

# Discussion of “Capital Injection to Banks versus Debt Relief to Households”\*

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Jinhyuk Yoo asks an important and interesting question in this paper: if policymakers have to choose between providing debt relief to households versus injecting new capital into banks, how should they evaluate the choice? The paper addresses this question through the lens of a DSGE model, and makes the case that household debt relief is more potent than capital injection for banks as a stimulus measure in the midst of a recession drive by household debt like the one the United States experienced in 2008. Amir Sufi and I also came to a similar conclusion in our 2014 book *House of Debt*. In my comments below, I will first describe the intuition behind the key result in Yoo’s work. I then discuss the empirical relevance of the model’s assumption and implications in light of the increasing body of work that has come about since the great recession. Finally, I discuss a conceptual extension of the model that Yoo presents to highlight some important questions for further inquiry.

## 1. Basic Intuition

The paper builds on a standard New Keynesian DSGE model with the typical ingredients: (i) a Euler equation that connects consumption today to consumption tomorrow through the interest rate and expected inflation, (ii) a monetary authority that follows the Taylor principle subject to a zero lower bound (ZLB) constraint, and (iii) a Phillips curve for the supply side with a positive relationship between output and inflation. It is well known that the standard DSGE model with these three ingredients does not have a direct role for financial policy, either for household debt relief or for bank capital injection.

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Therefore, to make the model relevant for the question at hand, Yoo adds two additional ingredients.

First, there is heterogeneity across households, with patient households lending to impatient households. The impatient households have higher marginal propensity to consume (MPC) but face a leverage constraint that limits how much they can borrow from patient households. Second, there is a banking sector that funds both households and entrepreneurs. However, the banking sector faces a leverage constraint that makes the net worth of the banking sector relevant for aggregate credit supply.

With the addition of the above ingredients, the models can address the key policy question in a non-trivial way. Since impatient households have higher marginal propensity to consume, tighter constraint on their spending can reduce aggregate demand if the economy is unable to stimulate additional demand due to interest rates stuck at the zero lower bound. In such a situation, “redistributive policy” can expand total output by expanding demand. For example, a transfer from the patient to the impatient households in the form of “debt relief” raises aggregate demand due to the above-mentioned higher MPC for impatient households in the presence of zero lower bound. In fact, the paper points out a second important advantage of expanding demand, namely its positive impact on inflation. When the nominal interest rate is stuck at zero, any increase in expected inflation is helpful, as it lowers the real rate and brings the economy closer to its natural rate of interest.

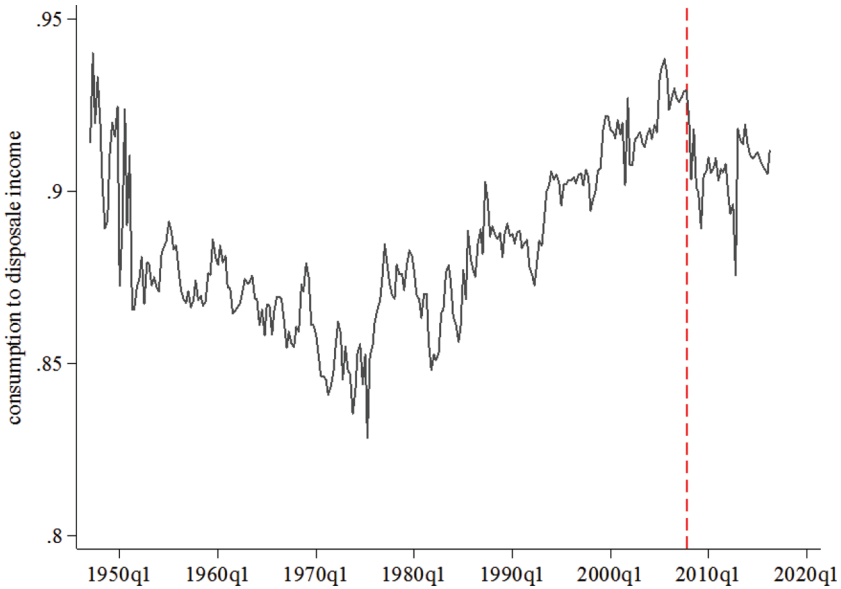
The model weighs the positive gains from household debt relief due to the above forces against the potential gain from injecting new capital into banks. For example, instead of transferring funds from patient households to impatient households in the form of debt relief, we can transfer funds from patient households to banks in the form of capital injection. An increase in bank capital helps to lower spread. This raises investment and also enables impatient households to borrow more at lower rates, thus boosting demand. However, the expansion in investment credit to entrepreneurs expands supply and hence is fundamentally deflationary in scope. This is the key effect that makes bank capital intervention relatively less attractive in a zero lower bound environment: the economy needs higher inflation expectations, and a deflationary shock is not helpful in achieving that goal.

