THE CHANGES OF REGULATIONS AND DISBURSMENT AMOUNTS OF SUBSIDIZED STAFFORD GOVERNMENT STUDENT LOANS: THE IMPACT ON HOMEOWNERSHIP RATES

_____

A THESIS

Presented to

The Faculty of the Department of Economics and Business

Colorado College

In Partial Fulfillment of the Requirements for the Degree

Bachelor of Arts

By

Cash K. Forster

May 2019

THE CHANGES OF REGULATIONS AND DISBURSMENT AMOUNTS OF SUBSIDIZED STAFFORD GOVERNMENT STUDENT LOANS: THE IMPACT ON HOMEOWNERSHIP RATES

Cash K. Forster

May 2019

Economics and Business

Abstract

The problem that is reviewed within this thesis is the exponential rate of growth in student loans that affect certain age groups ability to borrow in the future. The changes in regulations and disbursement amounts of unsubsidized Stafford government student loans is affecting home ownership rates through the lack of ability to take out a mortgage within certain age groups. The method which is used is the reviewing of various papers on similar educational topics, data used from government and public information sites and testing correlations through regression. Using data from the past 27 years to analyze national homeownership rates and specific areas of undergraduate grants and loans, this research done primarily explores and questions the correlation between homeownership rates and student loans. This paper depicts the exponential increase in unsubsidized Stafford student loans is having a negative effect on certain borrowers, therefore proving that the borrowing methods and lenders of current student loans are ineffective and inefficient in providing beneficial growth in human capital.

KEYWORDS: (Student Loans, Homeownership rates, Subsidized vs. Unsubsidized Stafford)

Table of Contents

Introduction

What influence do undergraduate student loans have on U.S. homeownership rates? This is an extremely broad question to answer, as homeownership rates have several different components; the main factors being age groups, regions and ethnicities. To identify a correlation between student loans and homeownership rates, specification on these certain factors are needed to clearly understand what these loans effect. As we consider the different regions, consumers, and quantity of student loans, this paper identifies a specific disparity in borrowing between student loans and the homeownership rates. One can posit a major source of this issue seems to be caused by a transition from subsidized to unsubsidized loans. Out of the many barriers for different socioeconomic groups, unsubsidized student loans significantly contribute to building these barriers rather than tearing them down. The importance in recognizing these barriers can help identify key borrowing disparities and how they affect first-time home buyers.

When a student takes out loans today, it is out of necessity to supplement living needs and academic expenses while attending college or university. Where higher education was once only accessible for specific socioeconomic groups, now there is greater student diversity throughout the United States. However when we compare today to previous generations, it was substantially easier to provide for not just themselves but for a family, even without a college education. Dickerson exclaims that her parents were better off in the "Old Economy" and that many of these old economy jobs that provided this financial stability (Dickerson, 2016, pg. 442-443). In the 1980's it was much easier to be in the middle class with neither parent having a college degree, whereas today it is almost essential to have a bachelor's degree if someone aspires to be in the middle class. And even if an individual did attend a university or college during the 1980's, the price, and subsequent loan amounts, that had to be taken were

substantially lower than today (Federal Reserve, 2016). This has become an issue because only a few decades ago, college was an opportunity to better oneself, where now attending college is an absolute must to remain financially independent.

To meet the exponential rise in tuition, some students are required to take loans to attend college. A loan's basic purpose is a means for being able to borrow in order to consume above one's current ability. To meet this need, the federal government offers students the opportunity to take out loans and accrue debt for educational purposes. These observations become a macroeconomics question asking how the government wants to see growth in the economy, and how increasing one's human capital is a benefit to the economy. One way to increase human capital, and therefore increase output per capita, is by further educating the general population (Dornbusch et al, 2017). This is one of the general reasons that the government invests its money into college students via their student loans. Though, there is always the chance of this backfiring. The dispersal of these loans can then negatively affect other parts of the economy. Weidner says, "that graduates with an additional ten thousand dollars in student loans have about 1-2% lower income one year after graduation (Weidner, 2016, pg.2). In order to account for the possible negative effects of student loans, to make the aspiration of the middle class possible, and to improve income per capita, current student loan policies need to change.

Following is a literature review discussing if the changes in regulations and disbursement amounts of unsubsidized government student loans affect home ownership rates through the lack of ability to take out mortgages within certain age groups. Next is a description of the methodology used from this study, including limitations due to data. The results and discussion follow outlining conclusions from the literature read and data analyzed. The final section presents suggestions for future research in higher education.

Literature Review

The U.S. government seems to have an interesting opportunity cost in the economy via the distribution of their federal student loans and the housing sector of GDP. So, it becomes a theory of trying to increase both. But what if the truth is, with current student loan policies, that this attempt at increasing human capital is affecting the housing market negatively. The government invests money by creating loans for students to take out so that they may go to college, increase their revenue, and altogether benefit the economy. Of course, this is only a benefit to the economy if the amount it is increasing the output per person outweighs the amount of debt they accumulate. Now despite an increase in income, how much of it transfers to disposable income? The issue visibly arises when someone cannot take out a mortgage or is even able to pay a down payment on a house. The opportunity cost now is not really an opportunity anymore, but a hindrance on the economy.

As it was discussed earlier, the housing market controls a large part of the U.S. economy, roughly 15 to 18 percent of GDP when all contributions are factored in (National Association of Homebuilders, 2017). Therefore, if there is a contraction within 15 to 18 percent of GDP, then this could possibly slow the U.S. economic growth. If this is true, action should be taken to aid the housing market in the event of certain factors affecting its growth.

