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Low r-star and Monetary Policy

The Fed has a mandate from Congress to effectively promote the goals of maximum employment, stable prices and moderate long-term interest rate. Phrase real activity is used to refer to both real GDP and the unemployment rate. The Fed affects real activity level by setting the federal fund rate accordingly to reach its legislated goals of full employment and price stability. The Fed policy makers set the target overnight rate equal to the natural rate of interest, r-star, plus the target inflation. By setting a target rate, manipulates the economy to fulfill its dual mandate task. This paper will discuss economist's definition of natural rate of interest, and possible reasons behind the decline in the long- run trend value of r-star and continued low r-star in the future. Additionally, the paper will illustrate what problem does a low r-star create for monetary policy, and what solutions have been proposed to these problems.

The natural rate is the real fed funds rate consistent with real GDP equaling its potential level (potential GDP) in the absence of transitory shocks to demand. Potential GDP is the level of output consistent with stable price inflation, absent transitory shocks to supply. Thus, the natural rate of interest, r-star, is the real fed funds rate consistent with stable inflation absent shocks to demand and supply (*"The Natural Rate of Interest", p.1*). Graph 1 shows what determines the natural rate. The vertical axis is the real interest rate. The real interest rate is the nominal interest rate minus expected future inflation. Horizontal axis represents the real GDP

level. The downward sloping line, called the IS curve, shows the negative relationship between spending and the real interest rate. That is, other things being equal, an increase in real interest rates reduces investment spendings. The vertical line indicates the level of potential GDP. At the intersection of the IS curve and the potential GDP line, real GDP equals potential, and the real interest rate is the natural rate of interest *(p.1).* When real rate of interest equals natural rate of interest both unemployment and real GDP, real activity, levels equal to their natural level meaning the economy is at full strength. Therefore, the natural rate of interest is the real interest rate expected to prevail when the economy is at full strength. While a central bank like the Fed sets short-term interest rates, natural rate of interest, r-star, is a result of longer-term economic factors beyond the influence of central banks and monetary policy (*"The Future Fortunes of R-star: Are They Really Rising?", p.1).*

A variety of economic factors and structural factors have pushed the natural interest rate very low and they appear poised to stay that way. It is important to distinguish between the strong economic conditions and the key longer-run drivers underpinning interest rates. The underlying determinants of these declines are related to the global supply and demand for funds, which include change in demographics, slowdown in productivity growth, and the heightened demand for safe assets, all point to the natural rate of interest remaining low for quite some time (*p.2*). Economic theory suggests that when the trend growth rate of potential GDP rises so does the natural rate of interest. Potential growth is the rate that the economy can sustain in the long run without generating inflationary pressures. It depends on the trend in the number of people available to work, that is the size of the labor force, and the trend in how much output those people can produce an hour meaning the productivity of the labor force *("Economic*

Growth and Monetary Policy", p.2). The labor force growth in the United States has actually slowed largely due to baby boomers retiring and a lower fertility rate. Fewer people joining the labor force means fewer people working, producing and consuming. As a result, there is slower growth and less investment, driving the natural rate of interest down ("*The Future Fortunes of R-star: Are they really rising", p.2)*. In addition to its effects on labor force growth, the aging of the population is likely to boost aggregate household savings. Furthermore, the educational attainment of the workforce has stayed stable, reducing its contribution to productivity growth through labor quality. Economists argue that the labor quality will add less per year to productivity growth than it has historically, since we will not repeat the massive 20th century increase in educational attainment ("*Is Slow Still the New Normal for GDP Growth", p.4).* The lower long-run trend productivity growth, and thus lower trend output growth, affects the balance between savings and investments through a variety of channels. A slower pace of innovation means that there will be fewer profitable opportunities in which to invest, which will tend to push down investment demand. Lower productivity growth also reduces the future income expectations of households, lowering their consumption spending today and boosting their demand for savings. Hence, slower productivity growth implies both lower investment and higher savings, both of them tend to push down interest rates ("*Why Are Interest Rates So Low? Causes and Implications", p.5)*. Another factor holding down r-star is the high global demand for safe asset which has developed over the past two decades. This has driven down the returns on Treasury securities and safe short-term loans relative to those on riskier assets like corporate bonds and equities, and depressed r-star *("The Future Fortunes of R-star: Are they really rising", p .3).*

Low long- trend value of r-star creates some problems for monetary policy. It could lead to longer and deeper recession. Under normal circumstances, policy makers adjust the funds rate to achieve their objectives for output and inflation. To stimulate the output, policymakers lower the target for the nominal funds rate. For a given inflation, lowering the nominal funds rate leads to lower real funds rate, which stimulates economic activity *("What is the Optimal Inflation Rate?", p.11)*. Due to a downward shift in the IS curve, nominal funds rate might hit zero percent. However, technically nominal interest rate couldn't go below zero because there is a perfectly safe asset, easily available to anyone which always pays a nominal interest rate exactly equal to zero which is called currency. This contradiction creates a zero lower bound problem. (Hanes Notes). Occasionally, policy makers can even achieve a negative real funds rate, by setting the nominal funds rate below the expected rate of inflation which is called effective lower bound (ELB). In a very low inflation environment, the federal funds rate is likely to be close to zero. In such a circumstance, if the economy is hit by an adverse shock, leading to a fall in aggregate spending, monetary policymakers will have limited scope to stimulate the economy by lowering the funds rate. Once the funds rate reaches zero, conventional monetary policy no longer works *("What is the Optimal Inflation Rate?", p.12)*. The limitation on monetary policy imposed by low trend interest rate could therefore lead to longer and deeper recession when the economy is hit by negative shocks. Furthermore, experience of longer and deeper recession with low inflation at the effective lower bound risks eroding inflation expectations and further compressing the conventional policy space. The risk is a downward spiral where conventional policy space gets compressed even further, the ELB binds even more frequently, and it becomes increasingly difficult to move inflation expectations and inflation backup to target (*"Federal Reserve Review of Monetary Policy Strategies, Tools, and Communications: Some Preliminary*

