suppose further that the nominal demand schedule for fixed investment remained unaffected and was reasonably elastic with respect to the relevant interest rate. In such a case one might suppose that a modest decline in long-term interest rates induced by an orthodox open-market operation would be sufficient to offset the decline in aggregate demand. Declines in the bank loan rate would stimulate new investment and the increased demand for investment goods would compensate for the deficient component of aggregate demand. If this monetary policy could be implemented rapidly and effectively, recovery might be accomplished before accelerator effects caused a weakening of investors' confidence.

This, I imagine, is how monetary policy could be effective in stabilizing an economy otherwise sensitive to shocks in aggregate demand. This use of monetary policy might even be effective in checking a recession initiated by a decline in the demand for investment – provided, first, that the initial decline was relatively small and, second, that action was taken sufficiently quickly to reverse the situation before accelerator effects caused a plunge into a Keynesian depression. Nothing in what follows is intended to cast doubt on the effectiveness of monetary policy in preventing serious depressions that might otherwise arise in such cases. The question at issue is whether monetary policy can be effective in curing a serious depression once it has appeared.

We can, I think, be certain that Keynes believed that the world-wide depression of the 1930s was produced by a massive collapse of investment demand. Keynes’s analysis of the cause of the Great Depression can be found in the first of his Chicago lectures from the 1931 series. Entitled "The Originating Causes of World-Unemployment," Keynes’s talk could not have been more emphatic about the role of the collapse of fixed investment.

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22 I need not consider the question of whether discretionary stabilization policy is necessary or wise in these cases. I am merely arguing that if used to fine tune the economy, monetary policy – in theory – might be effective in insulating the economy from shocks.
I see no reason to be in the slightest degree doubtful about the initiating causes of the slump. ... I find the explanation of the current business losses, of the reduction of output, and of the unemployment which necessarily ensues on this not in the high level of investment which was proceeding up to the spring of 1929, but in the subsequent cessation of this investment. I see no hope of a recovery except in a revival of the high level of investment. [Keynes 1931: 344]

American data support Keynes’s claims that expenditures for plant and equipment began falling before the stock market crash in October of 1929 and had collapsed disastrously before the first banking crisis in the fourth quarter of 1930 [Keynes 1931: 349-350]. Lowell Chawner’s quarterly estimates of expenditures for manufacturing plant and equipment made for the Department of Commerce and published in the Survey of Current Business are startling. A peak in spending was reached in the second quarter of 1929. By the third quarter of 1930 spending was only 61 percent of the peak level:

<table>
<thead>
<tr>
<th>Year</th>
<th>Value (millions of current dollars)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1929:1</td>
<td>659</td>
</tr>
<tr>
<td>1929:2</td>
<td>713</td>
</tr>
<tr>
<td>1929:3</td>
<td>682</td>
</tr>
<tr>
<td>1929:4</td>
<td>685</td>
</tr>
<tr>
<td>1930:1</td>
<td>600</td>
</tr>
<tr>
<td>1930:2</td>
<td>500</td>
</tr>
<tr>
<td>1930:3</td>
<td>435</td>
</tr>
<tr>
<td>1930:4</td>
<td>373</td>
</tr>
</tbody>
</table>

[Chawner 1941: Table 1, p. 10]

Monthly data on narrower definitions of plant and equipment are plotted in Figure 2.

By 1931 Keynes had come to think of the economic system as locally stable but globally unstable. A “small” shock might self-correct, but a larger one could precipitate a downward spiral propelled by accelerator effects and self-fulfilling prophecies before reaching a bottom with high rates of unemployment that might persist for years.

Once this decline was started on a significant scale, it is exceedingly easy to see (on my way of looking at the matter) how the mere fact of a decline precipitated a further decline ... This decline has continued down to the present time, and so far as fixed investment is concerned, the volume of new

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23 The data on the construction of new plants are for the total square footage of floor space of new construction for commercial and industrial buildings contracted in 37 eastern states. For equipment I have plotted an index of machinery production that does not include transportation equipment or automobiles. The information on building contracts was originally collected by the F. W. Dodge Corporation. I have deleted the estimate for October 1931 because of an apparent typographical error. Machinery production was estimated by the Federal Reserve. Both time series are available from the National Bureau of Economic Research [Feenberg et al., NBER Macrohistory Database: Series 2018c and 1277a]. The Chawner data cited in the text is available as NBER Series 10096.
investment must be today, taking the world as a whole, at the lowest figure for very many years. [Keynes 1931: 351]

A detailed chronology of the contraction was not required by Keynes nor was the actual sequence and nature of the unfolding events foreordained by his theory. By contrast, monetarists such as Friedman and Schwartz [1963 and Schwartz 1981] begin their analysis with the unstated and unexamined belief that the capitalist economy is globally stable in the sense that a negative shock (small or large) might disturb the equilibrium away from full employment but that a self-correcting force would move the economy back to equilibrium. Thus a very deep and sustained depression like that of the 1930s could only be understood as the consequence of repeated deflationary shocks that hammered down on the economy repeatedly. As Anna Schwartz put it, “the screw was tightened again and again … and unanticipated change in each case required a new period of adjustment” [1981: 130]. Thus for Friedman and Schwartz a detailed historical narrative of the contraction is required to list, one-by-one, the sequence of bad shocks [Schwartz 1981: 111]. The Monetary History of the United States offered such narrative, a post hoc - prompter hoc discourse. To them the Great Depression was the consequence of an unlikely stream of bad luck; so unlikely that it probably would prove to be a unique phenomenon in the history of capitalism.

For Keynes, a stream of multiple negative shocks is not required to produce a Great Depression. After establishing that the initial shock was large enough to push the economy into the region of instability, the logic of Keynes’s economic theory would suffice to explain the catastrophe. “Here I find – and I find without any doubts or reserves whatsoever – the whole explanation of the present state of affairs” [Keynes 1931: 351]. The General Theory was Keynes’s effort to convince the economics profession that such a self-propelling collapse was possible [Keynes 1936: 317-318]. Since only a single triggering shock of a sufficient magnitude was required, Keynesian depressions could happen elsewhere and again.

In Keynes's view the depression was initiated by a single event, the “cessation” of investment in 1929. The primary cause of the “falling away of fixed investment” was a leftward shift in the demand schedule investment conceptualized as a negative function of the long-term

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24 John Cochrane has observed that the economist’s “choice of equilibrium matters enormously to … predictions about what happens in a liquidity trap and how policies may affect that outcome.” The problem with assuming a globally-stable economy for the 1930s, as do Friedman and Schwartz, is that a globally-stable economy doesn’t experience deep depressions unless beset by “a steady stream of unexpected negative shocks … . But five tails in a row is pretty unlikely” [Cochrane 2014: 1-2, and 29].
borrowing rate. This shift in demand began in 1929 “prior to the Wall Street slump in the autumn of 1929.” The curve shifted, Keynes thought, because “experience was beginning to show that borrowers could not really hope to earn on new investment the rates which they had been paying” and “even if some new investment could earn these high rates, in the course of time all the best propositions had got taken up, and the cream was off the business.” The consequence of the collapse of the demand schedule might have been a fall in the rate of interest. But instead, the unfortunate inward shift of the curve was abetted by a perverse movement along the curve in the wrong direction caused by the Fed’s misguided efforts to end stock market speculation.25 “But at this moment,” Keynes remarked, “so far from falling, the rate of interest was rising. The efforts of the Federal Reserve Banks to check the boom on Wall Street were making borrowing exceedingly dear to all kinds of borrowers” [Keynes 1931: 350, also Keynes 1930: Volume 2, p. 176; Keynes 1936: 315-318; Hamilton 1987].

Most subsequent writers in the Keynesian tradition have accepted Keynes’ analysis of the collapse in investment. Peter Temin, however, has argued otherwise. Temin suggested that it was a collapse of consumption — not investment — that precipitated the depression [Temin 1976: 172]. Partly this is a definitional issue since Temin includes consumer durables in consumption, whereas many economists, including Keynes in 1931, were inclined to model the purchases of consumer durables as investments.26 Yet, Temin does not deny that by 1931 the demand for capital goods investment had collapsed.

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25 In September 1928, Keynes sent a memo to Benjamin Strong, Carl Snyder, and W. Randolph Burgess at the New York Federal Reserve that urged against raising interest rates to check the stock market boom. “How can it be maintained that it is the duty of the Federal Reserve Board — even if it were certain that in the long run [a recent purchaser of stocks] has been wrong and is going to burn his fingers — to force [him] to his knees by producing the actuality of business depression?” [Keynes 1928: 58].

26 In 1931 Keynes defined investment as “the expenditure of money on the output of new capital goods of whatever kind” [1931: 362-363]. Although somewhat ambiguous on the point he apparently thought of consumer durable goods as capital goods, at least those purchased on the installment system (that is, with borrowed financing). He called these “semi-investment” and specifically included “motor cars” [345 and 347]. The treatment of consumer durables is less clear in the General Theory, where Keynes unhelpfully said “whether it is right to consider the purchase of a motor-car as a consumer-purchase … has been frequently discussed and I have nothing material to add to the discussion” [Keynes 1936: 61]. However, when presenting data on US investment trends Keynes reproduced early estimates by Simon Kuznets on gross capital formation which included investment by consumers in durable goods such as houses, automobiles, and furniture [Kuznets 1934; Keynes 1936: 103; Kuznets 1936: 188]. After an extensive exchange with Kuznets following the publication of the General Theory, Keynes wrote that “it is not possible to draw a hard and fast line” delineating which durable goods purchased by consumers should be regarded as the result of “an act of entrepreneurship” [Keynes, “Fluctuations in Net Investment in the
Temin's argument about a causal role for the decline in consumption has been challenged by others who – persuasively in my view – reject his argument [Mayer 1978, Andrews 1986: Chapter 3, Olney 1989: 140-144, Lebergott 1996:9-16]. 27 Christina Romer [1990] and Martha Olney [1999] have pointed to a decline in consumer durables following the stock market crash as contributing to the depression. But, even if one were inclined to agree with Temin that the cause of the 1929 collapse was something other than a shift of the demand for investment, there is still the fact that by 1931 the bottom had undeniably fallen out of investment demand no matter how it is measured. 28 Temin does not deny this. He explains: “The much larger declines [in investment] of subsequent years [1931-1933] were part of the Depression; they did not precipitate it in any meaningful sense of the word” [Temin 1976: 68]. Whether the collapse of investment is viewed as part of the depression whose cause lays elsewhere or the whole cause of the Great Depression, the collapse in spending on investment goods may plausibly be modeled as involving an inward shift of Keynes’s demand curve for investment, rather than a movement along a stable curve. That is all that is needed for the Keynesian argument about the liquidity trap to proceed.