Homeownership in the U.S. Economy: Unwanted Affects

The once broad question that undergraduate student loans have an influence on the U.S. economy, has now found a possible correlation between the housing market and student loan debt. Now, indirectly through the housing market sector of GDP, we can see a connection of how student loans impact a large part of the U.S. economy. When students take out federal loans

under the current federal policies that accompany them, they end up with a long-lasting debt that affects their decisions to become homeowners and is now becoming hard for anyone who earns the minimum wage to find safe, affordable housing since housing costs in most areas continue to rise faster than wages (Dickerson, 2016, pg. 444). This, in turn, can negatively affect GDP growth.

When someone does decide to enter the housing market they are now faced with paying off, or even qualifying for, a mortgage or paying off student loans. If the hypothesis of homeownership rates being impacted by these student loans is true, then the growth of 15 to 18 percent of GDP could, in reality, become a contraction. To follow the response that could come about from this theory, it is not the numbers that need to be looked at closely, but the direction of growth or contraction they take. Starting with initial GDP growth, the assumption that this issue could be widely overlooked is because of the other 82 to 85 percent that could and probably is accumulating growth. But the goal is not trying to prove that GDP is contracting but to prove that there is a large portion of it that is not reaching potential efficiency. As of 2017, the World Bank Group said that the current growth rate of the U.S gross domestic product was around 1.6 percent (Federal Reserve, 2016). This is not an impressive growth rate as far as the U.S. is concerned. Now take that 15 to 18 percent of this GDP, the housing market, growth could be negatively affected by through correlation of student loans. Referring to (Figure 1) below, the nearly 20 percent drop over past six years of homeownership is a drop of the housing market (Federal Reserve, 2016). Therefore, the possible impact and inefficiency of loans on GDP can be traced through the housing market.

Figure 1: Homeownership by Age 30

Homeownership by age 30

Source: Federal Reserve Bank of New York.
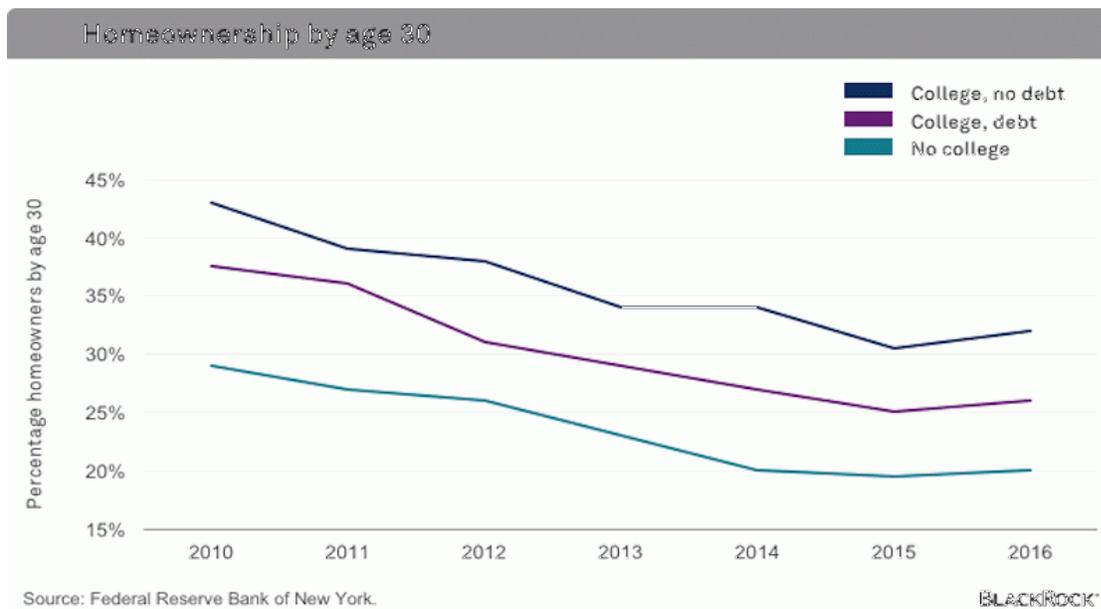
Of course, the government does realize, to a certain degree, the effects that student loans have on certain areas of the economy and do try to mitigate the force they may impose. One of the primary ways they try to lessen the negative load of loans is through loan forgiveness, including: Teacher loan forgiveness, Public service loan forgiveness, Income Driven Repayment, and military service (Student Loan Forgiveness, 2015). There are, however, certain eligibility requirements that these loan forgiveness plans have. For example, if one qualifies for the Teacher Loan Forgiveness Plan, teaching full-time for five complete and consecutive academic years in lower education schools and educational service agencies that serve low-income families, and meet other qualifications, you may be eligible for forgiveness of up to a total of $17,500 on certain federal student loans (Student Loan Forgiveness, 2015). Another prominent example for these requirements is for the Income Driven Repayment Plan. When paying back loans underneath this plan, however much of your balance remains on your student loans will be forgiven after you make a specific number of payments (Student Loan Forgiveness, 2015). One

8

will probably qualify for an income-driven repayment plan if one's outstanding federal student loan debt is greater than one's annual income or if it represents a large portion of your annual income. These forgiveness plans may help in small ways, though they do not solve the problem.

