Household Debt and the Great Recession: Fisher's Debt and Deflation Theory and How We Should View the Household Debt Burden

Honors Thesis

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Abstract

This paper compares household debt conditions in the United States before and after the Great Recession of 2007 – 2009. I use a combination of data from the World Bank Development Indicators and the Bank for International Settlements to estimate a model using the Synthetic Control Method for Stata, which creates a depiction of what household debt in the U.S. would have looked like without the impacts of the Great Recession. As a reference point for countries that could be used to compile the weighted synthetic control group, I study the economic characteristics of Australia, Canada, France and Germany because these countries performed well under recessionary pressure. However, upon running the model, I find that the best fit for the data set uses Belgium, Netherlands, Canada, Korea, Portugal, Germany and Denmark. The estimated model is best interpreted through a graph of the household debt service ratio in actual U.S. data and for the synthetic control group changing over time. It shows a clear rapid deleveraging trend for households over the course of the Great Recession, contrasting with a household debt service ratio that remains relatively high for the control group through the recovery period. I then discuss possible implications of my findings, including how the model's similarities to Fisher's household debt theory suggest its relevance in explaining household debt behavior and how it suggests we should view the household debt burden.

Introduction

The Great Recession, beginning December 2007 and coming to an official end in June 2009 according to the most recent report from the National Bureau of Economic Research, was the worst period of economic downturn the United States has seen in post-war years in terms of the magnitude of the immediate effects on key economic performance indicators and the exceptional length of the period of recovery compared to the other most recent recessions. The events that characterized this recession can be primarily traced back to the increased lending and rising prices in the United States housing market. The surface potential for continued value increases in the future attracted home-buyers and helped to encourage lenders to create new debt instruments to satisfy them. As the number of subprime mortgages increased, so did the probability of mass defaults and financial frictions, which would be the perfect storm for a recession. By June 2007, this risk became a reality. It follows that this severe recession would affect various aspects of household finances even as it was caused by some of them, including the decisions they make regarding the type and amount of debt they hold. Household debt is a key topic for research regarding the Great Recession because of its intimate connection to the underlying cause of its events. It is vitally important that we understand the rippling effects substantial increases and subsequent drops in public debt can have through goods markets, labor markets, inflation and interest rates. In estimating a model that creates a synthetic control version of the United States that I can compare to the actual data, I contribute a clear visual of where the country's household debt might be had we not experienced the major impacts of the Great Recession: decreased GDP, deflation, and increased unemployment. My model supports previous research that indicates a widespread deleveraging by households in

the wake of the Great Recession as the need to reduce debt obligations grew stronger. It could also help to support Fisher's theory that persistent deleveraging can both be encouraged by recessionary feelings of uncertainty about the economy and actually contribute to worsening the recession. At the very least, my findings combined with the assertations of previous literature support the further consideration of high debt service ratios as warning indicators prior to recessions and possibly taking actions to prevent household debt from climbing too high.

Literature Review

In my research on the works of other scholars relating to the impact of the Great Recession on household finance, I primarily studied three papers: Household Debt and Saving During the 2007 Recession (Chakrabarti, Lee, Klaauw & Zafar, 2011), Household Debt and the Great Recession (Garriga, Noeth, & Schlagenhauf, 2017) and Spending Behavior Change and Financial Distress During the Great Recession (Chalise & Anong, 2017). Each of these papers addresses important questions about how the Great Recession changed how families with varying demographic characteristics make household finance decisions to deal with job loss, negative income shocks, home equity loss, and other adverse impacts of the financial crisis. I also studied Fisher's debt and deflation theory through his original 49 "creeds" published in 1933 as well as an application of these "Fisher dynamics" in Mason and Jayadev (2014) to help lend clarity to the interpretation of my empirical results later in my paper.

