I. Introduction

Gauti Eggertsson’s paper, “What Fiscal Policy Is Effective at Zero Interest Rates?” addresses one of the classic questions in macroeconomics: what government policies should be used to fight deflation and depression? And over the years, there have been many proposed answers, including monetary easing (Friedman and Schwartz 1963; Lucas and Rapping 1969), increasing government spending (Keynes 1936), and increasing competition and efficiency (Prescott 1999; Kehoe and Prescott 2007).

Eggertsson’s very creative and provocative paper discusses various proposals for exiting deflationary depressions, with a focus on what at first glance seems counterintuitive. He argues that when nominal interest rates cannot fall due to the bound at zero, then policies that otherwise would be considered contractionary, such as tax increases, increasing firm’s monopoly power, wage and price controls, or expanding trade barriers that raise the prices of imported intermediate goods, can increase employment, output, and welfare, despite the fact that these policies depress the economy in normal times. He also argues that policies that increase nominal demand, such as increasing government spending, can have an order of magnitude larger effect at the zero bound than during normal times.

My comment is organized as follows. I will discuss the mechanics for these paradoxical results in a simple cash-in-advance (CIA) economy. I will then discuss issues related to the quantitative importance of the zero bound mechanism in terms of how tight the zero bound constraint was during the 2008 recession. I will also discuss the extent that the interest rates that actually have been near zero during the 2008 recession reflect institutional features that are not captured in models like the one in this paper and thus may have important implications for interpreting the zero bound and quantifying the impact of policies on real activity.

I will then discuss evidence on this mechanism from three episodes that have been described as being relevant for the zero bound: the Great
Depression, Japan’s lost decade of the 1990s, and the 2008 U.S. recession. I will conclude from these episodes that the zero bound, in conjunction with variation in nominal demand, does not appear to have nearly as large an impact on actual economies as predicted by the zero bound theory.

II. The Zero Bound Mechanism in a Simple Economy

Eggertsson finds that, in a model with Calvo pricing and in which there are no other monetary frictions, the zero lower bound turns standard economic logic on its head. Specifically, he finds that expanding the supply side of the economy during a deflationary depression, such as cutting labor income taxes, will further reduce employment. Instead, promoting economic recovery in this model requires expanding nominal demand, such as an unexpected increase in government spending. Moreover, demand-side factors may have an order of magnitude larger effect when nominal rates are zero than when they are not.

I now illustrate this in a cash-credit good model along the lines of Lucas and Stokey (1987). Lowercase letters denote household choices, and uppercase letters denote aggregate (per capita) variables. There is a representative household with one unit of time endowment each period. Preferences over consumption of a single final good \(c_t\) and nonmarket time \((1/\hat{c}_t)\), and in which preferences over consumption are perturbed by the taste shifter \(\xi\), are given by

\[
\max E \sum_{t=0}^{\infty} \beta^t \{\xi_t U(c_t) + V(1 - \hat{c}_t)\}.
\]

The household budget constraint is given by

\[
m_t + b_t = (1 - \tau)W_t h_t + R_t b_{t-1} + \pi_t + (m_{t-1} - P_{t-1} c_{t-1}) + T_t. \quad (1)
\]

The constraint requires that the sum of after-tax wage income, income from holding one-period bonds, profits, cash from the previous period, and government transfers is sufficient to finance new bond holdings and money. The cash-in-advance constraint (CIA) is given by

\[
P_t c_t \leq m_t. \quad (2)
\]

The technology and resource constraints in the economy are given by

\[
Y_t = A_t H_t, \quad (3)
\]

\[
Y_t = C_t + G_t. \quad (4)
\]
To first see how a taste shock affects the economy, suppose as in Eggertsson that there is a decline in the marginal utility of consuming at date \( t \), such that \( \xi_t < 1 \). Moreover, I assume for heuristic purposes that \( \xi_{t+i} = 1 \) for all future dates. Equation (5) shows the Euler equation for this economy:

\[
\xi_t U'(c_t) = \beta E_t \left\{ \frac{P_t}{P_{t+1}} U'(c_{t+1}) R_{t+1} \right\}. \tag{5}
\]

Now suppose that the right-hand side of the Euler equation is fixed. This assumption is central for understanding the mechanics of Eggertsson’s argument. Under this assumption, note that the decline in \( \xi_t \) must reduce consumption today if the Euler equation is to be satisfied. Moreover, note that with \( G \) fixed, the decline in consumption also drives down output and employment one for one given the additive resource constraint and constant returns to scale production in the single input labor. Thus, assuming that the right-hand side of equation (5) cannot decline guarantees that income, output, and employment all fall.