Dickerson says, "Given the labor market prospects young adults are facing and their higher student loan debt burdens, overall homeownership rates likely will remain low unless this country's leaders are willing to admit that the nation is facing a housing affordability crisis that affects both potential homeowners as well as struggling renters" (Dickerson, 2016, 455). The issue not only becomes about repaying the loans, but how people cannot even save up for a place to live.

A Background of Student Loans and Disbursement Requirements

When a student takes out an education loan they are faced with different options when acquiring said loan. The first distinction of student loans is from where they can be obtained. The two different types of procurement are private or federal loans. On the one hand, private loans are a financial option that are acquired from an institution that is not federally funded. These loans tend to be second option to federal loans because their interest rate is flexible and can sometimes be raised over the payment period, potentially hurting the borrower in the long run (Interest Rates and Fees, 2017).

On the other hand, are federal loans. There are two types of federal loans, subsidized and unsubsidized. The preferable option is a subsidized loan. This loan is based on one's financial need and is only available to undergraduate students. With subsidized loans the government does not usually charge interest under the following circumstances: while students are in school, for the six months after the student leaves school, during a period of deferment, and, sometimes,

during repayment under an income-driven repayment plan. The student's school determines the amount that can be borrowed and that amount may not exceed one's financial need or the limit set on how one can borrow per year and total over the course of an undergraduate degree. The other type of federal loan is an unsubsidized loan. Unlike subsidized loans, a student can qualify for unsubsidized loans, regardless of income or financial need, which are available to graduate and undergraduate students (Interest Rates and Fees, 2017). These loans can be dangerous as the government charges interest from the time the loan is disbursed throughout the life of the loan. Regardless of whether one paid during or later in one's academic career, unsubsidized loans are still compounding interest during the entirety of that time. Again, the student's school determines the amount that can be borrowed based on one's cost of attendance and the other limit set on how much one can borrow per year and as well as the total amount borrowed.

One of the factors in government debt regarding student loans is in fact a grant called the Free Application for Federal Student Aid (FAFSA). FAFSA is a grant for up to five years, of approximately $6,000 a year, that is offered to every college student that is eligible based on their financial need (Interest Rates and Fees, 2017). This is not a loan but a grant from the government, money given without the expectation of repayment. Although this has only a positive effect for the student, it is a $46 billion-dollar expenditure on the economy every year with no hope of repayment (Interest Rates and Fees, 2017). Due to this fact, with no expectation of repayment, it is not figured into the National Student Loan Debt. The concern about the economy is whether or not it is a viable investment. In other words, is the return of human capital worth the cost? This is not something that is addressed in regard to the benefits and detriments of student loans, but should still be considered when factoring in the economic cost.

The Shift from Subsidized to Unsubsidized Undergraduate Student Loans

In the last two decades, a major shift from subsidized federal loans to unsubsidized federal loans has been noticed. This has most likely been caused by the exponential growth in students attending college. Thus, the high influx of new students has created a high demand for student loans and since schools, regulated by the government, are only allowed to disburse a certain amount of student aid in subsidized loans, the students then must take out higher amounts in unsubsidized loans. As depicted in (Figure 2) (Federal Reserve, 2016) the transition in the last two decades shows the percentages between the two loans almost switching places (Interest Rates and Fees, 2017).

**Figure 2: Loans in Billions of 2015 Dollars**
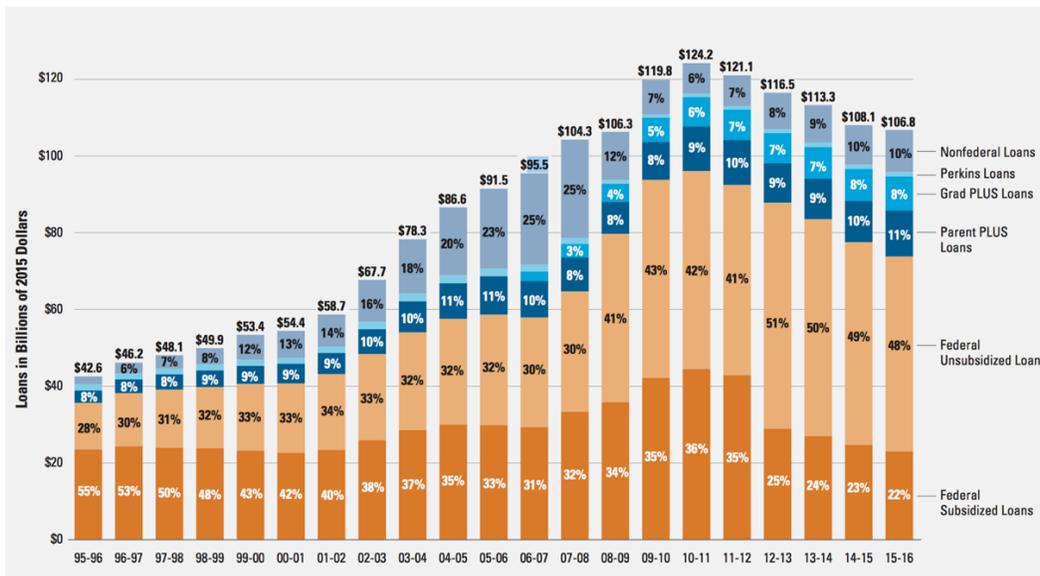
This becomes a problem because the rising percentage of unsubsidized loans has negative effects on students, due to worsening terms, such as the lack of grace periods and immediate build up of compounding intertest (Interest Rates and Fees, 2017).