The Great Recession has been mostly associated with the building and subsequent bursting of the housing bubble in the early 2000s. Homeowners saw sizable increases in

housing values prior to June 2007, which led to more and more mortgage loans as new households entered the market. Garriga (2017) examined the changes in different forms of debt in the years leading up to and after the recession, and found that in 1999, average mortgage debt was highest for age 45 at $60,000. The peak then moved to age 42 in 2008 with a value of $117,000. Households then watched as their equity plummeted along with prices. The more mortgage debt a household accumulates, the greater the effect on their equity when prices decline, creating a snowball effect. Chakrabarti notes that those who purchases their homes after 2005 experienced the greatest losses because they had to pay the peak prices at the time of purchase (Chakrabarti et al, 2011, p. 4).

Household debt was steadily growing from 1990 to 2008 and then began to rapidly decline as the country slid in to recession. Garriga (2017) observed similarities between the decisions households made regarding their debt during the recession and a theory developed by Irving Fisher in 1933. Fisher hypothesized that if the household debt burden becomes too large during boom periods, it can cause households to have to "rebalance their balance sheets" and deleverage through sales and bankruptcies. This large selloff can create a positive supply shock in the economy, lowering prices and leading to a subsequent decrease in demand in labor markets—some trademarks of a recession (Garriga et al, 2017, p. 184). It appears that the effects of the recession align quite closely with Fisher's theory. As conditions in labor markets worsen, the likelihood of defaults can increase as more people find themselves unemployed or underemployed (working in a job that they are perhaps over-qualified for that pays less than what their ideal occupation would). Concern that debtors may not be able to fulfill their current obligations arises and leads to greater illiquidity and decreased ability to obtain new credit,

creating a snowballing effect during financial crises (Mason & Jayadev, 2014, p. 216). Garriga

also suggests that the reason we ended up with so many mortgage defaults as households

began to deleverage is partially because of the updates made to bankruptcy laws in 2005 that

made bankruptcy a less accessible solution to financial distress (Garriga et al 2017, p. 201).

Changes in spending and saving behavior are discussed in two of these papers,

particularly in how they relate to the financial position of households. Chakrabarti addressed

the question of how households responded to the new conditions of the economy by looking at

their spending. He notes that in the RAND survey used in his research, a median monthly

spending cut of 20% was reported just between October 2008 and the time the survey was

conducted in the following month. Cuts in monthly spending were found to be strongly related

to unemployment, with an average cut of 18% among those unemployed in November 2008

(Chakrabarti, Lee, Van der Klaauw, & Zafar, 2011, p. 11). Chakrabarti also observes a frequently

reported increase in personal saving across demographic groups. This could be due to the

relative constant average values of disposable income and the persistent drop in consumer

spending.

Chalise (2017) tested two hypotheses regarding household spending behavior—first,

that households who systematically spent more than their income prior to the Great Recession

would be more likely to become financially distressed during the Great Recession that those

who spent less than their income, and second, that households who switched from spending

more to spending less than their income during the Great Recession reduced their chances of

becoming financially distressed by doing so (Chalise & Anong, 2017, p. 52). Neither hypothesis

could be supported by the findings. It turned out that in the second model used, which included

binary variables for being a spender in 2007, being a spender in 2009 and changing to a saver in 2009, individuals who switched to being savers during the recession were twice as likely to be financially distressed and prerecession spending habits were insignificant in predicting financial distress. However, as we would expect, being a spender in 2009 came with three times the likelihood of being financially distressed compared to people who were spending less than their income.

It is also important to note that in all three papers regarding household finance conditions in the United States that I reviewed, the authors found many ways in which certain demographic groups suffered more than others. The Great Recession was particularly harmful to younger, less educated individuals with lower incomes. African Americans and Hispanics were much more adversely affected than whites. Individuals in these categories seemed to be hit from all sides— they were more susceptible to dropping home values, more likely to be unable to make loan payments, and experienced higher rates of unemployment. Chakrabarti (2011) reported that the net worth disparity between median households and households in the bottom 30% in terms of income continued to increase from 2007 to 2013, from 4.53 to 5.49 times the net worth of the lower group. Chalise (2017) also discussed the increased probability of becoming financially distressed associated with being in poor health. Those in good health had odds 37% lower than those in poor health (Chalise & Anong, 2017, p. 59).