**Specification of the Demand for Investment**

If, as Keynes believed, the demand schedule for investment collapsed sometime after the spring of 1929, one might picture the before and after demand curves for investment as I have drawn them in Figure 3. The fraction of net national product accounted for by net fixed investment \( (I/Y) \) is plotted on the horizontal axis and the relevant rate of interest \( (R) \) is plotted on

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27 Robert Hall has estimated a model that he claims supports Temin’s conclusion [Hall 1986: 239-240]. Actually, there is reason to question this. First, Hall’s definition of consumption includes consumer durables. Second, Hall focuses on the entire 1929-1933 period, whereas Temin is arguing for a precipitating shock in 1929 that preceded the stock market crash. Third, when Hall considers the “Keynesian business cycle theory,” rather than an alternative that assumed consumption is “an exogenous variable,” the apparent shift in the consumption function as he measures it is quite muted [pp. 250-252]. Although Temin cites Hall in subsequent work he seems now to favor a fall in interest-sensitive demand (investment and consumer durable purchases) triggered by a rise in interest rates as the Depression’s initiating cause [Temin 1990: 7-8, 41-43].

28 Temin’s figures (which are the same after 1929 as the 1966 version of the Department of Commerce data [Temin 1976: 193]) put gross private domestic fixed investment at $6.8 billion in 1931 and a mere $3.4 billion in 1932 compared to $14.5 billion in 1929 [US Department of Commerce 1966: Table 1.1, p. 2]. More recent revisions of the national accounts have slightly different absolute numbers, but agree on the relative magnitude of the decline: a drop of approximately 50 percent from the 1929 level in 1931 and 75 percent decline by 1932.
The higher of the two curves is meant to represent the pre-Depression situation (say in early 1929) with \((I/Y)^*\) measuring the level of investment compatible with full employment and \(R^*\) indicating the level of the relevant interest rate consistent with the maintenance of full employment. The lower of the two curves represents the situation after the collapse in investment (say in mid-1931 when Keynes was in Chicago). As drawn, a substantial fall in the relevant rate of interest to very low levels, from \(R^*\) to \(R_d\), would be needed to return investment demand to the full employment level.

I have drawn the post-collapse demand curve in Figure 3 as less elastic than the pre-collapse demand curve at \(R^*\). This seems reasonable to me, but is not an essential part of the argument. What is of some importance, though, is whether the investment demand curve intersects the horizontal axis. If so, then it would be possible for the investment demand curve to fall so far that it would intersect the axis at a point to the left of \((I/Y)^*\), so that even a rate of interest of zero percent would not restore full employment.

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29 Keeping with the spirit of the *General Theory*, this depiction is a static short-run snapshot, not well suited to a long-period dynamic analysis. In a fully-employed and growing economy the \(Y\) in the denominator of \(I/Y\) would be current income. During the acute phase of the slump, the \(Y\) might be the previous peak income. In a protracted recovery \(Y\) might be thought of as potential income growing to keep pace with the potential labor force.

30 The rate \(R^*\) is sometimes labeled the “natural rate.” Keynes called it the “neutral rate of interest” or, he suggested, it might better be described as the “optimal rate.” This is the long-term bank rate “which is consistent with full employment, given the other parameters of the system” [1936: 242-243, emphasis in original].

31 I am taking some liberties here with the Keynesian system by treating the value of \((I/Y)^*\) as invariant. In a more complete system the required volume of investment for full employment would depend upon the level of government spending, the volume of net exports, and the position of the consumption function (which can be shifted by changes in the tax rate or tax structure). I ignore these other factors because formally introducing them would add unnecessary and unhelpful complications to the argument. The reader should note that Keynes’s advocacy of fiscal policy as a cure for depressions amounts to proposing changes in government spending and taxation that would shift \((I/Y)^*\) to the left as increased government spending takes the place of deficient investment in aggregate demand.

32 After a depression is underway, many firms will have excess capacity. Before they are willing to undertake new investments to expand their productive capacity, they will want to put the existing plant and equipment back to work. At this point in the cycle a reduction in the rate of interest may produce only very feeble stimulus to *new* investment. The notion that the demand for investment might be inelastic when the economy is in deep recession was not part of the *General Theory* but was added in the 1940s by the Keynesian theorists who developed the ineffectiveness corollary of the ZLB trap.
But, some economists would argue that such a situation could not persist for any substantial period if there were any hope at all that the economy would eventually stabilize or recover. This belief is derived from the very neoclassical proposition that investment demand would be effectively unlimited at a zero interest rate. As Paul Samuelson pointed out, as long as there is a curve or hillock in any railroad line or highway in the world there will exist an investment project with a finite rate of return.\textsuperscript{33} It might seem, on the basis of this argument then, that monetary policy could be effectively applied provided the authorities could drive the relevant interest rate to zero. Samuelson's argument, however, is couched in real terms whereas the Keynesian demand for investment is a nominal relationship. If the depression were accompanied by an expected deflation of prices (not unlikely in the early 1930s), then, the neoclassical flattening out of the demand for investment might still take place but at a point below the axis – at negative nominal rates of interest (but positive real rates).

The "relevant" interest rate for this conceptualization of the demand for investment is the nominal rate charged for borrowed money to the firms and entrepreneurs whose demands are represented by the curve. In my schematic diagram, which is consistent with Keynes’s logic, R* is a long-term borrowing rate.\textsuperscript{34} This is so because the marginal efficiency of capital curve represents borrowers’ expected rate of return on the array of potential long-term investment projects calculated in nominal terms. That curve slopes down because the investment projects are arranged in the order of their anticipated return with the most promising projects at the left and the less attractive ones towards the right. Entrepreneurs are assumed to borrow money to finance any projects undertaken. Maximizing behavior assures that every project where the expected rate of return exceeds the rate of interest charged by willing lenders will be undertaken. As these attractive projects are funded they must be replaced by a new batch of equally attractive projects or the demand curve will shift to the left. This is what Keynes meant when he conjectured that

\textsuperscript{33} I remember this statement from Samuelson’s lectures at MIT about 1965. Stephen Marglin informs me that in the Second Edition of Samuelson’s elementary textbook he states: "As long as there is a single hilly railroad track left, it would pay at a zero rate of interest to make it level. Why? Because in enough years, the savings in fuel would pay for the cost” [1951: 636].

\textsuperscript{34} Some treatments define the natural rate to be a short-term rate [e.g., Laubach and Williams 2003: 1063]. I could alternatively consider a version of Figure 3 defined with a short-term rate on the vertical axis, but to do so I would need to assume that there is an exogenous mechanical link between short- and long-term interest rates. Since both the Keynesian theory and debt management policies such as “operation twist” assume that the shape of the term structure can be manipulated by policy there is little incentive to do this. More recently there has been a growing recognition that a long-term natural rate is most appropriate [Mascaro 2004; Anderson 2005].
the slump in 1929 occurred when “all the best propositions had got taken up, and the cream was off the business” [1931: 350].

**Specification of the Transmission Mechanism**

Orthodox monetary policy in 1936 (and in 2008) directed the central bank to purchase short-term government securities in the open market. The Federal Reserve would pay for the securities by creating reserves (or printing money) which would be deposited in the seller’s bank account. The additional demand for short bills in the market would drive their price up and lower their yield. But Keynes maintained that a reduction in $R$, the long-term borrowing rate, to low levels would be required to stimulate investment after the collapse of the demand curve for investment [Keynes 1932: 415; 1936: 316]. Thus a transmission mechanism that linked the short-term bill rate to $R$ is needed to close the model.

Keynes suggested that $R$ could be thought of as having three components. Using the most familiar names for these elements, they are: (1) the pure expectations component, (2) the risk premium, and (3) the default premium. The first two elements are relevant for all borrowers, including the Treasury. The yield on a long-term obligation of the US government, however, is free of number 3, the default premium, since a Treasury security is considered to be “default free.” That is because Federal Reserve notes (cash) are “legal tender for all debts, public and private” [Section 31 U.S.C. 5103, the quoted phrase is printed on the face of the $20 bill and bills of all the other denominations]. Since the monetary authorities can print legal tender, the government never need be forced into default on its obligations.

An individual or an institution that has a portfolio of assets to manage might consider investing in Treasury securities. There is an active market with a long menu of alternative choices. At one extreme are short-term securities that come due within a few months. At the other are long-term bonds that do not mature for several or even many years. Each security will have a market price that determines the interest yield if the instrument is held to maturity.

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35 When considering bank loans it is the “effective maturity of the loan” implied by the ongoing relationship between the borrower and the banker, not the contractual maturity, that matters [Bernanke and Lown 1991: 209].

36 It is true that the holder of government bonds stills bears the risk of unforeseen inflation (or less-then foreseen deflation). Since I am conducting the entire analysis in nominal terms and, in any case, both the borrower and lender face the same risk of unforeseen price movements our treatment here is appropriate.
Suppose a college endowment or an employee pension fund is interested in investing for the long term. It could purchase a long-term bond and earn the long-term rate. Alternatively it could invest in a short-term security, hold it to maturity, then purchase another short-term bill, hold it, purchase another, and so on; thus earning a sequence of short-term returns stretching out over the long period. If there were no uncertainty about the future course of short-term rates, arbitrage between the markets for long-term and short-term securities would insure that the long-term bond yield would equal the expected return from investing serially in short-term bonds.\footnote{In this hypothetical world, with no uncertainty, this argument is known as the “pure expectations model of the term structure.” Keynes’s insight here was developed formally by Friedrich A. Lutz [1940].} Uncertainty about the future course of interest rates, however, will mean there will be risks for any investor who holds bonds or makes a loan with a maturity period that does not exactly match his or her desired holding period [Keynes 1936: 168-170]. Such risks mean that a premium will be required to move any investor away from the preferred maturity habitat. The existence of preferred holding periods gives rise to a "risk premium" (or “term premium”) between the long-rate and the expected return on a series of short-term bonds [Modigliani and Sutch 1966; Sutch 1968; Gagnon et al. 2011: 7-8].

The risk premium on long rates can, in theory, be either positive or negative depending upon the distribution of maturity habitats relative to the distribution of assets by maturity. If there are, for example, more long-term bonds in the market than there are investors whose maturity habitat is long, then long-term rates will have to exceed the expected return from a sequence of short rates by a positive premium sufficient to tempt enough short-term money into the long-term market. Alternatively, if there were a relative shortage of long-term bonds, the risk premium at that maturity would be negative.

Empirical work with the US term structure reveals that long-term rates generally exhibit a positive risk premium above the expected return from short-term rates. This holds true whether the expected return on future short-term bonds is measured by the ex-post actual returns (perfect foresight) or by the ex-ante rational expectation of future returns [Sutch 1968; Modigliani and Shiller 1973; and Dobson, Sutch, and Vanderford 1976]. Thus the Treasury yield curve usually rises with maturity.