According to the Federal Reserve Bank of New York, the outstanding value of student loan debt, in the United States, lies between $902 billion and $1 trillion with around $864

billion in Federal student loan debt. As of the first quarter in 2012, the average student loan

balance for all age groups was $24,301. This is roughly 44 Million people that average around

70% of college students (Federal Reserve, 2016).

One of the problems we are faced with is not, per say, the numbers of the loan debt, but

the increasing numbers of students taking them out and the possible negative effects that they

may cause through delinquency. More people are now pursuing college because it is becoming a

necessity (Dickerson, 2016). A college degree is still a must for ensuring better future

employment and higher income. Those without higher education face higher unemployment rates

and lower earnings potential, as (Figure 3) below illustrates. Some who cannot afford college

without loans, however, may be discouraged from seeking a higher education due to the even

higher cost of a degree when loan burdens are factored in (Bureau of Labor Statistics, 2017).

Figure 3: Earnings and Unemployment Rates by Educational Attainment, 2016
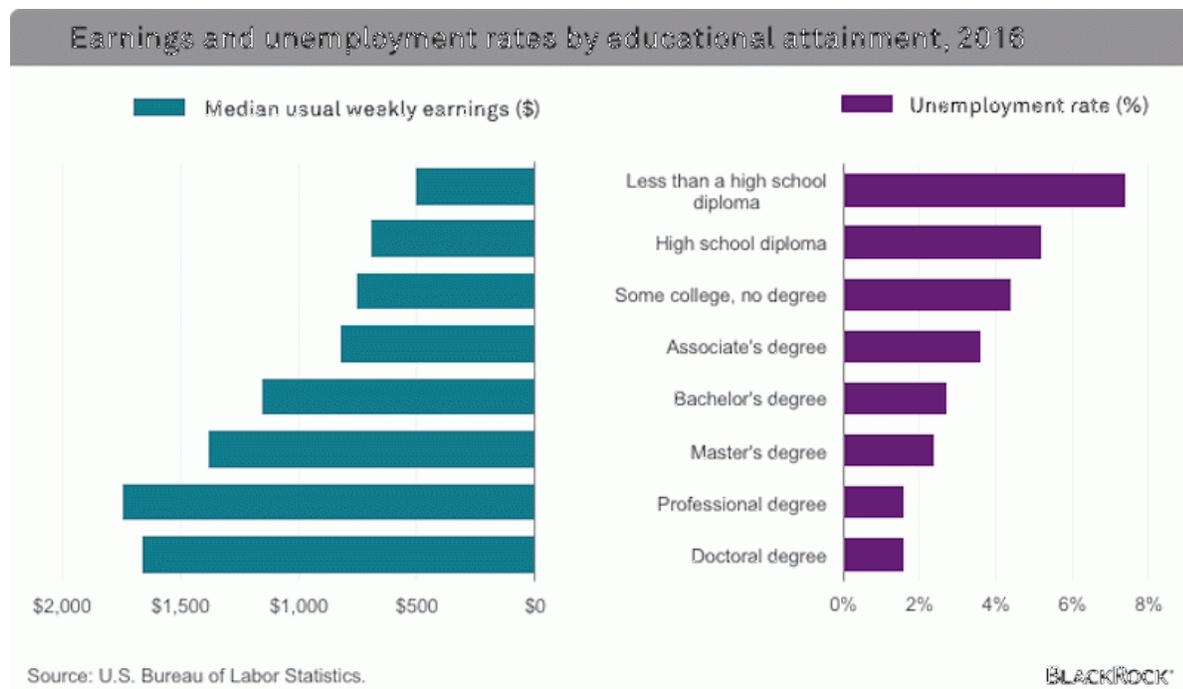
One of the main factors that is causing this epidemic is the fact that over the past few

decades to the present, tuition, of universities and colleges, has been increasing exponentially

faster than the amount of aid these institutions are able to offer students. Mechele Dickerson

(2016), professor at the University of Texas, says "Because costs have increased but financial

support, including federal Pell grants for low-income students, has not kept pace, the total

volume of student loans and the percentage of undergraduate students who took

out student loans has increased dramatically since 1980" (pg. 453). As displayed in (Figure 1),

the amount of loans has nearly tripled in the past 20 years. This amount becomes an issue for the

economy on a per capita level when early borrowing prohibits next-stage life events.

Homeownership Rates and the Groups Affected

According to the U.S. Census Bureau, the home ownership rate in the U.S. has fallen

each year over the last six years (Bureau of Labor Statistics, 2017). If the home ownership rate is

falling, the housing market, despite a solid economic recovery from the 2009 housing crisis, is

going to affect the GDP. One potential explanation behind the declining home ownership rate is

student loans, which makes it harder for first time home buyers to make a home investment. As

seen in (Figure 1) (Federal Reserve, 2016), the home ownership of people under 30 years of age

with college debt has dropped from around 44 percent to nearly 25 percent (Federal Reserve,

2017). That is nearly a 20 percent drop in homeownership over a six-year period leading close to

current date. Dickerson (2016) says, "While millennials ostensibly should have more income

they can save to make a down payment on a home, it is harder for them to save enough to buy a

home or, increasingly, to even find affordable rental housing because of student loan debt and

jobs that pay relatively low wages" (pg. 455). So, if these facts hold true for homeownership and

student loans, we may be seeing a negative and hurtful correlation between the two.

