Literature Review: Reconciling two models of public debt and interest rates

In recent years, as many countries continue taking on more debt, Debt- to-GDP ratios across developed economies has reached a historical high level. The U.S. government's public debt is now more than $22 trillion. The amount of government debt not only is very important in terms of central government economic policy, but also it is an important issue because people, firms, and governments are all subject to intertemporal budget constraints. And with an interest rate lower than the growth rate, the intertemporal budget constraints will be less binding and there are ongoing controversies about what government should do with the continuous growing debt.

Blanchard (2019) has discussed the cost of high debt in the low interest rate environment. He concluded that the safe interest rates in U.S. were lower than the growth rates for a long time in the past, so they will continue stay below the growth rates and in this low interest rate environment, the fiscal and welfare costs of the public debt can be much lower than expected. He argued from four aspects. First, he suggested that it is normal to have the interest rate lower than the growth rate and the situation will continue in the future, so the public debt will have no fiscal cost. Second, although public debt reduces capital accumulation, a safe rate that indicated that the risk-adjusted rate of return on capital is also low, so the welfare cost is also smaller the expected. Third, while the measure rate of earnings has been quite high, the marginal product of capital is lower and in turn will lead to a lower welfare cost of debt. Fourth, although investors might require risk premium to balance the high public debt and the fiscal burden will increase, he claims that this argument has no straightforward implications for the appropriate level of debt.

Evans (2020) recreates the modeling and calibration approaches of Blanchard and finds contrasting results. The attempted replication of Blanchard's stated approach could not find any long-run average welfare gains from increased government debt. Moreover, Evans's research has found that with some relax on the strong risk-reducing assumptions, those welfare losses are exacerbated. As there is no direct mapping between the two studies, the purpose of my research is to explore the difference

between Blanchard's model and Evans's model. By trying to identify the reasons that give rise to the exact opposite results, this paper seeks to further explore the relationship between the increased public debt and the low interest rates.

Diamond (1965) discussed a model to examine long-run competitive equilibrium in a growth model and its effects on government debt. In an overlapping generation model with uncertainty, whether an intergenerational transfer from young to old is welfare improving depends on the interest rate. In the Diamond model, a transfer has two effects on welfare including the reduction of capital accumulation and an induced change in the returns to labor and capital. In the current circumstances where the interest rate is lower than the growth rate, and the average marginal product of capital exceeds the growth rate, the two effects have opposite signs. This model shows that net effect might be positive if the safe rate is sufficiently low and the average marginal product is not high but the effect on welfare is ambiguous.

Many literatures address the relationship of fiscal stress and equity premia or interest spreads. Evans et al. (2013) has specified a stochastic general equilibrium model determining via simulation of the time it takes for the economy to reach to the point where current policy can no longer be maintained. Their simulations were based on an OLG model calibrated to the U.S. economy, and they show that as the economy gets closer to its fiscal limit and gets closer to a default event, not only the fiscal gap but also the equity premium rises. This paper is using almost the identical modeling approach used in the Blanchard (2019) and reaches the conclusion that increasing government debt leads to more frequent default and will lead to increases in the interest rate spread.

Rebelo et al. (2019) proposed a model of sovereign debt where countries vary in their level of financial development. Comparing to developed countries, emerging economies are very different in which they generally pay high credit spreads on their sovereign debt while having much lower Debt-to-GDP ratio. Their abilities in hedging rare disasters in international capital markets also varies. Low levels of financial development generate more "debt intolerance" phenomenon and leads to reduction in debt capacity, increase in credit spreads, and limitation of the ability to smooth

consumption. More importantly, their model suggests that rare disasters generate increased hedging and saving behaviors and increased credit spreads.

Besides Rebelo et al. (2019), other papers have also explored the effects of the rare disaster towards market and interest rates. Tsai and Wachter (2015) has surveyed several recent models of disaster risk that can provide implications for numerous puzzles in many aspects, including equity premium, volatility, return predictability and other features of the aggregate stock market. By examining their modeling techniques and results, they show that the rare disaster risk model has unifying framework on asset pricing.

The present analysis of Barro (2009) is extended from previous study where he studies the effect of rare economic disasters to the equity premium and asset-pricing puzzles and considers additional aspects of asset pricing in order to assess the welfare cost of consumption uncertainty. The study has showed that calibrations indicate that society would willingly reduce GPD by 20 percent each year to eliminate rare disasters, while the welfare cost from usual economic fluctuations is much smaller, which is related to lowering GDP by about 1.5 percent per year.

Gourio (2012) constructs a business cycle model consistent with the observed behavior of asset prices. His study contains an introduction of a small, time-varying risk of economic disaster in a standard real business cycle model to study the effect of shocks to aggregate uncertainty. He has landed two results: the risk of disaster does not affect the path of macroeconomic aggregates if the probability of disaster remains constant and shocks to the probability of disaster are almost equivalent to preference shocks.

Studies including Rebelo et al. (2019), Tsai and Wachter (2015), Barro (2009), and Gourio (2012) all find that in the emergence of rare disasters or negative shocks, there will be higher equity premia, more insurance and hedging behavior, and lower overall utility.

All of these studies show the importance of taking the effect of rare disaster and negative shocks into consideration, and also have important implication on the

assumptions and settings of Blanchard (2019) model. Without considering the influence brought by these negative shocks could lead to very different or biased results.

Therefore, this research will explore how different assumptions were set up and how they are influencing the result and implications on the relationship between low interest rates and fiscal and welfare cost of public debt. With almost identical modeling and methods, the contradicting results coming from Blanchard (2019) and Evans (2020) has shown importance of some of the assumptions that got relaxed, and by exploring the difference between the two studies, this paper will find more evidence on the relationship between public debt and interest rate.

Reference:

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