Next I will show how a tax cut will result in even lower employment and output. To see this, consider the household’s intratemporal condition that equates the marginal rate of substitution between consumption and leisure to the after-tax real wage:

\[
\xi_t U'(c) = v' \frac{(1-h)}{W (1-\tau)}.
\]

With the right-hand side of the Euler equation fixed, cutting the labor income tax rate puts additional downward pressure on the left-hand side of the Euler equation, as the tax cut reduces the denominator in the equation. This means that employment, consumption, and labor must fall more than the case of a decline in \( \xi \) and no tax cut. This simple example shows that the key to generating the paradoxical result that expanding the supply side further depresses the economy is preventing the right-hand side of the Euler equation from falling in response to the decline in \( \xi_t \).

III. Effective Policies in the Presence of the Zero Bound

In Eggertsson’s model, the right-hand side of the Euler equation cannot fall because of sufficiently inflexible Calvo pricing and the assumption that the interest rate cannot fall. Thus, a taste shock in Eggertsson’s
model actually raises the right-hand side of the Euler equation through expected deflation and the inability of the interest rate to fall. I next show what policies are expansionary in my simple example economy. The policies that can raise employment and output are those that reduce the right-hand side of the Euler equation:

$$\beta \frac{P_t}{P_{t+1}} U''(c_{t+1}) R_{t+1}.$$

The most direct approach to reducing the right-hand side of the Euler equation is by raising expected inflation. This could be accomplished with a credible announcement by the central bank that it will increase the growth rate of base money, which would then increase inflation expectations through the standard quantity theoretic channel. However, Eggertsson argues that this approach will not be effective because of his view that households would not believe such an announcement. This is because households in his model understand that inflation reduces welfare, and thus these households would view an announcement of inflationary money growth as being noncredible, which would not lead to an increase in inflation expectations and thus not reduce the right-hand side of the Euler equation.

Eggertsson’s argument that households would not believe a central bank’s promise to inflate stands in contrast to the historical record. Specifically, virtually all of the credibility problems that central banks historically have faced is convincing households that they will reduce inflation, not raise inflation. Households seldom have had trouble understanding the incentives for governments to create inflation, even anticipated inflation. Moreover, in terms of Eggertsson’s argument that inflation reduces welfare, inflation can be welfare enhancing in an economy with a large amount of nonindexed nominal debt, particularly if a significant amount of nominal debt is held by individuals outside the country. Thus my own view is that if policy makers are concerned about the zero bound, then monetary policy is a direct and quick protocol.

In addition to monetary policy, there are a number of other approaches to increasing the right-hand side of the Euler equation. One approach is adopting wage and price controls to raise expected inflation. This is an interesting approach, because the goal of boosting prices and wages to foster economic recovery was specifically the goal of much of Roosevelt’s New Deal (see Cole and Ohanian 2004). I will return to the impact of these policies in Section VI.
Another approach to reduce the right-hand side of the Euler equation is by constructing a sequence of intertemporal consumption taxes that make date $t$ consumption relatively inexpensive by promising to raise consumption taxes in the future as follows:

$$\beta \frac{P_t}{P_{t+1}} \frac{1 + \tau_{ct}}{1 + \tau_{ct+1}} U'(c_{t+1}) R_{t+1}.$$ 

Government spending is also a possible approach. Note first that if the right hand of equation (5) is fixed, then the government spending “multiplier” is necessarily one, which follows from the fact that production is constant to returns to scale and government spending and consumption are additive in the economy’s resource constraint. But note that government spending can have a large “multiplier”—or more broadly, the impact of any policy change can raise employment substantially—if in the absence of a policy intervention the taste shock $\xi$ results in a large expected deflation in which $R$ is driven to 0, and the policy change can reverse this. In Eggertsson’s model, government spending has this impact because it raises anticipated inflation.