The interest rate relevant to investment plans, our $R$, is not the long-term Treasury yield. The relevant rate would be that charged on a bank loan or obtainable in the corporate bond
market. Different borrowers are charged different rates of interest depending upon the apparent risk of default by the borrower and the strength of the collateral offered. The resulting gap between the Treasury yield and the borrowing rate charged to would-be investors is the default premium. So $R$ is the sum of the expectations component that depends upon the market’s anticipated path of short-term rates into the future ($r_{\text{e path}}$), the risk premium ($p_r$) and the default premium ($p_d$). The default premium is defined by the difference between the Treasury yield ($T$) and the borrowing rate:

$$R = r_{\text{e path}} + p_r + p_d = T + p_d$$

This equation helps to clarify the transmission mechanism envisioned by Keynes. Open market purchases of short-term bills will lower their rate of return ($r$). That will influence expectations about the future path of the short rate and thus, given the size of the risk premium, the long-term Treasury yield ($T$). The size of the default premium attaching to each potential borrower will determine the relevant $R$:

Open-market operation $\Rightarrow r \Rightarrow r_{\text{e path}} \Rightarrow T \Rightarrow R$

If monetary policy is constrained to operate only on the short rate, once $r$ reaches zero, $R$ will have reached its lower limit.

I may finally be specific about the preconditions for the ineffectiveness corollary to be valid: the demand for investment must collapse so far that the relevant long-term rate of interest necessary to induce sufficient investment to restore full employment lies below the lower limit of practicable rates. Keynes saw three impediments to reducing the rate, as listed on Page 10 and numbered 1 through 3. They are (1) the rigidity of the term structure, (2) absolute liquidity preference, and (3) default premiums.

**Rigidity of the Term Structure**

When the short-period rate is below its “normal” level, it might be presumed that some persistence of this condition would be anticipated and thus long-period Treasury yields would also be lower than normal.\(^{38}\) To some extent expectations can be said to be extrapolative. Still, it

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\(^{38}\) Gregory Mankiw, Jeffrey Miron, and David Weil report that after the war in Europe the three-months short rate showed remarkable persistence from month-to-month suggesting that expectations of future rates
is unlikely investors will expect short-rates to be abnormally low for decades.\textsuperscript{39} Thus expectations of the distant future are likely to be “sticky,” reflecting the market participants’ belief that they will return to normal levels after some crisis has passed. That means that long-term Treasury yields will be only moderately responsive to the decline in short-term rates [Mankiw, Miron, and Weil 1987: 365-366]. The longer the maturity, the less responsive. Conventional monetary policy targeting the short-term rate can be used to shift the entire term structure of Treasury yields down (or up), but the relative insensitivity of distant expectations make it difficult for the monetary authority to achieve a substantial decline in the long-term rate. If the short-term rate has reached the zero bound, that may effectively set a floor for the long-term rate.

A second factor that would work to make the long-term rate recalcitrant is the existence of the positive risk premium attaching to long-term rates. That premium is required to tempt investors with a short-term maturity preference to hold long-term bonds. But those induced to leave their safe habitat expose themselves to the risk of capital loss. As Keynes related the argument, the long-term rate of interest on government securities is a “highly conventional” phenomenon [Keynes 1936: 203]. Experience gained in pre-depression times would define, in the prevailing view, a “normal” rate of interest. As long-period interest rates fall below their normal range in response to open-market operations, many in the market will expect them eventually to return to normal. But when bond yields rise, their prices fall, so the expectation of an increase in rates is synonymous with the expectation of an eventual capital loss if the bonds are sold before they mature. Presumably those holding long-term assets who are not safely in

\textsuperscript{39} The coefficient estimates described in the preceding footnote imply that the expected short rate would return to 96 percent of normal within one year and 98 percent of normal within two years.

would be influenced by the current rate [1987: 358 and 362]. Between January 1922 and December 1927, for example, I estimated a naïve forecasting regression model that predicts the next quarter’s change in the three-month short rate by extrapolating a fraction (α) of the previous quarter’s change and closing a fraction (β) of the gap between the current quarter’s rate and a “normal” level. The regression estimates α as equal to 9.3 percent, β equal to 85 percent, and the normal level to have been 4.43 percent. Calculated over the 72 monthly observations the average yield was actually 4.41 percent. The regression was corrected for first-order serial correlation (Prais-Winsten estimator; rho=0.85). The adjusted R-squared of the regression is 43 percent. The Mankiw-Miron-Weil data is available in their Table A1 [p. 372]. These are time-loan rates at New York banks, not yields on Treasury securities.
their habitat will require a larger bribe to compensate for the higher risk of capital loss. Risk premiums would rise.40

The capital loss problem becomes more acute when interest rates are far below the expected normal and for two reasons. First, the lower the rate of interest, the more likely a rise in rates will seem. Second, small changes in percentage points of interest – apparently equally probable in the eyes of the investor whether rates are high or low – will produce large changes in bond prices when rates are low. A rise from 2 percent to 2½ percent would produce a twenty percent decline in long-term bond prices. While an equal increase from 10 percent to 10½ percent generates only a 4.8 percent capital loss.41

Unless reasons are believed to exist why future experience will be very different from past experience, a long-term rate of interest of (say) 2 percent leaves more to fear than to hope. [Keynes 1936: 202].

Conventional monetary policy would find it increasingly difficult to bring the rate below some psychological limit. That limit Keynes guessed was at about 2 or 2.5 percent on long-term government bonds during the Depression [Keynes 1936: 218-219 and 309]. The US 20-year rate fell below 2.5 percent only briefly. That was in 1935 when it bottomed out at 2.24 percent in February. It also hovered around 2.5 percent in 1939 and 1940, but never fell below 2 percent during the long course of the Depression. See Figure 4.

**Default Premiums and the Lender's Risk**

As stated earlier, different borrowers will pay different rates of interest depending upon the apparent risk that the borrower will default. One would suppose that the credit worthiness of an average borrower was less than that of the prime borrower or an Aaa-rated corporation. For the 1920s and 1930s in the United States, it seems reasonable to use the bank rate for middling loans or, as I do here, the yield on Baa-rated corporate bonds as a measure of the interest rate relevant to representative investment decisions [Gordon and Veitch 1986: 289].

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40 The origins of Keynes’s thinking about the term structure can be traced back to his analysis of futures markets in the *Treatise on Money*. These ideas he applied to interest rates with illustrations using US data [Keynes 1930 volume 2: 27-129 and 315-324; Keynes 1932]. His intuition was good, but the theorizing was informal. It was John Hicks who formalized Keynes’s term structure theory, which is now known as the “liquidity premium model” [Hicks 1939: 138-153]. Modigliani’s and Sutch’s preferred habitat version is a generalization of Hicks’s model [1966]. For one formalization of their preferred habitat model see Dimitri Vayanos and Jean-Luc Vila [2009].

41 For simplicity, I assume an infinitely long-lived bond for these calculations.
One can think of the Baa rate as the sum of two components: the rate of return on default-free long-term loans and a "default premium." The premium charged over and above the Treasury yield compensates the lender for assuming the risk associated with the character and collateral of the borrower. It is worth quoting at length what Keynes had to say about this risk.

Two types of risk affect the volume of investment which have not commonly been distinguished, but which it is important to distinguish. The first is the entrepreneur's or borrower's risk and arises out of doubts in his own mind as to the probability of his actually earning the prospective yield for which he hopes. If a man is venturing his own money, this is the only risk which is relevant.

But where a system of borrowing and lending exists, by which I mean the granting of loans with a margin of real or personal security, a second type of risk is relevant which we may call the lender's risk. This may be due either to moral hazard, i.e. voluntary default or other means of escape, possibly lawful, from the fulfillment of the obligation, or to the possible insufficiency of the margin of security, i.e. involuntary default due to the disappointment of expectation. ...

Now the first type of risk is, in a sense, a real social cost, though susceptible to diminution by averaging as well as by an increased accuracy of foresight. The second, however, is a pure addition to the cost of investment which would not exist if the borrower and lender were the same person. Moreover, it involves in part a duplication of a proportion of the entrepreneur's risk, which is added *twice* to the pure rate of interest to give the minimum prospective yield which will induce the investment. ...

This duplication of allowance for a portion of the risk has not hitherto been emphasized, so far as I am aware; but it may be important in certain circumstances. [Keynes 1936: 144-145 emphasis in the original].

I interpret this passage in the following way. The “pure rate of interest” is what I call the default-free rate of interest and I measure it by the yield on 20-year government bonds in Figure 4. The borrower's risk is associated with the project, is assessed by the entrepreneur, and is reflected in the risk-adjusted expected rate of return on a potential investment project. In terms of my Figure 3, an increase in borrower's risk caused by entrepreneurs increased uncertainty about the future would cause the investment demand curve to shift downward. This is the collapse that is at the root of a Keynesian depression.

Keynes’s “lender's risk” is what I call default risk and which I measure by the difference between the yield of Treasury bonds and the Baa-rated corporate bonds. Keynes’s statement that a proportion of the lender's risk represents a duplication of the borrower's risk means that
whenever the demand schedule for new capital falls, the default premiums charged by lenders would rise by at least as much. Thus, if the monetary authorities were to hold the long-term rate of interest on government bonds constant while the investment schedule depicted in Figure 3 shifted down, the Baa-rated bond rate would simultaneously rise. The volume of investment spending would fall for two reasons: first, because entrepreneurs were less optimistic about the future profitability of prospective investments (a downward shift in the $I/Y$ curve); and, second, because lenders would demand a higher return since they would share the borrowers’ heightened doubts about the future. There would be a movement upward to the left along the depressed $I/Y$ curve induced by an increase in $R$.

Figure 4 plots the movements in the Treasury twenty-year bond yield and Moody's Baa-Rated Corporate Bond Yield for the period from 1925 through 1940.42 The difference between these two interest rates (called a “spread”) is plotted in Figure 5. The explosion of lender's risk during the contraction can be clearly seen. Despite the fact that the default-free rate held relatively stable between 1929 and late 1931, the rate of interest relevant to typical entrepreneurs began to rise in early 1928 and rose very rapidly after the first banking crisis in October and November 1930.43 This is not surprising since bankruptcies and the number of unprofitable corporations rose dramatically during this period [Carter et al. 2006: Series Ch412 and Cb55]. Surely, the perceived risk in lending to a Baa-rated corporation increased as the economy plunged into depression.

Keynes’s logic suggests using the rise in the Baa-Treasury spread as a crude index of the shift in the demand for investment. Whenever the demand for investment shifts down because of an increase in borrower's risk, the Baa-Treasury spread should rise.44 Examination of Figure 5

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42The long-term Treasury rates for January to October 1925 are an unweighted average of daily figures for bonds exceeding eight years to maturity. Between October 1925 and December 1928 only bonds of twelve years to maturity are included. These yields were published in the Federal Reserve’s Banking and Monetary Statistics [1943, Table 128]. Thereafter the Treasury yields are the adjusted rates for twenty-year bonds estimated by Stephen Cecchetti [1988]. Both the Treasury yields and Moody’s Baa-rated bond yields series are reproduced in Carter et al. 2006: Series Cb61 and Cb57.

43Peter Temin has suggested that the Baa-Treasury spread is likely to be an underestimate of the lender's risk since the quality mix of bonds included in the Baa average improved as the depression worsened. The improvement was brought about by the downgrading of bonds of some corporations to junk status and the failure of the weakest firms previously included in the Baa average [Temin 1976: 106-108, and 169].