Alternative Views

However, many others have a different opposing view on the millennial housing market. A recent article published by the *Wall Street Journal* said that millennial housing was at an all-time high. The Census Bureau reported that ownership increased to 63.7 percent in the second quarter of 2017 (National Association of homebuilders, 2017). The general consensus is that millennials have a later marriage period ranging now around their late 20's. As these young adults reach that period of settling down and starting to raise a family, the housing rate is spiking. Over the last six years, the U.S. Census Bureau reports that the multifamily housing units under construction have increased from a little under 200,000 to just a little above 600,000 (Kusisto, 2017). This is an extensive increase and could possibly have been brought about by the exponential increase in college graduates over the past few decades. Wall Street continues to watch the demographic trends that may further affect this market, such as millennial marriage rates (Kusisto, 2017). The question to ask though is how long can these millennials hold on to this housing? It very well may concern some of their outstanding student loans and how effective they are at keeping pace with them.

Methodology

The purpose of this thesis is to look at the relationship between unsubsidized Stafford loans and homeownership rates in the United States. After careful consideration a selection of independent variables were selected to test the hypothesis. The data set for this study was not prearranged. To create a new testable data set, data was collected from a number of sites including the Federal Reserve, The College Board, Bloomberg, Forbes and Freddie Mac. The first step in moving forward with combining these data sets was to format them in comparable ways. All data sets used have a twenty-seven to twenty-eight year span starting in 1990 with data frequencies of monthly, quarterly and annual bar delinquency rates which were only available between 1995 and 2011. The relevance of the timespan selected was due to the undergraduate educational independent variables which will be discussed later in the relevant variables section.

The collected data sets had two main format issues that prohibited them from tying together including frequency of data and standardizing the dollar amounts and years. A macro approach was decided based on the availability of data and time constraints. Since the predominant frequency of the data was annual, all others were converted from monthly and quarterly data. If data was presented in quarterly numbers, then an average was taken to obtain annual throughout the years. To keep methods consistent if the set provided monthly data then it would be averaged into quarterly and then annual. In order to explain results in the most relevant terms all data sets were standardized to 2018 dollars from 2016 and 2017 using averaged inflation rates between the one and two year gaps within their respective sector.

Relevant Variables

  To obtain a relevant answer when testing the independent variables, four independents were selected as controls for homeownership rates. The first control selected was Median Income. This control was selected under the general assumption that as median income increases general purchasing power increases and therefore more opportunities to purchase a home. The official data set used was obtained from the Federal reserve as the Real Median Household Income in the United States collected on an annual basis in 2017 dollars. The data was presented in annual averages but still needed to be converted into 2018 dollars. Using a CPI Inflation Calculator from the Bureau of Labor Statistics, a general inflation of 2.44% was found to have happened between the years of 2017 and 2018. Using the already standardized 2017 data, the Median Income was converted into 2018 dollars.

  The second independent control selected was mortgage rates for homes across the United States. The rationale behind this control is as higher accessibility to mortgage loans increase, homeownership rates should be affected positively as well. The official data set was the conventional single-family, fixed-rate mortgages collected on a monthly frequency in current 2018 dollars from the Federal Housing Finance Agency. The parameters for mortgage rates were selected due to the macro nature of the paper and other variables. To standardize the data the months were first converted into quarterly averages to remain consistent with conversions of other quarterly data and then averaged to annual.

  The next control selected was Federal Student Loan Default Rates for delinquency after two calendar years in annual rates. These default rates were selected to observe that as federal student loans default that homeownership rates will decrease in response. This can be attributed

to the bad credit history that will affect later borrowing and purchasing power. It should be noted data for this variable was only available 1995 and 2011 when running regressions.

The last control used was Median Sales Price of Houses for the U.S. as a national average in 2018 dollars. The data is collected on a quarterly frequency by the Federal Reserve's Economic Research Division. To adjust the frequency of data, the quarterly data was averaged into annual for accuracy in results. This variable was selected to show a direct relationship with homeownership rates. As the economy can be reflected through housing prices, the homeownership rates should increase with the median pricing of homes.

After the controls were selected other affecter variables were selected due to their significance by running different models. Many different models and variables were considered when selecting the following for the model being used but because of certain limitations the following independents were chosen.

The first predictor of homeownership rates that was selected was undergraduate Stafford unsubsidized loans. This variable is at the center of the study of whether it is a successful predictor of a decrease on homeownership rates. Unsubsidized loans were selected to show that the unprecedented rise in need for student loans in the United States is having a negative effect on the housing market at an aggregate level. The data was collected by the College Board in annual 2016 dollars at a national level. To normalize the data, an average inflation rate was calculated from an education inflation index between 2016 and 2018. The educational inflation average was found to be 63.10% which is significantly higher than the general inflation for these years which was 2.29% as an average. The literature would agree the cost of education has been rising exponentially over the last twenty to thirty years and should be noted.

The second predictor selected was undergraduate federal Pell Grants collected on a national annual level from the College Board in 2016 dollars. The same averaged educational inflation of 63.10% was applied to the data to integrate into 2018 dollars. Subsidized loans were discussed as a possible predictor but were determined to be well represented within Pell Grants. This Predictor was selected to encompass the positive effects federal grants and subsidized loans have on homeownership rates.