IV. Importance of Calvo Pricing Plus Long-Lived Price Rigidity

Given the mechanics of how supply side and demand side policy work under the zero bound, I now discuss some technical issues related to Eggertsson’s model, with a focus on the importance of Calvo pricing and on why long-lived price rigidity is important. Deriving a unique solution in Eggertsson’s model, as well as generating a large impact from nominal demand shifts, depends on parameter values, particularly those that govern the duration of price rigidity in the Calvo model ($\alpha$), consumption and labor supply elasticities ($\sigma, \omega$), the expected duration of the low demand state ($\mu$), and the elasticity of demand across intermediate good producers ($\theta$).

A unique solution requires that the following inequality holds in which $\kappa$ is a nonlinear function of other model parameters:

$$(1 - \mu)(1 - \beta \mu) > \kappa(\alpha, \sigma, \omega, \theta) \mu \sigma.$$ 

I now make assumptions on some of the parameters in order to understand the implications of this inequality. I assume that the household discount factor, $\beta$, is close to one, and I also assume a Rogerson-Hansen utility function for the representative household in which preferences are
logarithmic over consumption and linear in leisure. Under these assumptions, the inequality becomes

$$\frac{(1 - \mu)^2}{\mu} > \frac{(1 - \alpha)^2}{\alpha}.$$ 

This states that the odds that the economy exits the low demand state, $\frac{(1 - \mu)}{\mu}$ scaled by that probability $(1 - \mu)$, must exceed the odds of changing prices, scaled by that probability $(1 - \alpha)$. Note that this inequality is difficult to satisfy as prices change frequently: $\alpha \to 0$ and thus implies that the model solution may not be well defined, as prices change frequently. In contrast, Eggertsson chooses $\alpha = 0.77$. This is important because it is reasonable that the incentive to change prices rises during turbulent periods, such as the crises that are central for this issue. Addressing this issue requires departing from the simplicity of Calvo price setting.

V. How Binding Is the Zero Bound, and Is Zero the Bound?

The quantitative importance of the zero bound depends on the deflation rate, which in turn affects how binding the zero bound constraint is through deflation-induced increases in the real interest rate. Eggertsson’s analysis is based on a 10% deflation rate, which yields a very binding zero bound constraint by generating a real interest rate of 10%.

While the zero bound is very binding in Eggertsson’s analysis, it is unclear how binding it is in recent episodes in which this mechanism is presumed to be important, including the U.S. 2008 recession and Japan in the 1990s. This is important because the quantitative impact of the nominal demand policies stressed by Eggertsson hinge on a very binding zero bound. One reason why the tightness of the constraint in these recent episodes is an open question is because there was very little deflation. For example, the consumer price index (CPI) in the United States increased on average $-0.03\%$ between September 2008 and April 2010 in the United States, and averaged $0.02\%$ in Japan between January 1992 and December 2002. This means that real interest rates on many securities, particularly those with nominal rates that are near zero, are not nearly as high as in Eggertsson’s analysis.

Another reason why the tightness of the constraint is an open question is because of the actual pattern of nominal interest rates during the 2008 U.S. recession and whether Eggertsson’s model is equipped to plausibly capture that pattern. Specifically, the model implicitly has a single asset in which the nominal interest rate is zero. But many securities during the
2008 recession have returns well above zero. Moreover, the securities with rates that are near zero are primarily very short-term money market instruments, and according to market participants, the economic forces that are driving these rates to near zero are unique. Specifically, a view among those who trade money market securities is that the near zero behavior of interest rates is due to government policies that have flooded those markets with cash from various government programs, including TARP, as evidenced by the following statement:\(^1\)

There is a massive wall of liquidity, a pile of cash which needs a home driving yields lower, as institutions need to show cash in something other than a mattress. Whatever the case, I am certain that present circumstance is not an indicator of financial stress as plunging bill rates have been in the past.