44Changes in the spread will not be perfectly correlated with shifts in the marginal efficiency of investment. There can be changes in the transactions cost elements of the Baa yield that would be independent of changes in borrower's risk. Bernanke makes much of this possibility [1983: 263-268]. A
suggests, on these grounds, that the fall in the investment schedule began in February of 1929, eight months before the stock market crash in October. An early date for the decline of the investment schedule supports Keynes’s view that a decline in investment was responsible the Great Depression.

Critics of this view will be quick to note that the magnitude of the rise in the spread during this period was not very impressive. Moreover, the Baa-Treasury spread actually fell slightly during the first half of 1930 suggesting that the fall in the demand for investment had temporarily been arrested. It begins rising rapidly only after the first wave of bank failures in November 1930. This development supports those who would argue that the bank failures converted a recession into a depression. Indeed, examining the trend of industrial production during the early months of the Great Depression and the movements in industrial production in 1920-1923 during that earlier depression (see Figure 6) it is hard to see much difference before mid-1931.45

Thereafter, however, matters deteriorated greatly. June of 1931 saw another run on banks, even as Keynes was advocating the use of monetary policy in Chicago. A much larger wave of bank failures came in August, September, and October of 1931 [Carter et al. 2006: Series Cb70]. By then the American economy was in clearly full decline. Bank suspensions were harmful in two ways. They had a direct effect on those who would seek to borrow from a banker with whom they had a close and trusting relationship with only to find their customary lines of credit terminated when the bank abruptly closed. Establishing new banking connections would be costly and for a protracted period would result in a reduced quality of the credit intermediation [Bernanke 1983: 263]. But the bank failures also raised widespread doubts about the stability of the banking system. Banks that suspended business were in trouble, not because their past loans were bad, but because they lacked liquidity [Postel-Viney 2014]. The uncertainty and fear caused borrowers to reconsider their plans and lenders to become more cautious. It is not surprising,

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45 The data displayed is the Federal Reserve Board’s seasonally adjusted index of industrial production [Carter et al. 2006: Series Cb31].
then, that default premiums measured by the Baa-Treasury spread rose to seven percentage points.

To offset a decline in the demand curve for investment the government long-term rate would have to be brought down at least twice as many interest points as the fall in prospective rates of return on capital projects. In other words, if entrepreneurs felt that the marginal efficiency of capital had fallen by one percentage point, the Treasury bond rate would have to be reduced by two percentage points in order to prevent a decline in investment demand. Monetary policy would have to work twice as hard to stop a recession as to start one. Of course, up to a point, even when battling against a rising default premium, a sufficiently vigorous monetary policy pursued sufficiently quickly might have checked the depression.

As a counterfactual exercise, I have calculated what the yield on US Treasury bonds would have had to have been to offset the fall in the investment schedule. I begin this conjectural calculation in March of 1929 and assume that the rise in the Baa-Treasury spread provides an exact instantaneous measure of the vertical fall in the marginal efficiency of capital. The hypothetical bond yield is compared with the actual yield in Figure 7. In the initial phase of the Great Depression, before the first bank run, the analysis suggests that a modest fall in bond yields would have done the trick. Thereafter, however, significant declines would have been required. If I take the month of June 1931, when Keynes was in Chicago, as an interesting date, I can say on the basis of Figure 7, first, that monetary policy had yet to be applied in sufficient force to bring down the long-term default-free rate of interest (the “pure” rate), and, second, that an effective monetary policy would have required a fall in the bond yield from the prevailing level to negative numbers. If negative nominal yields are deemed impossible, then Keynes was whistling in the Windy City when he advocated monetary policy during his Chicago lectures. By mid-1931 monetary policy, even though it had yet to be effectively pursued, was facing a depression too large for it to handle.

**Absolute Liquidity Preference**

As mentioned above, absolute liquidity preference is distinct from the term structure problem, although the two are closely related and often conflated. Because of the rigidity in the term structure, the greater the gap becomes between the long-term rate and its “normal” level, the more difficult it becomes to budge the long-term rate down any further. Quite apart from this problem is the possibility that the demand for money (defined as cash and bank accounts) might become infinitely elastic at a sufficiently low rate of long-term interest. Keynes thought that
liquidity preference could become absolute if a large proportion of the public became convinced that no financial asset appeared that offered a positive rate of return over the short term.

There is a problem with this argument. The proposition that investors will attempt to sell long-term assets when their price is expected to fall seems sensible, but the funds they receive in exchange would be better invested in short-term government assets than in cash [Modigliani 1968: 399-400]. Short-term bills, for example, present no risk of capital loss if they are held to maturity. A flight from long-term to short-term assets will drive the short-term rate lower, but as long as it is above zero, short-term assets should dominate cash. So the speculative demand for cash cannot become absolute until the rate of interest on short-term assets is zero.46 On the other hand, even after reaching a zero short-term rate of interest, the flight from long-term assets might continue. This would sustain the downward pressure on their prices. Long-term rates would then rise. An unconventional government purchase program directed at long-term bonds would have to be undertaken during such an episode just to prevent long-term rates from rising. Whatever the theoretical merits of the absolute liquidity preference argument, Keynes did not put much stock in this part of his liquidity trap story.

I know of no example of [absolute liquidity preference] hitherto. Indeed, owing to the unwillingness of most monetary authorities to deal boldly in debts of long term, there has not been much opportunity for a test. [Keynes 1936: 207]

Figure 8 presents monthly data on the short-term rate of interest in the United States from 1925 to 1940.47 The rate actually fell to five-one-hundredth of one percent in November of 1932. It would seem that the ZLB trap had been reached and because of the Fed’s unwillingness to deal boldly in debts of long term, the broad-spectrum trap had also been reached. Yet the demand for money had not yet become absolute. If it had, the Fed would have been forced to purchase long-term securities to prevent the collapse of the market.

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46 Two qualifications might be made. First, here I assume that the rate of return on cash was zero, but during this period banks paid interest (though at a very low rate) on demand deposits. I should say that absolute liquidity preference could not become evident until the short-term interest rate falls below the rate on demand deposits. Second, there are costs involved with making portfolio transactions and so short-term rates may still be positive but insufficiently attractive to overcome the inertia produced by those transactions costs.

47 Data for the period before 1929 are for 3- to 6-month Treasury notes and certificates and are taken from the Federal Reserve’s Banking and Monetary Statistics [1943, Table 122]. Thereafter they are the adjusted rates originally estimated by Stephen Cecchetti [1988]. Both series are reproduced in Carter et al. 2006: Series Cb56 and Cb60.
Keynes’s Monetary Prescription: Quantitative Easing and “Low for Long”

What is often lost in the debate between hardcore Keynesians and liquidity trap deniers is that Keynes did not believe that the central bank was powerless once the short-term rate reached the ZLB. He consistently regarded expenditures for new plant and equipment as the key to recovery from a recession and believed that even deeply-depressed investment spending would respond positively to low long-term interest rates [Keynes 1930 Volume 2: 315; Keynes 1932: 415 and 422; Keynes 1934: 490; Moggridge and Howson 1974: 236]. While open market purchases of short-term assets would be ineffective at the ZLB, the central bank could hope to lower the long-term rate by purchasing long-term assets.

Today we call the practice of using newly-created reserves to purchase long-term assets “Quantitative Easing.”48 Keynes evidently thought this policy would work by reducing the supply of long-term bonds, increasing their prices, and hence lowering their yields.49 “The main object and advantage of a reduction in the long-term rate of interest is the assistance and stimulation of new enterprise” [Keynes 1932: 422]. Indeed, an 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. [Keynes 1936: 206]

Keynes, however, feared that even this broadened policy potentially could succumb to the rigidity of the term structure because of the stickiness of expectations.

48 “Quantitative Easing” was not, of course, Keynes’s term. Instead, this imperfectly descriptive and confusing label was apparently coined by economist Richard Werner in 1995 to refer to his related but distinct policy proposal that the Bank of Japan purchase non-performing assets from the banks. This was not intended to lower interest rates, but to remove the junk bonds from the banks’ balance sheets and free them to make new loans based, hopefully, on a more sober analysis of their prospects [Werner 2013]. It is unclear why the Bank of Japan chose to apply Werner’s label to the Keynesian policy of dealing in long-term assets. And it was the business media that borrowed the term to rename the Federal Reserve’s policy of Large-Scale Asset Purchases.

49 This is the argument behind the analysis of the Fed’s recent large-scale asset purchases offered by Joseph Gagnon, Matthew Raskin, Julie Remache, and Brian Sack [2011]. This effect has been called the “duration risk channel.” The policy reduces “duration risk” since it replaces long-term bonds in private-sector portfolios with short-term bonds, a short-duration asset, or with cash and reserves, which are zero-duration assets entirely free of duration risk. This should reduce term-structure premiums because “With less duration risk to hold in the aggregate, the market should require a lower premium to hold that risk” [Gagnon et al. 2011: 7-8]. As Keynes argued: “It is important that the market should be supplied with securities of different types and maturities in the proportions in which it prefers them” [Keynes 1932: 415].
A monetary policy which strikes public opinion as being experimental in character or easily liable to change may fail in its objectivity of greatly reducing the long-term rate of interest. [Keynes 1936: 203]

Faced with this possibility, Keynes still saw reason for hope because the prevailing public view “is not rooted in secure knowledge.” Therefore, “persistence and consistency of purpose by the monetary authority” might modify the conventional expectation [Keynes 1936: 204]. A policy of Quantitative Easing, then, should be accompanied by a credible commitment to maintaining the long-term rate at low levels for a long time – as long as it takes [Woodford 2012: 3]. “Low for Long” is the current moniker for this dictum. Even if monetary and fiscal authorities make an announcement of their intention to persist with zero short rates and vigorous Quantitative Easing, it may take quite some time for long-term rates to come down. Changing the hearts and minds of investors is not normally achieved overnight. When drafting the General Theory Keynes was pessimistic on this point.

[T]he most stable, and least easily shifted, element in our contemporary economy has been hitherto, and may prove in the future, the minimum rate of interest acceptable to the generality of wealth-owners. [Keynes 1936: 308-309]

Unless the monetary authority convinces wealth owners of its permanent commitment to keeping long-term interest rates low, it might purchase gilt-edged bonds of all maturities continuously without raising their price, thus condemning the economy to a permanent underutilization of its resources. Moreover,

the remedy for a boom is not a higher rate of interest but a lower rate of interest! For that may enable the so-called boom to last. The right remedy for the trade cycle is not to be found in abolishing booms and thus keeping us permanently in a semi-slump; but in abolishing slumps and thus keeping us permanently in a quasi-boom [Keynes 1936: 322, emphasis in the original].

Keynes also warned there is a second obstacle to be faced – the soaring and persistently high level of default premiums. In a depression, the loss of business confidence, the frequent experience of negative profits, and the increase in bankruptcies creates the problem of “bringing the borrower and the ultimate lender together.” The allowance for risk and moral hazard will induce the lender to demand a high default premium over the risk-free long-term rate.