The last predictor chosen was Median Tuition. The data encompasses the tuition, fees and room and board. The Data was collected annually as an average of undergraduate four year public institutions. As the median tuition of an institution increases, the average purchasing power goes down increasing the need for earlier borrowing. The relationship should be inverse with homeownership rates for this reason.

With the model's variables now presented, the next step is to explain the equation in use, the coefficients of the independent variables and their connection to homeownership rates.

Equation and Explanation of the Model

$Homeownership\ Rates$

$$= 0.72599 + 2.14e^{-13}(Unsubsidized\ Loans) + 4.19e^{-13}(Pell\ Grants)$$

$$- 0.00001(Median\ Tuition) - 0.28139(Default\ Rates)$$

$$- 0.32445(Mortgage\ Rates) + 3.24e^{-7}(Median\ Income)$$

$$+ 7.36e^{-7}(Median\ Home\ Prices)$$

The equation presented above is the result of the Stata regression analysis. A quick look at the coefficients and their significance shows for every dollar or percentage change in the

variable there is a relative coefficient change to U.S. homeownership rates. The constant 0.72599 represents the Y Intercept and an increase of 0.7% in U.S. homeownership rates. For every $1.00 increase in Unsubsidized Loans, there is a $2.14e^{-13}$ percent increase in homeownership rates. For every $1.00 increase in Pell Grants, there is a $4.19e^{-13}$ percent increase in homeownership rates. For every $1.00 increase in Median Tuition, there is a 0.00001 percent decrease in homeownership rates. For every 1.00% increase in Default Rates, there is a 0.28139 percent decrease in homeownership rates. For every 1.00% increase in Mortgage Rates, there is a 0.32445 percent decrease in homeownership rates. For every $1.00 increase in Median Income, there is a $3.24e^{-7}$ percent increase in homeownership rates. For every $1.00 increase in Median Home Prices, there is a $7.36e^{-7}$ percent increase in homeownership rates.

Limitations

One of the biggest limitations of this study came in the form of extreme multicollinearity amongst the data collected. Efforts were made to try and correct the multicollinearity found between most variables. To begin, certain variables were included and excluded to create different scenario models. After working down to relevant p-values within the model used, the multicollinearity still remained. After review, the multicollinearity error was deduced to be caused by the aggregate level of the data collected. Therefore further studies should take into account the observation that collecting non-aggregated data and including other variables such as age, ethnicity and region could help improve the study.

Another area of limitation was the data available to be collected within the time frame of the study. This study was able to gather roughly 30 years of annual data but could benefit from a more concise data set. Another suggestion regarding the time would be to stagger certain

variables. This idea comes from the observation that most undergraduate students taking out student loans will not be immediately purchasing a home for a number of years after taking the initial loans. By staggering the data four to six years could provide a more accurate model and results. Moving on, the next section will be discussing the analysis and results of the model above, the literature will be compared, discussed and analyzed.

Analysis and Results

This next section will discuss the different analyses used and the results that followed. The regression used in this analysis was a linear regression, more specifically an OLS (Ordinary Least Squares). This principle used is minimizing the sum of the squares of the differences between the observed dependent variable (values of the variable being predicted) in the given dataset and those predicted by the linear function. The choice comes from the data used in this study. Since the data is quantitative and discrete in nature, a OLS regression is the best fit. The data qualifies for these labels due to the measurements used and the countability of the dollar and percentage amounts.

Before reviewing the results of this study, one limitation must be restated. The dataset suffered severe multicollinearity amongst the independent variables used in the model. Multicollinearity can increase the variance of the coefficient estimates and make the estimates very sensitive to minor changes in the model (Davidson and MacKinnon, 2009). The result is that the coefficient estimates can be unstable. Attempts to solve the error were put into place. A correlation matrix was run to review the problem variables. The issue seen in the matrix was extreme correlation between all variables used. After removing some of the less relevant variables, the multicollinearity was improved but still present. The problem was deduced to be the dataset collected. Due to the large amounts and aggregate level of the data, the regression was picking up the multicollinearity at the macro level. The conclusion of this limitation is to be skeptical of the high R^2 value and do not take it at face value.

The following figures and results are a product of the national aggregate data collected for the purpose of studying the transition and effects of Federal Stafford loans and other possible predictors on U.S. homeownership rates. The first result to examine would be the R^2 value. For

the model used in this study, the R^2 value was 0.9731 or roughly 97.31%. At first glance this appears to be a good fit model and account for almost all of the variance in the dependent variable. But, as mentioned before, the model does suffer from multicollinearity. To understand what is happening the residuals were plotted against the fitted values. The graph in (Figure 4) presented below shows how the models residuals are under and overestimating even though the R^2 value says the variance is accounted.