Those who have access to Fed Funds market (banks and other financial institutions) are flooding that market with cash. Those who don’t have access to that inter-bank market (hedge funds, mutual funds, etc.) are flooding T-Bill market with cash. ... Money market rates are at ridiculously low levels, from cash from government programs like TARP.

Moreover, there are institutional features at work in money markets such that the nominal bound on some money market rates is sometimes less than zero. Some treasuries have yielded \(-300\) basis points, reflecting penalties on failure to deliver securities related to short sales. This was particularly important between 2003 and 2004, and during the current recession in 2009. This indicates that cash and bonds are not always perfect substitutes at interest rates of zero and that negative rates are possible. This raises questions about what the bound is on money market securities and indicates that the bound may fluctuate considerably over time.

Taken together, this suggests that models with standard Euler equations, such as in this paper, could address these issues along two dimensions. One approach is to abstract from money market complications, and focus on non–money market securities, but nominal rates on these securities are greater than zero. And note that securities with rates above zero may provide another interest rate channel for central bank policy to possibly operate. Alternatively, models could be developed with money market institutional detail to study those securities with near zero nominal rates, but this would result in a nonstandard Euler equation. In the absence of models like this, it is hard to know what the implications of interest rate bounds on money market assets are for the issues that are the focus of this paper.
VI. Economic Activity during Assumed Zero Bound Episodes

This section presents data during three episodes in which the zero bound is presumed by some economists to be important: the U.S. Great Depression, Japan in the 1990s, and the 2008 U.S. recession. In each of these cases I find little support that the zero bound had a strong impact on economic activity.

I begin with the U.S. Great Depression. In other research, Eggertsson (2008) has argued that Roosevelt’s New Deal wage and price controls from the National Industrial Recovery Act was key for generating recovery from the depression by raising inflationary expectations. Table 1 shows data between 1932 and 1938 for the GDP deflator, consumption, hours worked, real GNP, and the right-hand side of the Euler equation in the model described above, which is \( \left( \frac{P_t}{P_{t+1}} \right) \left( \frac{1}{C_{t+1}} \right) R_{t+1} \), in which the price level is the GDP deflator, consumption is nondurables plus services, and the interest rate is the 3-month Treasury rate. All data except the Euler equation are relative to 1929 levels. The Euler equation is measured relative to its average calculated between 1929 and 1931.

Table 1 shows that there was substantial deflation through 1932, resulting in a right-hand side of the Euler equation that was high during the Depression. But prices stabilized by 1933, and there was some inflation afterward. This led to a significant decline in the right-hand side of the Euler equation after 1932, but note that there was not much economic recovery. Per capita hours worked remained far below trend throughout the period, with virtually no recovery through 1935. There was also very little recovery in consumption, and the recovery that did occur in GDP was largely the result of productivity growth. This weak recovery contrasts with the prediction of the zero bound argument, which predicts a strong recovery based on rising inflation that induces a fall in the right-hand side of the Euler equation.

<table>
<thead>
<tr>
<th>Year</th>
<th>Price Level</th>
<th>Consumption</th>
<th>Hours</th>
<th>Real GNP</th>
<th>Euler Right-Hand Side</th>
</tr>
</thead>
<tbody>
<tr>
<td>1932</td>
<td>78.2</td>
<td>76.0</td>
<td>73.5</td>
<td>65.2</td>
<td>70.0</td>
</tr>
<tr>
<td>1933</td>
<td>76.5</td>
<td>72.2</td>
<td>72.7</td>
<td>61.9</td>
<td>52.4</td>
</tr>
<tr>
<td>1934</td>
<td>83.0</td>
<td>72.1</td>
<td>71.8</td>
<td>64.6</td>
<td>49.7</td>
</tr>
<tr>
<td>1935</td>
<td>84.6</td>
<td>73.1</td>
<td>74.8</td>
<td>68.1</td>
<td>47.9</td>
</tr>
<tr>
<td>1936</td>
<td>85.0</td>
<td>77.0</td>
<td>80.7</td>
<td>74.9</td>
<td>58.2</td>
</tr>
<tr>
<td>1937</td>
<td>89.1</td>
<td>77.2</td>
<td>83.1</td>
<td>76.0</td>
<td>47.1</td>
</tr>
<tr>
<td>1938</td>
<td>87.0</td>
<td>74.3</td>
<td>76.4</td>
<td>70.6</td>
<td>44.5</td>
</tr>
</tbody>
</table>
I next consider Japan in the 1990s. Figure 1 shows per capita real GDP relative to trend. Real output per person peaks in 1991 and then declines steadily over the next 10 years or so, cumulatively falling about 12%. Some have argued that Japan’s prolonged slump was the consequence of anticipated deflation and a zero bound constraint that raised real interest rates (see, e.g., Krugman 1998; Auerbach and Obstfeld 2005). Figure 2 shows Japanese inflation, which is primarily positive through most of the slump, suggesting that real rates were not high as a consequence of deflation. Rather, real interest rates were quite low, which is inconsistent with the view that Japan’s slump was not due to the zero bound and deflation.