Thus the rate of interest which the typical borrower has to pay may decline more slowly than the pure rate of interest, and may be incapable of being brought, by the methods of the existing banking and financial organization, below a certain minimum figure. [Keynes 1936: 208]
However, once a recovery has started—perhaps helped along by stimulus spending—, as confidence improves, and the investment schedule begins to rise, the lender’s risk will shrink. This process will likely be drawn out. Because of the overhang of underutilized capacity, the accelerator effect is sluggish in a recovery. This is all the more reason for the central bank to persist with Low for Long and to partner its monetary policy with fiscal stimulus.

Part II: The Great Depression

A detailed history of the convolutions of the Federal Reserve in the period 1929-1939 is beyond the scope of this review. The subject has been treated at length by Allan Meltzer [2003: Chapters 5 and 6] and Barry Eichengreen [1992: Chapter 10]. For the period before the liquidation crisis of late 1932 suffice it to note that policy was anything but consistent and coherent. There was an absence of a system-wide policy and a lack of agreement among those on the Board about how the economy would respond to alternative actions. Governor George Harrison, who, as President of the New York Federal Reserve Bank, was the de facto leader of the Board and chair of the open market conferences, was indecisive. The Fed felt constrained by the gold standard and the requirement that Federal Reserve notes be backed by gold. There was a widely-held belief that the long-term rate was inflexible and that open market purchases should be confined to short-term assets. The Board resented and resisted pressures from Congress to “go further and faster.” Expansionary policies were frequently opposed because of a conjectured danger of inflation. As a consequence, policy was generally either passive or half-hearted. In 1931 it was positively perverse (see Figure 8). The money supply was allowed to shrink.

50 Also valuable is the perspective of government security dealers provided by C. F. Childs [1947]. The classic treatment, of course, is that by Milton Friedman and Anna Schwartz [1963]. Their work is still useful, particularly for the data they assembled on broad monetary aggregates, but their narrative account has been superseded in several regards by the more recent work of Eichengreen, Meltzer, and others [Gordon and Wilcox 1981; Epstein and Ferguson 1984; Temin 1990; Romer 1990, 1992, and 1993]. For a brief review see Bradford DeLong [2013]. For a sampling of monthly statistics during the Great Depression period see Sutch [2006: Series Cb35-76] and the helpful Macrohistory Database maintained by the National Bureau of Economic Research [Feenberg et al.].

51 Nevertheless, the monetary base, currency in the hands of the public or in bank vaults plus bank reserves held at the Fed, (“high-powered money”) increased dramatically, engineered with open market operations and rediscounting [Friedman and Schwartz 1963: Chart 32 (pp. 336-337), 384-389, and 511]. But at the same time, the public’s demand to hold currency and the banks’ parallel desire for liquidity caused the aggregate money supply (“M2”) to decline and excess reserves to soar [Friedman and Schwartz 1963: Table A-1, column 8, pp. 712-713; Carter et al. 2006: Series Cb64-Cb65 and Cb67; Wilcox 1982: Table 1].
A major problem was the belief of the monetary and fiscal authorities that the economy was self-correcting. Gerald Epstein and Thomas Ferguson offer this as the primary explanation for the Federal Reserve’s “Jovian indifference” to the collapsing economy in 1930 and 1931.

Conventional doctrine among businessmen, bankers, and economists in the period held that occasional depressions (or deflations) were vital to the long-run health of a capitalist economy. Accordingly, the task of central banking was to stand back and allow nature’s therapy to take its course. [Epstein and Ferguson 1984: 958 and 963].

Keynes might well have agreed.

The real obstacle here is, I think, that the minds of most people are still riddled with the fallacy that the volume of investment and the rate of interest are maintained at the right figures by some absolutely reliable automatic mechanism. … If only this deep-seated habit of thought could be eradicated! [Keynes 1932: 423]

What is relevant for this review is how policy was conducted after the ZLB was encountered in late 1932. Reflecting the “bankers’ view,” which dominated the Fed in this era, there was apparently little notice of the fact that interest rates had fallen to zero at the November 1932 and January 1933 meetings of the Open Market Conference. Incredibly, the discussion centered on proposals to sell short securities (not purchase them, as orthodox stimulus policy would have it). The logic at that moment was that excess reserves had grown so large that the Fed was losing its control over bank credit [Meltzer 2003: 376-377]. Selling Treasury bills to banks, it was thought, would soak up some of those reserves. Sales were made in January of 1933.⁵³ Those sales and the short-run reaction to President Roosevelt’s Bank Holiday sent the short-term rate up to one percent in March. But thereafter the rate quickly subsided. It reached 0.15 percent in June and stayed close to zero for the rest of the decade (Figure 8).

The economy began to recover noticeably after mid-1934. The election of Franklin Roosevelt seemed to produce a shift in expectations, boosting the hopes and confidence of many. The policy actions undertaken within a few months of his inauguration in March 1933 were a radical change. He ended the commitment to tie the value of the dollar to gold, increased government spending without increasing taxes, and promised sweeping reforms. Gauti

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52 Christina and David Romer would also agree. They describe this 1930s belief as “The most dangerous idea in Federal Reserve history” [2013].

53 These sales of short-duration assets may have actually reduced long-term interest rates. By satisfying the demand for liquidity, fewer investors with short-term habitat will need to be bribed by high premiums to hold long term assets. This would reduce the risk premiums component of long rates and lower bond yields. There is no evidence that the Fed recognized the possibility of such an effect at the time.
Eggertsson suggests that the “key to the recovery was the successful management of expectations about future policy” [2008: 1476, emphasis in the original]. The Federal Reserve’s Index of Industrial Production rose 37 percent between October 1934 and April 1936 [Carter et al. 2006: Series Cb31] with a revival of business investment leading the expansion. The index of floor space for new construction jumped 90 percent; the index of machinery production was up 50 percent [see Figure 9]. This expansion was achieved without an increase in industrial prices. Producer prices of industrial commodities rose by less than one percent [Carter et al. 2006: Cb72].

Perhaps because of the zero lower bound, the Federal Reserve took few policy actions from 1933 to 1941. Indeed, following the liquidation crisis, as Allan Meltzer has observed, the monetary authorities were frequently passive – “in the backseat,” as he put it. They “watched events take place and failed to respond as long as the level of market interest rates remained low” [Meltzer 2003: 379 and 415]. While the monetary base grew from April 1934 to December 1936, this growth was engineered by the Treasury, not the Fed. The rise in the base was produced when gold flowing in from abroad and new production from domestic mines was purchased by the Treasury which then dutifully created gold certificates backed by the gold and then deposited the certificates in one of its accounts in a commercial bank or at the Federal Reserve [Hanes 2006: 177].

Richard Anderson [2010] suggests that this increase in the monetary base is similar to today’s QE policies in its effect on the banks’ balance sheets [2010]. This “backdoor” version of QE was achieved without the help of the Fed and without the Central Bank or the Treasury Department purchasing long-term assets. Keynes would have argued, I think, that this would be of modest help. It would work, in his view, only indirectly to lower the critical long-term rate of interest. Much of the monetary increase went straight into bank reserves. Reserves increased more than 70 percent between April 1934 and December 1936 [Carter et al. 2006: Series Cb68]. However, the banks did spend some of it to increase their portfolio of long-term government securities. Holdings of US government notes, bonds, and guaranteed securities by banks that were members of the Federal Reserve System rose from $7.3 billion in March 1934 to $12.5 billion at the end of 1936 [Board of Governors 1943 Volume I: Table 20]. The heightened demand for bonds in the absence of any substantial increase in their supply helped to raise their
price.\textsuperscript{54} Actually, the rate on 20-year government bonds did fall about 10 percent from 2.91 percent in March 1934 to 2.69 percent in November of 1936 [Carter et al. 2006: Series Cb61]. Not a startling change and perhaps one that owed more to revised expectations about future interest rates than to the banking system’s purchases of government securities. If so, this experience gives credence to the power of a sustained period of near zero short rates to reduce the slope of the Treasury yield curve. Of greater significance for the economic recovery, I claim, was that the default premium declined as the investment picture brightened [Figure 5].

In mid-1936 the ongoing expansion was augmented by a significant fiscal stimulus. Congress – overriding Roosevelt’s veto – authorized a deficit-financed veterans’ bonus of $1.8 billion payable beginning June 15.\textsuperscript{55} Over $1.1 billion of the bonds issued to vets were cashed by the end of July. The typical veteran received $550 dollars, “more than annual per capita income, and enough money to buy a new car.” Joshua Hausman calculated that the bonus added 2.5 to 3 percentage points to 1936 GDP growth [2013: 2].

A severe drought affecting the Corn Belt sent agricultural prices rising in mid-1936.\textsuperscript{56} By August the wholesale price of corn in Chicago had doubled since the beginning of the year [Feenberg et al., NBER Macrohistory Database: Series 4005]. The producer price index, which had been steady at 86.0 from November 1935 through June 1936, took a baby step up to 86.6 in July [Carter et al. 2006: Series Cb72]. At this point the monetary authorities panicked, confidence was shaken, and default premiums rose. It was not so much the measured inflation that stimulated the Fed to act, but the \textit{fear} of inflation. This concern was justified, they thought, by the overhang of excess reserves. Sumner Slichter claimed the Federal Reserve confronted a dilemma.

Had they failed to act, inflationary fears would have been stimulated by their inaction. When they did act, the fear of price rises was stimulated by the very fact that the monetary authorities were taking cognizance of the danger. [Slichter 1938: 98]

\textsuperscript{54} The supply of marketable government securities did not rise in pace with the increase in member banks’ holdings. The share of privately-held government securities owned by member banks rose from 34.6 percent in 1931-1933 to 42.1 percent in 1934-1936 [Childs 1947: Table 15, p. 546].

\textsuperscript{55} The Veterans’ Bonus was the climax of a seven-year fight marked by marches on Washington by several “Bonus Armies” and military violence directed at the marchers. Roosevelt’s veto was explained by his objection to unbalancing the budget. However, this veto has been considered a half-hearted political gesture. He did nothing to prevent an override. Roosevelt actually advertised after the fact that it was all political posturing [Dickson and Allen 2004: 252-255].

\textsuperscript{56} For a discussion of the severity of the drought see Sutch [2011: Figures 7.1-7.3, pp. 196-198].
The Fed did act. It raised reserve requirements. At the time, this was an extraordinary action. Legal reserve requirements at Federal Reserve Banks had remained unchanged at 13, 10, and 7 percent for Central Reserve City, Reserve City, and Country banks respectively since 1917 [Board of Governors 1943, Volume 1, Table 107, p. 400]. But during the depression, banks became so reluctant to lend or hold long-term securities, they amassed considerably more reserves than were required. The first increase came in August 1936. Reserve requirements were raised again in March 1937 and after a third increase in May they had been doubled across the board. The objective was to turn excess reserves into required reserves predicated on a belief that those reserves – excess in a bookkeeping sense – were also redundant in an economic sense. Immobilizing them, they claimed, would have no impact on the banking system or the economy. They were wrong.