As I broadened my knowledge of previous literature surrounding the Great Recession and its ripple effects reaching outside of the U.S., I studied a set of countries that emerged largely unscathed. The countries I will examine in comparison to the United States are Canada, Germany, France and Australia. All survived the global financial crisis with little to no

macroeconomic turmoil and can serve to help estimate how the United States may have looked had the Great Recession never happened. GDP and the unemployment rate and the two major performance indicators that reveal significant differences between the U.S. and these other countries. For the most part, prior to the recession, Canada, Germany and France had much higher unemployment rates than the U.S. Once the Great Recession hit, the U.S. unemployment rate began to climb much faster and became the highest of the four countries by the start of 2009. Canada's lack of large unemployment increases can be attributed to the agility of regional labor markets in reacting to changing macroeconomic conditions (Dube and Polese, 2015, p. 250). The main regions that experienced negative effects of the recession were ones closely linked to the automobile and lumber industries, the latter being heavily dependent on U.S. demand for housing materials that dropped sharply with the burst of the housing bubble (Dube and Polese, 2015, p. 236). What is even more interesting is that from 2007 to 2009, German unemployment actually declined, even in the midst of the worst modern global economic contraction. Australia's unemployment rate also increased much slower than that of the U.S. from 2007 to 2009 (Hoffman & Lemieux, 2014, p. 4).

Most countries experienced a steep decrease in real GDP between 2007 and 2009, with the U.S. experiencing a rate of 4.7 percent (Hoffman & Lemieux, 2014, p. 5). Germany was similar to the United States while Canada and France showed slightly smaller drops and Australia saw barely any change at all. Contrary to initial ideas that the additional expenditure by Australian government intended to shore up demand during the global financial crisis was what helped Australia survive, Australia most likely weathered to storm more successfully than most countries as a result of stimulatory changes in net foreign demand (Makin, 2010, p. 15).

Australia, Canada and Germany recovered with the most strength, seeing increases of over 8 percent from mid 2009 to mid 2012 while France saw little GDP growth The United States struggled a bit more in these first few post-recession years with a growth rate of 6.9 percent (Hoffman & Lemieux, 2014, p. 6).

The goal of my research is to add to our understanding of how household debt in the United States was affected by and contributed to the Great Recession so that we can continue to learn from mistakes made during it and better equip individuals to deal with financial distress. By comparing the United States to the Stata-generated version of itself created using the data from other countries, I estimate a sort of counterfactual that sheds light on what the United States may have looked like had we avoided such substantial economic downturn. The counterfactual estimated makes it easy to see Fisher's debt and deflation theory at work.

Data

I used World Development Indicator data from the World Bank as well as Debt Service Ratios from the Bank for International Settlements to create the model. The set of World Development Indicators includes annual values for a wide variety of macroeconomic performance measures—everything from government expenditures on education as a percent of overall government expenditure to literacy and mortality rates. I use variables for the, unemployment rate, GDP growth rate, and inflation rate for each of the countries as predictor variables, as these are the typically referenced indicators of the broader economic conditions of a country. The main dependent variable of interest is the debt service ratio for households (*hnpish*) reported quarterly for each of the countries. This data set is obtained from the Bank

for International Settlements and merged with the World Bank data to create my final data set used in the analysis. In general, a debt service ratio (DSR) represents the ratio of the total amount of debt obligations to the total amount of resources available to pay them. For households, this means all required household debt payments to total disposable income. The household DSR can be separated into two categories—mortgage debt and consumer debt—the latter of which can include credit card debt, pay day loans and any loans used purely for consumption rather than investment. The household DSR is commonly referred to as the household debt burden. Because disposable income has stayed rather constant since 2000, the household DSR can give us an idea of how the amount of debt households take on changes from period to period (Chakrabarti et al, 2011). These changes in debt, especially during periods of financial distress may have more to do with changes in income, inflation and interest rates and constraints imposed on households by these variables rather than actual changes in household preferences. I use a set of 17 OECD countries, included the United States, to conduct my analysis.