The model thus operates by translating household debt relief into an outward expansion of the aggregate demand curve, which is inflationary in nature. On the other hand, bank capital injection translates into an expansion of the aggregate supply curve, which is deflationary in nature. *This asymmetric effect is key to understanding the main result of the paper.* When the source of the recession is a fall in aggregate demand due to household debt overhang, the economy is in a deflationary cycle with interest rate at the zero lower bound. In such a scenario, policy that is inflationary in nature has a stronger multiplier—in the paper’s calibration, the effect is three times as large in the short run. This effect is specific to a ZLB world and does not exist otherwise due to the Taylor rule counteracting any effect on inflation.

## 2. Empirical Relevance

The paper builds a nice intuitive model to make the case for household debt relief in a demand-constrained economy. However, how realistic are the model’s assumptions and quantitative predictions—especially with reference to the 2008 financial and economic crisis? I discuss two of the model’s assumptions, (i) regarding heterogeneity in consumer preferences, and (ii) regarding assumed deviation from steady state. I then discuss the empirical relevance for the key prediction that household debt relief would lead to strong consumption response from indebted households.

The first key assumption of the model is a persistent and quantitatively important difference in marginal propensity to consume across households in the economy. This, by now, should be an uncontroversial assumption. There are a number of careful empirical studies that document strong differences in marginal propensity to consume and marginal propensity to borrow out of financial shock. Mian, Rao, and Sufi (2013) estimate large differences in marginal propensity to consume out of wealth shocks, with poorer households and households with high leverage having much stronger MPC out of wealth. Mian and Sufi (2011) show that homeowners with lower credit scores and homeowners with liquidity constraints borrow significantly more for a dollar increase in house price relative to the rest of the population. Agarwal et al. (2015) document that individuals with low credit scores respond much more strongly to an increase in

**Figure 1. Consumption-to-Income Ratio over Time**

credit limit, for borrowing as well as spending. Parker et al. (2013) estimate that lower-income households and liquidity-constrained households respond much more aggressively to fiscal stimulus checks.

A second assumption of the model is that the economy is in a steady state when the adverse shock hits. This is a natural and reasonable assumption. However, to the extent we want to apply the model to the 2008 recession, it is important to highlight that the economy on the eve of the crisis was not in “steady state.” In particular, credit dynamics leading up to 2007 may themselves reflect deviation from the norm. This can be seen in figure 1, which plots the ratio of consumption to disposable income over time. The data for this figure come from Pistaferri (2016).

The consumption-to-income ratio on the eve of the crisis was at a post-war high, having risen significantly in the preceding two decades. At the same time, household leverage was also at an all-time high, having undergone a rapid acceleration in the decade before. The two figures are likely related. As has been shown in prior work, many homeowners borrowed aggressively against the rising value of

their homes in the 2000s. Such borrowing is likely to provide a short-term boost to consumption. There is thus a close empirical relationship between the peak in the ratio of consumption to disposable income in 2006 and the peak in household leverage to GDP around the same time. If the consumption-to-income ratio tends to revert to its longer-term mean, then we would naturally expect consumption growth to slow down relative to income post-2008 crisis.