Figure 4: Fitted Values vs. Residuals
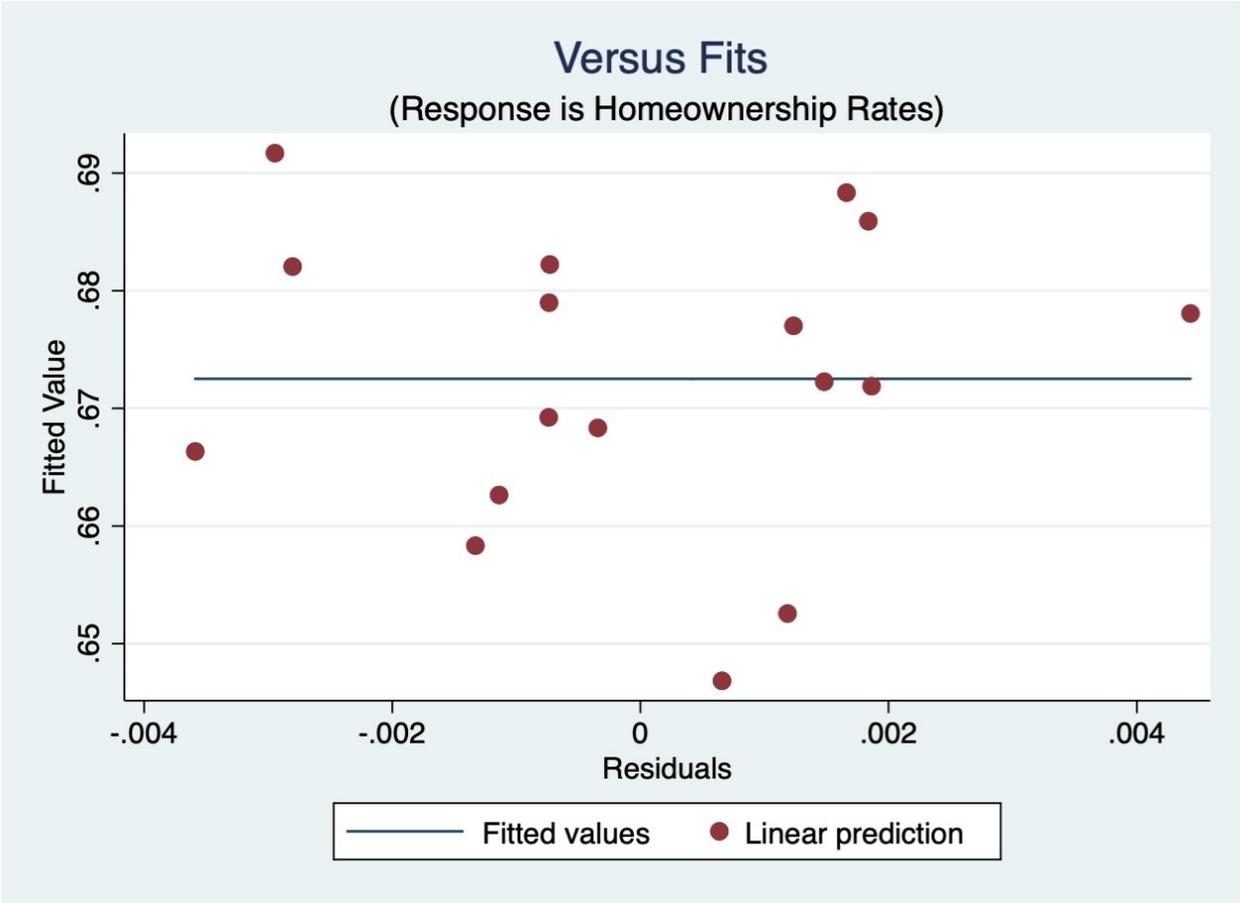
This figure is one way to visualize the multicollinearity in the aggregate data collected for the study. This does not immediately register the model useless but must be noted and kept in mind while going forward reviewing other results. A statistic to help evaluate the significance of the R^2 value is the P-value from the F-test. The F-test evaluates the null hypothesis that all

regression coefficients are equal to zero versus the alternative that at least one is not. Another way to understand the F-test is it determines whether the proposed relationship between the response variable and the set of predictors is statistically reliable. With a P-value of 0.0000, the null hypothesis can be rejected and the observed R^2 value is reliable the predictors are significant in some way. Next, the results of the different predictors and their significance to homeownership rates will be discussed.

Table 1: United States National Homeownership Rates and the Effects of Unsubsidized Loan and other Predictors

Variable	Model 1	
	COEFF	95% CI
Median Home Prices	$7.36e^{-7}$***	[4.50e-07, 1.02e-06]
Median Income	$3.24e^{-7}$	[-1.27e-06, 1.92e-06]
FR Mortgage Rates	-0.32455	[-0.95877, 0.30965]
2Y Default Rates	-0.28139*	[-0.51093, -0.05185]
Median Tuition	-0.00001**	[-0.00002, -6.04e-06]
Pell Grants	$4.91e^{-13}$*	[7.11e-14, 9.12e-13]
Unsubsidized Stafford Loans	$2.14e^{-13}$	[-6.00e-14, 4.88e-13]

Note. COEFF = Coefficient; CI = Confidence Interval; FR = Fixed Rate; 2Y = Two Year
*p<0.05; **p<0.01; ***p<0.001

The results above are produced by running an OLS regression and finding the line of best fit for the selected model. First, there are a couple test and figures that will be analyzed with each independent variable. The first is the t-statistic. These are the t-statistics used in testing whether a given coefficient is significantly different from zero. The next related test is the P-value. This statistic shows the 2-tailed p-values used in testing the null hypothesis that the coefficient is 0.

Using an alpha of 0.05 as the standard with anything greater not showing great significant. Now the results of each variable will be discussed and compared to the literature.