Empirical Methods

The counterfactual is calculated using Synthetic Control Methods for Comparative Case Studies, or synth, for Stata developed by Abadie, Gardeazabal, Diamond and Hainmueller (2003, 2010, 2013). This software extracts characteristics of a set of comparison entities and creates a synthetic control entity that approximates the characteristics of the entity receiving a treatment or experiencing an event. In theory, this synthetic control entity will more closely approximate what the treated entity would look like without the treatment than simply taking

an average of the group of comparison entities. This is valuable in cases of natural experiments

created by policy changes or events because the researcher has no control over which entity is

treated or how long the treatment lasts.

I essentially assume that the United States is the only one of the countries in the set that

experienced the recession at all for the purposes of obtaining a counterfactual. I argue that the

other countries in the set experienced contractionary effects of the global financial crisis that

ensued following the American-born Great Recession in a much smaller magnitude than the

U.S. did, and thus can be used to comprise the synthetic control group. In this case, the United

States is permanently affected by the Great Recession, so a counterfactual is the only picture

we have of how the country would have fared had it not happened. Any changes in household

debt post-2007 contain some residual effects of equilibrium changes stimulated by the Great

Recession.

Table 1 shows average values for the household DSR in the pre-recession period (1999

Q1 to 2007 Q4), the Great Recession (2008 Q1 to 2009 Q2), and the post-recession/recovery

period (2009 Q3 to 2016 Q4) for each of the countries in the final data set. I use 2008 Q1 as the

beginning of the recession because since it didn't officially start until December 2007, only part

of the fourth quarter of 2007 experienced the full force of the recession. The United States is

one of only four countries in the data set that shows and post-recession average dropping

below the pre-recession average, indicating rapid deleveraging. In the data, the *countryid*

variable equals 31 for the U.S., so I use that to declare the treatment unit as the U.S. and then

state that the treatment period begins where the year-quarter variable equals 2008 Q1. I

include my predictors—*gdp_gr*, *infl_rate*, *unemp_rate*, and *hnpish_* for the fourth quarter of

2007, the first quarter of 1999, the first quarter of 2003 and the first quarter of 2005—and

Stata estimates the synthetic control United State from there.

Table 1: Initial Summary Statistics

Country Name	Average Household Debt Service Ratio		
	Pre-Recession (1999 Q1 – 2007 Q4)	Great Recession (2008 Q1 – 2009 Q3)	Post-Recession (2009 Q4 – 2016 Q4)
Australia	13.01111	16.41667	15.54
Belgium	5.75	6.50	7.323333
Canada	11.13333	12.86667	12.49
Germany	9.055556	7.85	6.976667
Denmark	17.35556	22.75	18.57333
Spain	7.416667	11.51667	8.61
Finland	5.588889	7.833333	6.973333
France	4.908333	5.95	6.223333
United Kingdom	10.33056	12.71667	10.34
Italy	3.869444	5.15	4.906667
Japan	8.519444	7.583333	6.893333
Korea	10.00	11.66667	11.77
Netherlands	15.43889	18.26667	18.78667
Norway	12.16389	15.88333	14.73333
Portugal	9.155556	10.85	8.836667
Sweden	9.411111	11.21667	11.12
United States	**10.26667**	**11.03333**	**8.906667**

Results

The synthetic control United States is a weighted combination of Belgium, Netherlands, Canada, Korea, Portugal, Germany and Denmark. Table 2 shows the weights for each of the countries, the largest portions coming from Belgium, the Netherlands and Canada. Table 3 compares the values for each of the predictor variables between the United States and its synthetic version. It indicates a relatively close relationship for GDP growth, inflation rate, and

unemployment rate, but shows an especially precise relationship for each of the pre-recession

observations of the household DSR. This last of several models tested, with previous, less

accurate models with higher root mean squared prediction errors, including the employment

rate and substituting real GDP for the GDP growth rate. I chose this one for the synthetic

control group's closer approximation of the actual U.S. data in the pre-recessionary period, as

shown in Figure 2.