The Board’s visible concern about its ability to control inflation (should it come) and the Fed’s expressed conviction that the hikes in the reserve requirement would have no effect apparently convinced many bondholders that the Fed must soon act to increase interest rates and bring about a depreciation in asset prices (capital losses). The public (including the commercial banks [Stauffer 2002: 170]) sought to flee long-term securities, but since the Fed wasn’t buying, total public holdings could not be reduced and bond prices tumbled. The fear that rates would rise became a self-fulfilling prophesy. Long-term rates on Treasury Bonds obligingly rose and by March of 1938 they exceeded the level of March 1934 wiping out all of the improvement in long-term rates achieved in 1934-1936. The economy, which had been recovering well since March 1933, fell into a recession in early spring of 1937. Business confidence took a great plunge, which is indicated in Figure 5 by a sharp rise in the Baa-Treasury spread. Keynes was right to think that long-term rates and business confidence were the keys to investment demand. The index of floor space for new construction fell dramatically and the index of machinery production followed it down. See Figure 9. The economy stopped growing early in 1937, began to decline in the spring of 1937, and collapsed in the autumn of 1937.

57 In my view the connection between the reserve requirement change and the recession was the policy’s excitement of fears of capital losses on long-term assets. This view is consistent with Keynes’ emphasis on the importance of expectations on the term structure of interest rates. I take exception to the analysis presented by Milton Friedman and Anna Schwartz that the requirement change reduced bank lending [1963: 520-534, 543-545]. My view is consistent with recent contributions by Gauti Eggertsson and Benjamin Pugsley [2006]; Charles Calomiris, Joseph Mason, and David Wheelock [2011]; and Haelim Park and Patrick Van Horn [2014].
The Federal Reserve was not the only contributor to the downturn. In December of 1936 the Treasury, in an attempt to support the Fed’s campaign against excess reserves, abandoned its policy of monetizing gold inflows and thus abruptly halted the rise in the monetary base. By “sterilizing” gold inflows, bank reserves would not inflate [Meltzer 2003: 503-507]. Douglas Irwin has estimated that “as much as a 10 percent increase in the monetary base in 1937 was prevented as a consequence of the program” [Irwin 2012: 251]. Franklin Roosevelt’s election-year decision to adopt more orthodox fiscal policies and to move the budget toward balance has also been seen as an error that contributed to the economic reversal [Brown 1956; Romer 2009; Krugman 2010].

In February 1938, having realized its error, the Treasury ended its sterilization policy. In April 1938, it began monetizing its inactive gold holdings – the gold it had previously sterilized – at the Fed’s request. The Treasury’s substitute for QE was back in play. The money supply resumed its growth; see Figure 10. Long-term rates retreated; Figure 4. The Baa-Treasury spread shrank as business confidence improved and lenders became less fearful of default; Figure 5. In June 1938 the economy resumed its interrupted recovery; Figure 9. Member banks did not significantly increase their holdings of government securities in this second phase of backdoor QE, so the indirect balance-sheet channel not working to lower interest rates. The reductions in this period would be accounted for, in Keynes’s model, therefore by the reduction in the expectations component of long rates, which I credit to the fact that short rates were kept at the zero lower bound for the entire period, and the reduction in default premiums, which I credit to improving lender confidence.

**The Treasury Yield Curve**

If expectations played the dominate role in lowering the long-term default-free rate of interest, it is possible to infer something about the state of expectations during the Great Depression by examining the shape of the term structure. The term structure of interest rates may be depicted with a “yield curve” – a graph of the yields on each US Treasury security plotted against its own term to maturity. The yields are calculated assuming each asset is held to maturity at which time its face value is guaranteed. Figure 11 displays the Treasury yield curve at four selected dates.\(^58\) According to the Preferred Habitat Theory the long-term rates can be

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\(^{58}\) The data on yields reported at the time have been adjusted by Stephen Cecchetti [1988]. Cecchetti points out that the reported yields on government securities are distorted, particularly at short maturities, because holders had the right to purchase newly-issued securities at par at a future date. During most of the 1920s new issues were given coupon rates that caused those issues to sell above par. Thus the prices of existing...
thought of as having two components. The first is the anticipated path of short-term rates for as many years into the future as the maturity of the long-term asset (this is the expectations component). The second, is a risk premium sufficient to entice the marginal investor to hold them despite their lack of short-term liquidity (this is the premium component). In the usual analysis the premiums on long-term assets are positive. Thus the yield curve usually rises with maturity.

On occasion, however, the curve is seen to slope downward. This was the case, for example, in May 1929 when the three-month rate was 5.19 percent and the 20-year yield was 3.71 percent. The interpretation of this phenomena is that short-term rates on that date were abnormally high and, as a consequence, the market expected those rates to fall back to more normal levels in the future. The long-term rate was lower than the short rate since it embodied those expectations despite the presumption of a positive risk premium. Figure 8 plots the course of the short-term Treasury bill rate, which reveals that the three-month rate had reached a peak in May 1929 after a run up from more normal levels (around 3 to 3.5 percent) over the course of 1928 and the first five months of 1929. The Federal Reserve had intentionally driven the short-rate to these heights in their campaign against speculation [Meltzer 2003: 227-235].

The second yield curve charted in Figure 11 is for December 1932 – immediately after the zero bound for short rates had been reached. Even though the three-month rate was only 0.05 percent, long rates had fallen by only 0.5 percentage points. This underscores Keynes’s view that long rates would not be quickly and easily shifted downward. Apparently the market’s expectation at that point was that the liquidity crisis was temporary and that short rates would soon rise. But, that did not happen. Instead, the short rate was held at the ZLB for four years and by October 1936 (just before the recession of 1937) the long rate had fallen from its 1929 level by nearly a full percentage point (from 3.71 to 2.76 percent). See the third yield curve in Figure 11. This suggests that a persistently low short rate could eventually change expectations and thus have an effect on the long rate. Indeed, an additional three years of low short-term rates brought the long rates down by another half point or so by May 1939. Low for Long might said to be working to lower expectations, but working very slowly.

issues were higher than they would have otherwise been, depressing the calculated yields. Cecchetti makes an adjustment for the “exchange privilege premium” and then uses a curve fitting technique to estimate the adjusted term structure of interest rates.
Part III: The Great Recession

Keynes maintained that new investment expenditures in the midst of a depression would be influenced by long-term rates and thus by the entire path of expected future short-term interest rates, not just the current level of the short-term bill rate [Keynes 1932]. He also recognized that it was much more likely that the monetary authorities could influence the expected short-term rates for the near term than those that refer to the more distant future. Keynes noted the “extreme precariousness of the basis of knowledge on which our estimates of prospective yield have to be made.”

If we speak frankly, we have to admit that our basis of knowledge for estimating the yield ten years hence of a railway, a copper mine, a textile factory, the goodwill of a patent medicine, an Atlantic liner, a building in the City of London amounts to little and sometimes to nothing; or even five years hence. In fact, those who seriously attempt to make any such estimate are often so much in the minority that their behavior does not govern the market. [Keynes 1936: 149-150]

Thus, interest rates with several years to maturity are more relevant for judging the success of a quantitative easing policy than the very longest rate.

Term Structures: Then and Now

A distinction between the ZLB period of the 1930s and the current period is that today the Federal Reserve is actively attempting to influence expectations about the future course of interest rates. It has made commitments to keep rates low for the indefinite future and has offered “guidance” to suggest that a lift off would not take place before the economy improved sufficiently. During the ZLB period of the Great Depression, by contrast, the Federal Reserve was passive and made no attempt to influence expectations about the future course of interest rates. The impact on expectations, which seemed strong during the two phases of backdoor QE, would come merely from the demonstration effect of several years of zero rates. With the Fed inactive and making no promises, the future would be relatively uncertain. The effect of the past history of rates on the expected future was probably less then than now.

It is tempting, of course, to compare the success in lowering the medium- and long-term rates achieved with asset purchases and forward commitments to keep rates low during current experience with the backdoor QE of the 1930s. Such a comparison will necessarily be subjective. First, one must specify the appropriate dates in the two regimes that should be compared. I should also note that the level of these longer rates will be influenced by the distribution of
lenders by their preferred maturity habitats relative to the supplies of securities at the two dates. *A priori,* it is likely that the term premiums during the 1930s were lower than in recent years since there were proportionally more investors with long-term habitats in the 1930s (insurance companies, institutional endowments) than today.

The first dose of backdoor QE began in June 1933 and ended 41 months later in November of 1936 (gold sterilization began in December). However, the short-term rate first dipped into the ZLB in May 1932, 54 months before November 1936. Recently, short-term rates entered into the ZLB range in October of 2008 and have been sustained there without interruption for an even longer period. While the Fed’s program of purchases continued and the target range for the federal funds rate was not modified, the policy received a shock in May 2013. Federal Reserve Chair Ben Bernanke told Congress’s Joint Economic Committee that “in the next few meetings, [the Fed] could take a step down in our pace of purchase” [*Fontevecchia, Forbes* 22 May 2013].\(^{59}\) The markets reacted by sending interest rates sharply up, presumably because of a revised expectation that short-term rates would soon lift off the ZLB floor. For the purposes of the comparison between then and now I take the April 2013 as the end point of the period to be compared with the 1930s. Coincidentally, April is 54 months after the ZLB became binding.

For the record Figure 12 charts the impact of quantitative easing then and now on five-, ten-, and twenty-year Treasury yields. The yields for all three securities were markedly higher for the first three years of easing during the current episode than in the 1930s. However, I cannot rule out that this difference is attributable to higher risk premiums on long-term securities today. Note that before the unconventional polices were initiated, rates in 2008 were about eighty basis points (0.8 percentage points) above those at a comparable point in 1933. Looking uncritically at the endpoints reached after 54 months it would appear that the backdoor QE was more effective than the latter-day QE in reducing the five-year rate. But, after three years (36 months) at the ZLB the two policies had brought the ten- and twenty-year bond yields to comparable levels.

What is critical for the comparison of the two episodes, however, is the shape of the term structure, not its level. Abnormally low short-term rates are more likely to reduce expected future rates in the near term than those further out. As a result, if the expectation effect is strong, the

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\(^{59}\) A reduction in the volume of asset purchases, called “tapering,” scheduled to begin in September 2013, was announced in June but that plan was unexpectedly called off in mid-September. In December the Fed announced it would begin tapering in January 2014, which it finally did.
yield structure should be convex to the maturity axis in the mid-term maturity range. For that reason I have converted the two Treasury yield curves for November 1936 and April 2013 to indexes with the rate for 20-year bonds set at both dates to 100. The two indexed yield curves are plotted together in Figure 13. It would appear from the figure that the current polices have been noticeably more effective than those of the Depression era in altering the market’s expectations for the forward path of short-term rates for four, five, and possibly seven years out. That is not surprising since the current policies have included Forward Guidance and a commitment to keep rates “Low for Long.” Backdoor QE had to operate without these policies. Only the demonstration effect of a long period at the ZLB would be influencing expectations. A second dose of backdoor QE was applied from April 1938 through the end of the decade. That effort brought mid-term rates relative to the 20-year rate down further. The indexed yield curve for May 1939 is plotted on Figure 13 with a dashed line. This further reduction was probably due to the continuation of zero short-term rates and the consequent influence on expectations.