Another reason that I am skeptical that Japan’s slump was primarily due to the zero bound is because of large increases in government spending. Figure 3 shows government consumption, which was about 14% of GDP in 1991 and which rose to 18% over the next 10 years. According to the zero bound argument, this increase in government spending, which contributed to an increase in the primary deficit from around 50% of GDP in 1991 to about 160% by 2007, should have expanded employment and output. In contrast to this prediction, higher government spending appears to have had little effect on GDP, which fell steadily while government spending was rising.

So what then is responsible for Japan’s slump if not the zero bound and deflationary expectations? Hayashi and Prescott (2002) conclude

![Fig. 1. Real output, Japan](image-url)
that Japan’s slump was due to a decline in the growth rate of productivity. Figure 4 shows that total factor productivity declined by about 20% relative to trend after its 1991 peak. Hayashi and Prescott show how this change can quantitatively account for Japan’s depression and also low real interest rates. Moreover, note that productivity stopped falling...
around 2000, which is around the time when Japan’s GDP began to stabilize.

The third episode I consider is the 2008 U.S. recession. I exploit the fact that there are large seasonal changes in nominal demand, which according to the zero bound argument should have a much larger impact on the economy during 2009 than during other times. Specifically, economic activity seasonally peaks in the fourth quarter and is at its lowest point in the first quarter. Table 2 compares nonseasonally adjusted per capita hours worked between the fourth and third quarters and between the fourth and first quarters during the 2009 recession to their postwar averages. However, I find very little difference between the size of the seasonal movements across quarters in 2009 compared to their average movements. This finding is similar in spirit to that in Mulligan (2009), who found that the large seasonal increase in the labor force at the start of the summer in 2009 was largely absorbed into employment, and which is inconsistent with the zero bound argument. These data indicate

<table>
<thead>
<tr>
<th></th>
<th>Q4–Q3 Change</th>
<th>Q4–Q1 Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Postwar average</td>
<td>2.2%</td>
<td>3.3%</td>
</tr>
<tr>
<td>Current recession (2009)</td>
<td>3.0%</td>
<td>4.2%</td>
</tr>
</tbody>
</table>

Fig. 4. Total factor productivity, Japan

Table 2
Nonseasonally Adjusted Hours

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that seasonal changes in nominal demand did not have the large impact predicted by a strongly binding zero bound.

VII. Conclusion

This is an intriguing and provocative paper that is a significant contribution to the literature on policy analysis in economies with nominal interest rates that are near zero. This paper argues that with substantial price rigidity and with nominal rates that cannot fall, government spending can have very powerful expansionary effects and that supply side factors that are usually considered to be expansionary actually deepened a depression. The central mechanism that delivers these results is that the right-hand side of the Euler equation in the model cannot fall.

I conclude from analyzing data from three episodes for which the zero bound is presumed to be important—the Great Depression, Japan’s lost decade, and the 2008 recession—that the zero bound does not have nearly as large of an impact as suggested in these models. These empirical challenges from the perspective of the zero bound literature are interesting future avenues for research.

Endnotes

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References