Table 2: Weight of Each Country Making Up the Synthetic Control United States

Country	Unit Weight
Australia	0
Belgium	0.343
Canada	0.245
Germany	0.012
Denmark	0.002
Spain	0
Finland	0
France	0
United Kingdom	0
Italy	0
Japan	0
Korea	0.112
Netherlands	0.259
Norway	0
Portugal	0.027
Sweden	0

Figure 1 compares changes in GDP growth rates for each of the countries that comprise

a portion of the synthetic control group with those of the U.S. Though all countries experience a

drop in GDP growth after the beginning of the Great Recession (indicated by the vertical

dividing line on each of the graphs), the minimums that the GDP growth rates reach aren't as

low as the U.S. for Belgium and Korea. This may indicate that the synthetic control countries

experienced contractionary effects brought on by the Great Recession, but potentially at a

smaller magnitude than the U.S. Canada, Germany and Denmark seem to show larger increases

in their GDP growth rates than the U.S. once the recovery period begins.
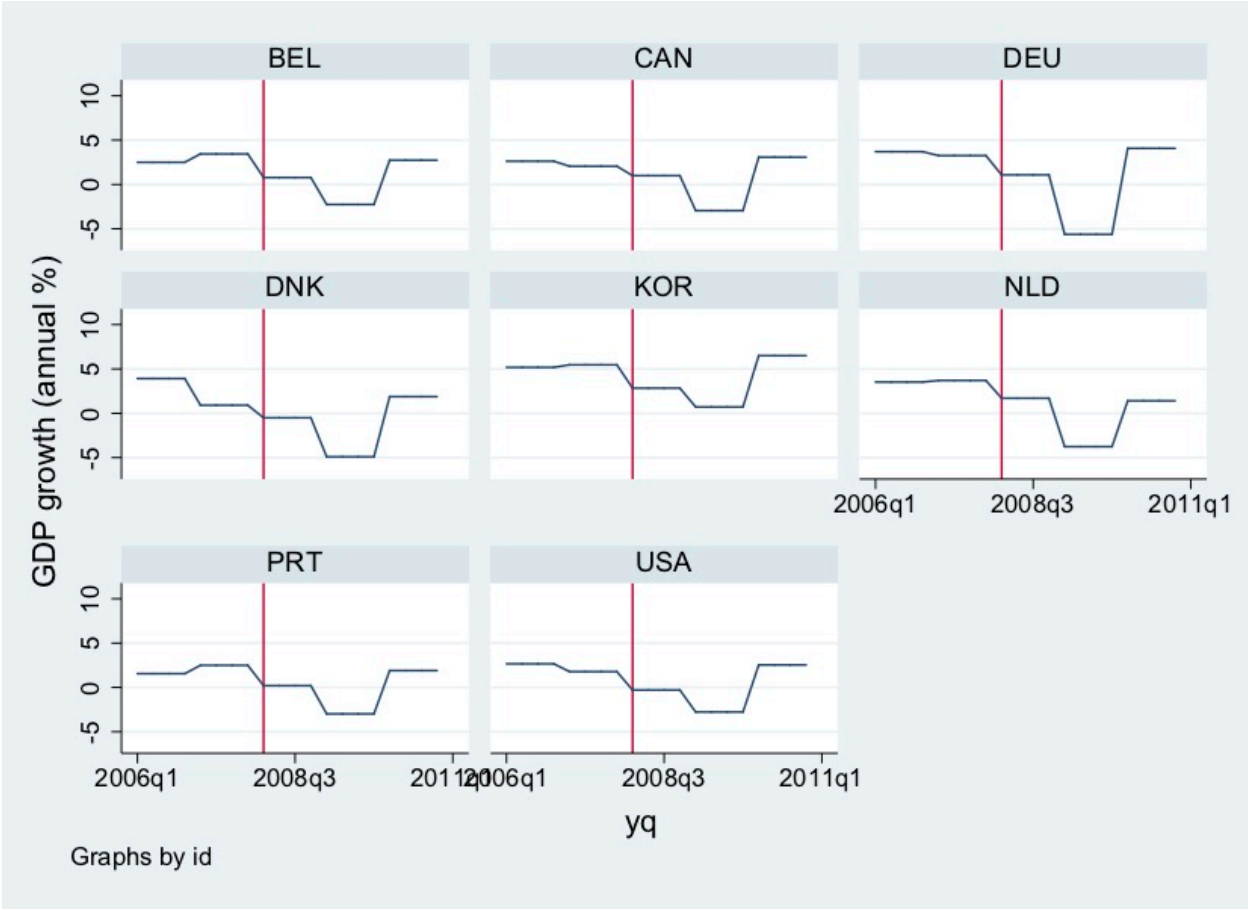
Figure 1: GDP Growth Rate Changes Over Time