Current Controversies

There is debate concerning the channel(s) through which Quantitative Easing in the current context might work. Some suggest that QE should work as Keynes described. Purchases of Treasury bonds and mortgage-backed securities will reduce the supply of long-term assets bringing the supply closer to the public’s desired quantity of long-duration assets. Thus a smaller “bribe” would be required to induce some investors with a liquidity preference to hold the unsafe assets. The risk premiums attaching to long-term rates would therefore fall and thus stimulate investment with lower borrowing costs. This effect is now described as the “duration-risk channel.” Joseph Gagnon, Matthew Raskin, Julie Remache, and Brian Sack report empirical evidence of “economically meaningful and long-lasting reductions in longer-term interest rates on a range of securities, including securities that were not included in the purchase programs” that worked “primarily” by this route [Gagon et al. 2011: 3, also Krishnamurthy and Vissing-Jorgensen, 2011, and Cahill et al. 2013].

This duration view is closely related to the “portfolio-balance approach” that Federal Reserve Chair Ben Bernanke cited in 2010.

Once short-term interest rates have reached zero, the Federal Reserve’s purchases of longer-term securities affect financial conditions by changing the quantity and mix of financial assets held by the public. Specifically, the Fed’s strategy relies on the presumption that different financial assets are not perfect substitutes in investors’ portfolios, so that changes in the net supply of an asset available to investors affect its yield and those of broadly similar assets. Thus, our purchases of Treasury, agency debt, and agency
MBS [mortgage-backed securities] likely both reduced the yields on those securities and also pushed investors into holding other assets with similar characteristics, such as credit risk and duration. For example, some investors who sold MBS to the Fed may have replaced them in their portfolios with longer-term, high-quality corporate bonds, depressing the yields on those assets as well. [Bernanke 2010: 9]

Bernanke’s description focuses on arbitrage between “broadly similar assets” – assets with “similar characteristics, such as credit risk and duration” [emphasis supplied]. Although he doesn’t mention it, Bernanke probably would include arbitrage across the maturity spectrum as well as across asset classes. 60 Keynes allowed for substitution both across maturity and across asset markets.

Some economists suggest that the direct supply effects of the portfolio balance channel are absent or very weak [Cochrane 2011; Woodford 2012; Thornton 2012; Bauer and Rudebusch 2014]. They assert that all that quantitative easing does is “restructure the maturity of US government debt in private hands” and that, they claim, should have negligible effect on the economy [Cochrane 2010]. 61 Their reasoning focuses attention on the extent to which the markets for assets with different characteristics, including maturity, safety, and degrees of risk, are linked. If these links are narrow, say limited just to Treasury securities of different maturity, … then QE2 can have a [big] effect on Treasury yields, since a given sale or [purchase] forces the segmented participants to bear more risk. Alas, then, QE2 has no effect on other rates, and thus on the economy as a whole!

But, if other securities are to some degree substitutable for Treasuries; that is, if Treasuries … are linked to mortgages, corporate bonds, other sovereigns, bank lending, etc. then QE2 has a hope of affecting the rest of the economy. But now even [$600 billion] is just a drop in the bucket. [Cochrane 2011: 7]

The version of the preferred habitat theory that Modigliani and I proposed takes the second view; treasuries are linked to other assets:

60 When Bernanke first discussed unconventional policies to deal with the ZLB in 2002 he explicitly considered links between the short-, medium-, and long-term markets [Bernanke 2002]. At that time though, he was speaking as a member (Governor) of the Board, not as its Chair. In addition to the cross market channel and the duration channel, some researchers include a possible “scarcity/local supply effect” caused by market segmentation. See Cahill et al. [2013] for a discussion of the local supply channel.

61 The objective of purchasing long-term bonds, in Keynes’s view, was not to rearrange the maturity structure of the federal debt, but to lower long-term rates. In 1931 the economy was stuck with high unemployment and no strong countervailing force to revive employment. His idea was to shock the system into a recovery.
... debt management should affect the yield structure through its effect on the age composition of the total outstanding supply of primary securities, which includes the debt of federal, state, local, and foreign governments, as well as domestic and foreign private issues. [Modigliani and Sutch 1967: 576]

Yet, the empirical results Modigliani and I reported revealed a very weak and imprecisely-estimated influence of changes in the maturity structure of the federal debt on the term structure of Treasury yields. We suggested at the time this result could be understood by noting the fact that the amount of long-term federal debt outstanding was not very large relative to the total outstanding supply of long-term debt [p. 588]. I wouldn’t describe recent QE operations ($3.5 trillion) as a “drop in the bucket,” but perhaps they are small enough relative to the total to conclude the structure of yields is not very responsive to variations in the age composition of government debt [p. 589]. Thus if the unconventional policies being implemented have a chance to significantly affect the economy, it will be through their impact on expectations rather than on the term premiums.

It was specifically to change expectations that Keynes advocated a steadfast and public commitment by the monetary authority to keep rates low for a very long time – permanently low, if necessary. It would accomplish this by offering “to buy or sell at stated prices gilt-edged bonds of all maturities.” In its current effort to escape the liquidity trap the Fed has adopted a weaker version of this policy that they describe as “Forward Guidance.” Ever since March of 2009 the Open Market Committee has regularly asserted that it “will maintain the target range for the federal funds rate at 0 to 1/4 percent and anticipates that economic conditions are likely to warrant exceptionally low levels of the federal funds rate for an extended period” [Federal Reserve Press Release, 18 March 2009; D’Amico et al. 2012]. Over time the language of these announcements has become more precise. For an example of a recent comment see the Federal Reserve’s press release of 30 July 2014.

The [Open Market] Committee continues to anticipate … that it likely will be appropriate to maintain the current target range for the federal funds rate for a considerable time after the [QE] asset purchase program ends, especially if projected inflation continues to run below the Committee's 2 percent longer-run goal, and provided that longer-term inflation expectations remain well anchored.

The objective of Forward Guidance is to influence the market’s expectations of the future path of short-term interest rates. If it is successful in lowering these expectations, the entire term structure would be lowered. This is described as the “signalling channel” [Gagnon et al. 2011; Woodford 2012: 3]. Michael Bauer and Glenn Rudebusch point out that large-scale purchases of
long-term assets can have important signalling effects quite apart from their duration-risk or portfolio-balance effects [Bauer and Rudebusch 2014; also Bhattarai, Eggertsson; and Gafarov 2014]. Indeed Bauer and Rudebusch provide “evidence suggesting that the Federal Reserve’s actions lowered yields to a considerable extent by changing policy expectations about the future path of the federal funds rate” [2014: 236]. Since the recent Fed policy has consistently combined QE purchases with Forward Guidance and Low-for-Long commitments, it will be difficult to disentangle the separate channels [Posen 2012: 2]. What does seem to emerge from the recent empirical work, however, is that a reduction in the expected future path of rates has had a significant effect on the course of mid-term and long-term rates beginning in late 2011 [Swanson and Williams 2014].

When judging the success of the unconventional policies to reduce the mid- and long-term Treasury yields during the current period, one should not forget the ultimate test of the policy is whether it assists in returning the economy to its full-employment growth path. According to Keynes for this to happen business confidence would also have to improve, lowering the lender’s risk, and investment spending would need to respond and ultimately be restored to a level compatible with full employment. Figure 14 plots the spread between Moody’s Baa-rated corporate bonds and the Treasury’s bond rate both for thirty-year maturity issues. This is a measure of the default risk and thus an index of the lenders’ confidence. For those impressed by narrative event studies, the results are impressive. It appears that QE-1, -2, and -3 – while those programs were operating – increased business confidence and pulled the spread down. Interestingly, the two periods between the three QE episodes when large-scale asset purchases were suspended saw in both cases a decline in confidence evidenced by a rise in the spread. This calls into question the persistence of the impact of the unconventional policy.

The success in stimulating investment spending and lowering unemployment is illustrated with Figure 15. Both series show gradual improvements beginning around the start of 2010.63

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62 This confirms the findings of declines in mid-term bond yields reported by Gagnon et al. [2011], Krishnamurthy and Vissing-Jorgensen [2011], Swanson [2011], Hamilton and Wu (2012), and Altavilla and Giannone [2014].

63 Plant and equipment expenditures by businesses rose from 7.7 percent of Gross Domestic Product in the fourth quarter of 2009 to 8.7 percent in the second quarter of 2014. All of the gain was attributable to an increase in equipment, particularly transportation equipment and industrial equipment. Residential construction rose from 2.5 percent of GDP to 3.2 percent. Consumer durables recorded only a modest increase from 7.3 percent to 7.5 percent [Bureau of Economic Analysis, News Release BEA 10-11 and BEA14-48]. The unemployment data in Figure 15 is from the US Bureau of Labor Statistics [Series...
Since the improvements in lender confidence appear to be linked to the on-again/off-again applications of long-term asset purchases by the Fed, it is tempting to conclude that the gains in investment spending and employment were at least in part stimulated by the unconventional monetary policy. But we really don’t know. Other things were happening, such as the bailouts, the fiscal stimulus package, and Forward Guidance.

**Lacking a Counterfactual**

Because we lack a counterfactual for tracing out the path of these two target variables, we don’t know how powerful the unconventional policies currently being pursued by the Fed have been. What would have happened in 2009 if QE had not been launched? The credit crisis in September of 2008 involved not only Lehman Brothers, but also the insolvency of Fannie and Freddie, AIG, Merrill Lynch, Washington Mutual, and Wachovia. This storm occurred ten months into a recession, which the National Bureau of Economic Research dated as beginning in December of 2007. It is conceivable that the on-going economic slump might have turned into a complete financial meltdown and sent the economy spiraling ever downward had the Fed not vigorously engaged in the unconventional policy late in 2008. At the time many feared so [Nocera 2008; Akerlof and Shiller (2009) 2010: xxii; Bernanke 2013: Lecture 3].

These fears echoed those of Keynes who thought that the economy was unstable in the sense that a large serious shock could, in principle, induce a complete shutdown of new investment.

Even apart from the instability due to speculation, there is the instability due to the characteristic of human nature that a large proportion of our positive activities depend on spontaneous optimism rather than mathematical expectation, whether moral or hedonistic or economic. Most, probably, of our decisions to do something positive, the full consequences of which will be drawn out over many days to come, can only be taken as the 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. … If the animal spirits are dimmed and the spontaneous optimism falters, leaving us to depend on nothing but a mathematical expectation, *enterprise will fail and die*; -- though fears of loss

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LNS14000000. The fixed investment data in Figure 15 is from the St. Louis Federal Reserve Bank [Series FPI and GNP].
may have a basis no more reasonable than hopes of profit had before. [Keynes 1936: 161-162 emphasis supplied]

As it was, the slump was ended and reversed in June 2009. So, it could be argued, channeling Keynes, that the Fed’s unconventional actions during QE-1 (December 2008 – March 2010, with an announcement effect coming on 25 November 2008) stabilized financial markets and offered a boost to confidence when many decision makers were close to panic. Timely and bold action in the long-term security markets might thus be credited with preventing the Second Great Depression.