Thus there may be additional forces in the background that make it difficult to sustain the level of consumption relative to disposable income seen in 2006. For example, if the higher consumption-to-income level was sustained due to the high credit growth during the 2000s, the ratio will naturally need to come down as the economy settles into a more normal flow of credit creation. Such an adjustment would create an additional headwind for consumption growth going forward. I suspect that if we take such additional forces into account, the positive impact of debt relief due to its inflationary pressure may be even further enhanced. We could benefit from such an analysis in the paper.

A key prediction of the model's framework is that debt relief leads to an increase in consumption for the indebted consumer. This follows naturally from the assumption of heterogeneity in MPC already discussed above. However, from an empirical standpoint, heterogeneity in MPC with respect to income or other financial shocks does not necessarily mean that households respond symmetrically to a write-down in debt balance as well. There is an increasing empirical literature that helps illuminate this issue.

Di Maggio, Kermani, and Ramcharan (2014) and Keys et al. (2014) design a natural experiment that exploits predetermined differences in the timing of when mortgage interest rates get set to a lower amount as monetary policy relaxes in the aftermath of the 2007–08 crisis. The authors show that households that receive a lower mortgage interest rate are less likely to default and also use that net cash saving to boost spending. However, cash flow constraints are important in understanding these results. Ganong and Noel (2016) use another natural experiment that explores debt write-down for “underwater” homeowners. The authors show that households experiencing a write-down on principal payment alone, without a reduction in cash payment due to the lender, does not result in a spending increase. Thus the combined evidence suggests that

interest burden relief is essential to benefit in terms of spending gain. Otherwise, individuals may be too cash flow constrained to benefit from a pure principal write-down. These details are important when quantitatively assessing the model's implications.

### 3. Model Extension

An important conceptual insight in the paper is that government intervention in financial markets can affect either the aggregate demand or the aggregate supply side of the economy depending on the nature of government intervention. This difference makes the nature of government intervention important, since a policy that expands demand is inflationary and hence more helpful in situations that suffer from liquidity trap. A related insight is also present in Bahadir and Gumus (2016), who explicitly model the household and firm sectors separately.

A policy shock in the Bahadir and Gumus (2016) paper is inflationary if it primarily expands the household sector and hence aggregate demand. However, a similar shock affecting the firm sector is deflationary, as its primary impact is on expanding aggregate supply. An advantage of the Bahadir and Gumus (2016) approach is that one can generate further empirical predictions to test whether a particular policy shock largely worked through the demand side or the supply side.

Mian, Sufi, and Verner (2017) introduce a tradable and non-tradable sector in the economy that otherwise looks similar to the Bahadir and Gumus (2016) approach. We show in that paper that credit supply shocks that boost household demand will tend to raise employment in the non-tradable sector relative to the tradable sector. At the same time, higher demand will push up the prices of local non-tradable goods. In contrast, credit supply shocks that expand tradable or non-tradable firms' labor productivity do not make this joint prediction.

We can thus use data on employment and prices at the tradable and non-tradable sector level to understand whether a given shock operated through the firm side of households. The empirical results in Mian, Sufi, and Verner (2017) suggest that credit shocks during the 1980s primarily worked through the household sector by affecting aggregate demand.

The broader comment I want to make here is that the author can look at tradable and non-tradable sectors separately to tease apart the true relevance of the mechanisms highlighted in the paper.

#### 4. Conclusion

Overall, this is an excellent paper that makes the important point that policies focused on debt relief, or lower mortgage payment, have a more stimulative effect than policies focused on bank capital injection when the source of crisis is insufficient demand. The key “multiplier” is driven by the inflationary impact of providing debt relief to highly indebted households. Future extensions of the paper can benefit from incorporating more of the empirical insights in the literature, and can enrich theory further by separating the tradable and non-tradable sectors. Doing so delivers a new set of predictions that can then be taken to data in subsequent work.

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