Graphs by id

Table 3: Predictor Variable Balance for United States (*Treated*) and the Synthetic Control United States (*Synthetic*)

Predictor Variable	Treated	Synthetic
gdp_gr	2.911746	3.016968

infl_rate	2.706584	2.214242
unemp_rate	4.954286	5.915677
hnpish_(2007 Q4)	11.6	11.6279
hnpish_(2005 Q1)	10.3	10.2937
hnpish_(2003 Q1)	9.8	9.8039
hnpish_(1999 Q1)	9.4	9.3776

Figure 2: Household Debt Service Ratio (*hnpish*) over Time, Real United States Data Compared to the Synthetic Control United States
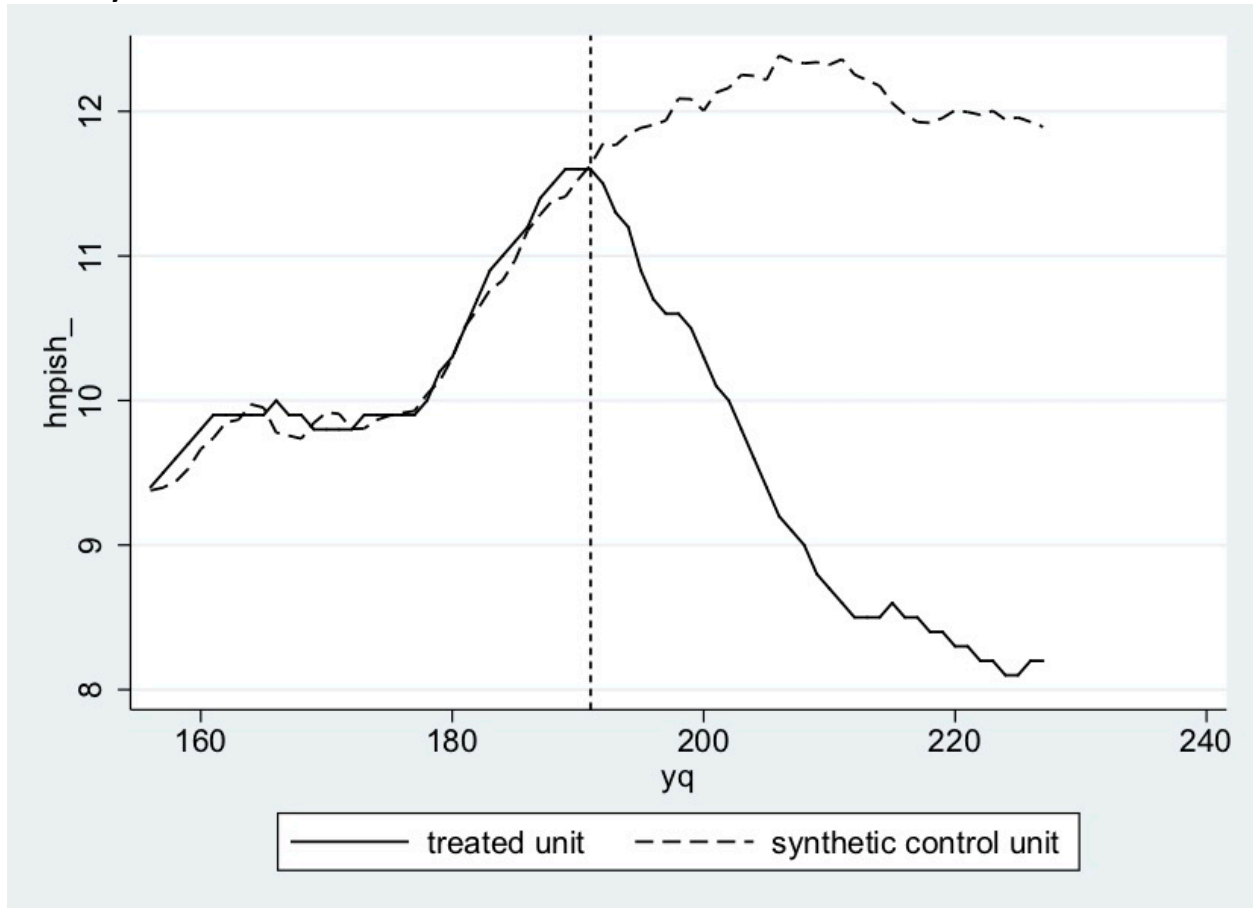
Notes: The starting period is 156 on the horizontal axis, which represents 1999 Q1. The vertical dividing line indicates the beginning of the treatment period (directly following the start of the Great Recession), and is placed at period 192, representing 2008 Q1.