This type of instability is difficult to model as it is the consequence of “the uncontrollable and disobedient psychology of the business world” [Keynes 1936: 317 and 154; on the difficulty of modeling animal spirits also see Akerlof and Schiller (2009) 2010: xii]. A verification of the idea QE saved the day that would hope to rely on observation of current events is impossible without an understanding of the role of animal spirits. Here is where the First Great Depression can offer some insight. The backdoor quantitative easing of 1933-1936 apparently was assisting the economic recovery of those years. When it was abruptly halted by the Treasury’s sterilization policy, the economy plunged back into serious decline. Employment fell 21 percent between May 1937 and June 1938 [Carter et al. 2006: Series Cb46 and Ba476]. New investment in plant and equipment plummeted; Figure 9. Yet when the Treasury resumed monetizing the gold inflows, investment began to slowly recover, the economy reversed course and proceeded to a second phase of recovery. Not quite a controlled experiment, the 1937-1938 recession nevertheless hints that (1) Keynes was right about the global instability of the economy and (2) quantitative easing can, in a precarious situation, prove very powerful. But also notice, then and now, that Quantitative Easing has proven very slow in promoting recovery after the collapse has been reversed.

Conclusion

It is often remarked, half seriously, that America has Hitler to thank for ending the Great Depression. War-time spending financed by deficits provided the fiscal stimulus that brought the unemployment rate down from 11.3 percent in 1939 to 1.2 percent of the civilian labor force in 1944 [Carter et al. 2006: Series Ba475]. In a way, the United States also has Hitler to thank for the backdoor QE that helped recovery along in the years before 1942. That ulterior policy, hardly acknowledged at the time, involved monetizing the gold inflow that was fleeing Europe as a consequence in part of the developing war clouds [Romer 1992: 773]. When Germany began
rearmament in 1937 those gold flows increased substantially [Bloomfield 1950: 25 and Chart 14, p. 270]. It is not obvious that had the gold inflows been modest or if the Treasury had continued to sterilize gold after 1937 that the Federal Reserve would have moved to the front seat and taken on an active policy role. Today, we can hope that we do not need war or a Hitler to give the monetary and fiscal authorities the political will to do the right thing.

Since the crisis in 2008 economists and financial journalists have pointed to the parallels between the Great Depression and the Great Recession. This review has pointed to the parallels between John Maynard Keynes’s analysis of the Great Depression and recent theorizing about the Great Recession. I have highlighted four similarities: the collapse of demand for new fixed investment, the role of the zero lower bound in hampering conventional monetary policy, the multi-year period of near-zero short term rates, and the protracted period of subnormal prosperity during the respective recoveries. A major difference between then and now is that in the current situation the monetary authorities are actively pursuing large-scale purchases of long-term government securities and mortgage-backed assets. This is the primary monetary policy that Keynes advocated for a depressed economy at the zero lower bound. This policy was not attempted during the Great Depression and it is unclear whether the backdoor QE engineered by the Treasury was an adequate substitute.

While the current monetary activism is to be welcomed, Quantitative Easing then and now appears to be slow acting. In both regimes recovery came only after multiple painful years during which uncertainty damped optimism. Improvement came only after multiple years during which many lives were seriously marred by unemployment and many businesses experienced or were threatened with bankruptcy.

Economists are notoriously poor forecasters and Keynes is not excepted from this generalization, but at least on this concluding point he was remarkably prescient. While other experts were predicting immediate and rapid recovery, Keynes opened his series of Chicago lectures in 1931 expressing the fear that, just possibly,

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64 Keynes, for example, did not foresee the stock market crash of 1929 and as a consequence King’s College suffered substantial losses in the portfolio that Keynes managed as the college Bursar [Chambers, Dimson, and Foo 2014: 23-24].

65 In June of 1931 both Irving Fisher at Yale and the Harvard Economic Service were predicting speedy recovery. Typical was the prediction from the Harvard group: “Except in construction activity, the current depression seems to be following much the same course as that of 1920-21, as respects the length and severity of decline and the inception of recovery; and we conclude that improvement in business volumes,
… when this crisis is looked back upon by the economic historian of the future it will be seen to mark one of the major turning-points. For it is a possibility that the duration of the slump may be much more prolonged than most people are expecting and that much will be changed, both in our ideas and in our methods, before we emerge. Not, of course, the duration of the acute phase of the slump, but that of the long, dragging conditions of semi-slump, or at least subnormal prosperity which may be expected to succeed the acute phase. [Keynes 1931: 344]
An Addendum: Leijonhufvud and the Meaning of tête montée

Axel Leijonhufvud, alone I think among commenters, states that Keynes “explicitly repudiated” the liquidity trap “notion” [Leijonhufvud 1968: 158 and 161]. Leijonhufvud refers to the following passage from the General Theory [p. 64]:

It might be, of course, that individuals were so tête montée in their decisions as to how much they themselves would save and invest respectively, that there would be no point of price equilibrium at which transactions could take place. In this case our terms would cease to be applicable, since output would no longer have a definite market value, prices would find no resting-place between zero and infinity. Experience shows, however, that this, in fact, is not so; and that there are habits of psychological response which allow of an equilibrium being reached at which the readiness to buy is equal to the readiness to sell. That there should be such a thing as a market value for output is, at the same time, a necessary condition for money-income to possess a definite value and a sufficient condition for the aggregate amount which saving individuals decide to save to be equal to the aggregate amount which investing individuals decide to invest. [Italics added as suggested by Leijonhufvud]

I find Leijonhufvud’s claim that this passage is relevant to the liquidity trap puzzling. It appears near the end of chapter 6 of the General Theory on the definition of income, saving and investment. Keynes has just introduced the macroeconomic identity that:

\[ \text{Saving} = \text{Investment} \]

Keynes then continues:

Saving, in fact, is a mere residual. The decisions to consume and the decisions to invest between them determine incomes. Assuming that the decisions to invest become effective, they must in doing so either curtail consumption or expand income. Thus the act of investment in itself cannot help causing the residual or margin, which we call saving, to increase by a corresponding amount. [Keynes 1936: 63]

The passage cited by Leijonhufvud follows immediately. It is intended to demonstrate that the propensity to consume and the decisions to invest would be endogenous, that is, responsive to prices. This I think is made clear in the paragraph which immediately follows the one Leijonhufvud quoted and which also concludes the chapter.

Clearness of mind on this matter is best reached, perhaps, by thinking in terms of decisions to consume (or to refrain from consuming) rather than of decisions to save. A decision to consume or not to consume truly lies within the power of the individual; so does a decision to invest or not to invest. The amounts of aggregate income and of aggregate saving are the results of the free choices of individuals whether or not to consume and whether or not to invest; but they are neither of them capable of assuming an independent value resulting from a separate set of decisions taken irrespective of the decisions concerning consumption and
investment. In accordance with this principle, the conception of the *propensity to consume* will, in what follows, take the place of the propensity or disposition to save. [Keynes 1936: 64-65; emphasis in the original]

To properly understand the passage cited by Leijonhufvud one needs to understand what Keynes intended when he used the French phrase *tête montée*. Taken literally this translates as “excited head.”[^66] The phrase is rarely encountered in English.[^67] Roget’s *International Thesaurus* defines the phrase as equivalent to “Quixotic” or “insane” [Mawson 1922: numbers 503 and 825]. Fredrika Bremer, a Swedish visitor to the United States uses the phrase to indicate insanity [1853 (in translation by Mary Howitt): letter 18]. I think it is this sense that Keynes intended. Only if people were insane, he suggests, would the equality indicated by S = I fail to be achieved. The passage has nothing to do with the interest rate’s influence on the demand for new investment or the liquidity trap, which is not introduced until nine chapters later in the book.

[^66]: It is currently used in French to describe an overhead shower fixture and a “bobble-head doll” [for example: Betty Boop *Tête Montée Sur Un Ressort*].

[^67]: A Google search turns up only two examples. The most frequent hits reference a notorious novel published in 1899 entitled *The Awakening* by Kate Chopin [1851-1904]. A reader’s guide to the novel describes the phrase as a French/Creole expression for a “quick-tempered or rash person.” The sentence from the novel containing the phrase reads: “Victor was the younger son and brother—a *tete montee*, with a temper which invited violence and a will which no ax could break” [www.enotes.com/awakening-text: Chapter 8, page 2]. The second Google discovery is the very passage from the *General Theory* under discussion here.
References


Bremer, Fredrika (1853). The Homes of the New World; Impressions of America. / Hemmen i den Nya verlden (translated by Mary Howitt), Harper & Brothers, 1853.


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Securities Over One Year to Maturity
Held by the Federal Reserve

Billions of Dollars

2007 2008 2009 2010 2011 2012 2013 2014

QE1 Begins
QE2 Begins
MEP Twist
QE3
Total including Mortgage-Backed Securities
Treasury Bonds

Figure 1
Figure 2

Indicators of Private Fixed Investment, 1925-1933

Index Number
1935-39 = 100

Contracts Awarded for Commercial and Industrial Buildings (right axis)

Index of Machinery Production (left axis)

Million Square Feet

1925 1926 1927 1928 1929 1930 1931 1932 1933

1929:5

1929:5
Figure 3

Demand for Investment Goods

Collapse of Investment Demand

1929
June 1931

R

R^*

R^d

(I/Y)_*

I/Y
Figure 4

Long-Term Interest Rates, 1925-1940

Percent

Baa-Rated Corporate Bonds

20-Year Government Bonds

1925 1927 1929 1931 1933 1935 1937 1939
Figure 5

Baa-Treasury Spread, 1925-1940

Percentage Points

1925 1927 1929 1931 1933 1935 1937 1939
Figure 7

20-Year Treasury Bonds

Hypothetical Bond Yield Needed to Offset the Collapse of Investment

First Bank Run

Percent

1929 1930 1931
Treasury Three-Month Rate, 1925-1940

5.19% - May 1929

0.05% - November 1932

Figure 8
Figure 9
Money Supply, 1934-1939

Billions of Dollars

Sterilization Period

Figure 10
Figure 11

Treasury Yield Curves

Percent

0 1 2 3 4 5 6

Years to Maturity

May 1929

December 1932

December 1936

May 1939
Figure 12

Yields on Five-Year Treasury Bonds
Two Comparable Periods, Then and Now

Yields on Ten-Year Treasury Bonds
Two Comparable Periods, Then and Now

Yields on Twenty-Year Treasury Bonds
Two Comparable Periods, Then and Now
Three Treasury Yield Curves, 1936, 1939, and 2013
Yields Relative to 20-Year Rate = 100

Interest Rate Index
20-year = 100

November 1936
April 2013
May 1939

Figure 13
Baa-Treasury Spread between 30-Year Yields

Figure 14