Views", p.6). Therefore, lower r-star causes recessions to be longer and deeper, recoveries slower, and the risks of unacceptably low inflation and the ultimate loss of the nominal anchor will be higher.

The problem of hitting the effective lower bound, made policymakers to find other ways to get around the problem. The Fed has developed two unconventional monetary tools: forward policy guidance and large- scale asset purchases or quantitative easing. The first unconventional tool is forward guidance. After reducing short-term interest rates to nearly zero, the Fed sought to affect longer-term bond yields and other financial asset prices directly by providing forward guidance about future short-term interest rates. The Fed attempts to manipulate expectations hypothesis component of all interest rates (*Hanes Notes).* The expectation hypothesis component is the average of expected future short-term interest rates over the maturity of the longer-term bond. The expectation component can change when the Fed provides information about the future path of short rates ("*A Review of the Fed's Unconventional Monetary Policy", p.2*). The Fed's second unconventional monetary policy tool was quantitative easing or large-scale asset purchase, which involved the Fed purchases of longer- term bonds. These purchases are often thought to work through a straightforward demand-supply channel: greater the Fed demand for bonds tends to push up bond prices, which pushes down yields. In other words, by engaging in QE the Fed attempts to push down the term premium which is the second component of longer-term yields *(Hanes Notes)*. Pushing down longer-term yields, forward guidance and QE have rippled through to other interest rates and boosted asset prices, lifting spending and the economy. Strong asset prices support consumption because they make people feel wealthier and more confident, in turn helps boost the economy. Although, these tools help boost the economy their full impact remains uncertain

There are other solutions proposed to deal with effective lower bound problem. The first proposal is using more expansionary fiscal policy during recession times, which calls for designing more predictable, systematic adjustment to fiscal policy that supports the economy during recession and recoveries. Some combination of more encouragement for private investment, improved public infrastructure, better education, and more effective regulation is likely to promote faster growth of productivity and living standards and also to reduce the probability that the economy and, particularly, the central bank will in the future have to contend with the effective lower bound ("*Why are Interest Rates So Low? Causes and Implications", p.10*). The second proposal is moving to a price-level targeting, or PLT, regime. Under the current inflation targeting regime, the policymakers do not strive to push up inflation above the objective in the future when inflation runs persistently below the objective. Under these conditions, the risk is that inflation expectations will become unanchored to downside. In contrast, under a price-level targeting regime, the FOMC would commit to make up any shortfalls below its 2 percent objective by allowing inflation to climb above the objective for the time necessary to eliminate the shortfall. This commitment to offsetting the period below-target inflation with a period of above-target inflation would help keep inflation expectations from becoming unanchored to the downside *("Important Choices for the Federal Reserve in the Years Ahead", p.5*). However, a symmetric PLT regime has a shortcoming. Compensation for inflation overshoots by deliberately keeping inflation below the FOMC's 2 percent objective would increase the risk of getting pinned at the effective lower bound for interest rates. The third proposal is to raise FOMC's inflation objective from 2 percent to perhaps 3 or 4 percent. The reasoning is that if the inflation objective were somewhat higher, nominal interest rates at the

later stage of the business cycle would also tend to be higher, which would provide greater scope for the FOMC to cut short-term interest rates to stimulate the economy. However, this proposal is not consistent with the Fed's Congressional mandate to pursue price stability. Congress has established the employment and inflation mandates, not the Federal Reserve ("*Important Choices for the Federal Reserve in the Years Ahead", p.5).*

To sum up, the Fed is responsible to pursue maximum employment, stable prices, and moderate long-term interest rate. In order to realize this congressional mandate, the Fed uses monetary tools by setting target for the federal funds rate. The Fed cut interest rates to mitigate risks and stimulate the economy during the times of recession. Due to changes in demographics, slowdown in productivity growth, and the heightened demand for safe assets, natural rates of interest are so low. This increases the possibility to hit the zero lower bound and prevent the Fed from using its conventional monetary policy during financial turmoil. As a result, the Fed has implemented two new unconventional monetary policy tools forward guidance and large-scale asset purchase. These unconventional tools help the economy to recover during a great recession. Economists also suggest other methods to deal with effective lower bound problem such as using more expansionary fiscal policy, changing the inflation target to 3 or 4 percent, or moving to a price level targeting regime. These proposals all have advantages and disadvantages, so it requires evaluating the balance between them.

Graphs

Graph 1