Figure 2 is a graph showing the changes in the household DSR from the first quarter of

1999 (where *yq* equals 156 on the graph) to the last period in the data, the fourth quarter of

2016. The solid line represents the actual data for the United States, while the dashed line

represents the synthetic United States created in Stata. The vertical line divides the graph into the pre-recession period and period after its official start, starting at the first quarter of 2008 (where *yq* equals 192 on the graph). It is clear that the United States and its synthetic control version move closely together for the most part and in the same general direction until the start of the Great Recession. One can think of the Great Recession "treatment" as a sum total of the trademark events of recessions: large decreases in demand and consumption, deflation, increased unemployment and the feelings of uncertainty and worry that stem from households experiencing these events. After this point, the real household DSR quickly plummets to a level well below any observed in the nine-year pre-recession period. The synthetic control unit line, however, continues to climb after the recession hits and shows a peak at just over 12. We then see it start a gradual decline while the actual household DSR continues to fall rapidly. The behavior of the synthetic control unit suggests that the household DSR would have continued to increase and then hover around 11 and 12 had the country not experienced the Great Recession. The small increase shown by the solid line in the last two periods in the data may indicate that the recovery period for household debt after the Great Recession only just concluded at the end of 2016, almost 10 years after the initial downturn.

It is important to remember that the movement of the household DSR can be a result of changes in one of both of two factors: the actual amount of household debt (including mortgage and consumer debt) and the amount of household disposable income. As previously mentioned, research indicates that for the most part, households in the U.S. were forced to deleverage as a result of the Great Recession. With the amount of disposable income staying relatively constant and many consumers cutting back on spending, most of the changes in the

household DSR can be explained by changes in the amount of household debt, influenced by income, deflation and interest rates (Chakrabarti et al, 2011) (Masona & Jayadev, 2014).

Discussion

These results contribute to Irving Fisher's 1933 theory that if households accumulate too much debt, they may be forced to deleverage in the event of economic downturn, which, if done on a nationwide scale, will then contribute to worsening the circumstances of the economy as a whole through deflation and its subsequent effects on other economic variables (Fisher, 1933). This suggests that there may be a simultaneous causality issue—the beginning of a recession triggers the first round of deleveraging, but then the selloffs and bankruptcies work to prolong and magnify the recession.

The large majority of the steady increase in overall household debt can be attributed to a substantial and persistent increase in mortgage debt leading up to the Great Recession. The subprime lending trend is largely to blame. As Americans watched housing prices rise, they could see more and more opportunity for investment and home ownership became more and more attractive. This trend was the trigger needed for the initial state of over-indebtedness preceding financial crises that Fisher described (Fisher, 1933). The practice of lending larger and larger amounts of money to households whose credit would have normally kept them from receiving such a loan as home values continued to climb heightened the risk of a crash in the housing market when households would no longer be able to make their loan payments. With this crash in the housing market, we saw subsequent effects in the stock and labor markets, triggering the worst post-war recession in the U.S. The consumer debt component of household

debt is negatively affected by these market fluctuations as well, with more consumers cutting their spending in the wake of job loss or decreases in their net wealth, further lowering the amount of overall household debt. Moving forward, it is imperative that we learn from the excessive subprime lending mistake that set these events in motion.

Though debt is a necessary part of our financial system that creates opportunity for increased consumption, investment and innovation for our economy, it is clear that there exists a threshold. Without debt, most ordinary people would never be able to save up enough currency to purchase things like homes, cars or land. However, debt can only help to boost consumption or investment when GDP, and subsequently, disposable income, keep pace with its growth. If not, the household DSR continues to grow and a relatively larger and larger share of disposable income will need to be used to meet debt obligations, leaving less and less to be used for consumption. These stimulatory effects that household debt can potentially have on the economy as a whole can contribute to creating jobs, increasing labor demand and boosting GDP. However, a large enough household debt burden can put us at risk of a pervasive desire for the rebalancing of household finances when people lose confidence in economic conditions. We should be asking ourselves "how much is too much?".

Figure 1 shows the household DSR staying high without the many market disruptions from the Great Recession, which could lead us to wonder if that could be a good thing. However, I argue that a household debt burden this large is not sustainable—it will eventually be brought down with economic contractions as we flow through more business cycles. Irving Fisher's debt and deflation theory came immediately after the Great Depression began to subside, but we still watched as public leverage rose consistently for the past six decades

(Mason & Jayadev, 2014, p. 217). Several models have been discussed in the recent decades that can be applied to the early 2010s. They suggest that suppressed consumption can be attributed to households adjusting their behavior after accumulating too much debt. The idea is that households with more debt attempted to decrease their consumption after the shock to home values, but other households with less debt didn't increase their consumption to offset it, making the recession harder to remedy (Mason & Jayadev, 2014, p. 218). My empirical results help to shed light on how drastically household debt was impacted by constraints imposed on the public by the Great Recession and support Fisher's theory that massive rebalancing leads to externalities that contribute to worsening the recession.

Conclusion

The United States saw a steady increase in household debt in the decade leading up to the Great Recession. A significant part of the blame can be placed on rising prices in the housing market encouraging investment. To keep up with trends, creditors lowered standards and increased subprime lending, increasing the risk of defaults. The housing bubble finally burst in 2007, creating disruptions in stock and labor markets that started the Great Recession. Households were forced to deleverage, leading to positive supply shocks and further deflation. Feelings of economic uncertainty further encouraged deleveraging and the household debt service ratio continued to fall. In this paper, I used the Synthetic Control Method for Comparative Case Studies in Stata to estimate a counterfactual for how the household DSR would have fluctuated had the United States not experienced the negative impacts on GDP and increased unemployment from the Great Recession. My results suggest that the household DSR

would have remained high for several years before gradually falling rather than rapidly

dropping. I argue that a high household debt burden is not sustainable based on Irving Fisher's

debt and deflation theory and later works discussing Fisher dynamics. As a country, we should

recognize the relevance of a high household DSR as a warning indicator for an imminent

economic contraction and respond accordingly in the future.

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