The first variable to look at is the Real Median Home Prices in the United States. This control had a coefficient of $7.36e^{-7}$ which means for every dollar increase there is a subsequent increase in percentage of homeownership rates. A t-statistic of 5.82 is a good start to showing significance. The P-value is the indicator of significance and must be looked at to support the t-statistic. With a value of 0.000 this shows the greatest significance, is sufficient to reject the null and show Real Median Home Prices having a greater than zero effect. Real Median Home Prices showing a direct correlation follows the hypothesis described previously in the methodology section. The control might be expected to provide inverse results but for this study can be interpreted as the health of the economy. As the economy grows, so does homeownership rates. This can be related back to the literature discussing U.S. GDP and how homeownership rates affect it on a larger scale. This variable can show as the median price of homes increase, a respective increase in U.S. GDP, economic growth, can be seen through homeownership rates.

Another variable observed was Real Median Household Income for the United States with a coefficient of $3.24e^{-7}$. This number describes for every dollar increase in Median Income there is a $3.24e^{-7}$ percent increase in homeownership rates. The t-statistic for this variable was 0.46, a relatively small value. The P-value result was 0.656 revealing Real Median Income has very little significance for the model used in the study. The positive coefficient result would agree with previous literature that as average Household Income increases the average purchasing power should increase as well. The rate Median Income has increased over the decades has been slow and the stagnated growth is a possibility for the lack of significance. Dickerson (2016) says it best when discussing how wages, Real Median Income, has been

increasing slower than the prices of homes (pg. 444). As Real Median Income increases, the disparity between income and homeownership becomes smaller due to easier purchasing power.

The next variable discussed had interesting findings as a control. The interest comes more from the significance than correlation. Fixed Rate Mortgage Rates for homes across the U.S. had a coefficient effect of -0.32455 with very little significance towards the model. The t-statistic found was -1.16 with a less than significant P-value of 0.277. These statistics provide enough information to reject mortgage rates as a significant predictor for homeownership rates. Although the data might say otherwise via the significance of the model, the correlation hypothesis discussed in previous sections is seen through the inverse relationship between Mortgage Rates and homeownership rates.

The next variable used as a control had certain limitations when compiling the data set. The Two Year Default Rates for undergraduate student loans had a limited time frame for collection. Even though the data was only available between 1995 and 2011, the results were surprisingly relevant towards the study. With a t-statistic of -2.77 and a corresponding P-value of 0.022, a significant inverse relationship can be observed. This control was selected to view the negative long term effects on homeownership rates which can be derived from defaulting on undergraduate student loans. The coefficient, -0.28139, for this control is significantly relevant for this model to predict for every dollar increase in Default Rates there is a -0.28139 percent decrease in homeownership rates. The literature review would agree with findings describing that any default in debt payments will result in difficulty acquiring loans in the future. This affect in homeownership rates can be explained through the difficulty of acquiring a new mortgage loan.

The next predictor analyzed was Median Tuition for public four year institutions across the United States. The tuition consists of tuition and fees and room and board. Median Tuition had relatively high significance for the resultant coefficient -0.00001. The significance is observed with a t-statistic of -3.94 with a P-value of 0.003. These statistics reject the null and verify the predictor as having a significant effect on homeownership rates. Dickerson (2016) agrees the exponential increase in college tuition is driving a higher demand for student loans as a whole (pg. 453). The exponential increase in tuition is having a negative effect on homeownership rates. As Median Tuition increases, it causes a disparity in borrowing later which effects homeownership rates.

Pell Grants is the last relevant predictor to be discussed. After reviewing the literature, Pell Grants as a predictor encompasses both itself and Subsidized loans. This analysis comes from the observation that the majority of students who qualify for Pell Grants are also as likely to be a receiver of Subsidized loans. Pell Grants had a coefficient of $4.91e^{-13}$ meaning that for every one dollar increase in this predictor is a $4.91e^{-13}$ percent increase in homeownership rates. The t-statistic for this coefficient is 2.65 and a P-value of 0.02 giving this predictor significance to the model. The hypothesis shift from subsidized to unsubsidized loans can be seen within Pell Grants positive correlation. This makes sense according to Dickerson (2016) that Pell Grant disbursements have not increased at the same rate as need (pg. 453). As aggregate subsidized loans and Pell Grants have decreased so does the effect on homeownership rates. The connection between the dependent and predictor analyzed should be noted and related to the shift in proportion in federal loans.

On a last note, the results of Unsubsidized Loans and the relevance to the study will be discussed. Unsubsidized Loans had a coefficient of $4.91e^{-13}$ meaning that for every one dollar

increase in Unsubsidized Loans is a $2.14e^{-13}$ percent increase in homeownership rates. The

relevance to the model used was proved insignificant with a t-statistic of 1.77 and a respective P-

value of 0.111. These results show a positive relationship with homeownership rates which is

contrary to the literature review. As seen in (Figure 2) and stated by the Federal Student Aid

(2017), the immediate buildup of compounding intertest creates a worse position for students

trying to pay the loans off. This in theory should make purchasing a home more difficult due to

the increase in loan amounts and respective payments. The model used, using aggregate data,

may have had issues depicting the larger numbers. Next the conclusions of this study will be

presented with suggestions for future studies on the subject.

Conclusion

This study has looked at the proportional change in federal undergraduate student loans and the specific implications and effects they have on United States homeownership rates. A review of the literature on different types and disbursement amounts regarding undergraduate Stafford loans was addressed and examined the differences between Subsidized and Unsubsidized loans. The trend of homeownership rates and their general effect on U.S GDP was discussed and the relevant portion of GDP they indirectly affect. The data set had to be assembled from different sources with data ranging from 1990 to 2018 being collected at an aggregate level. To examine the correlation between the three variables (unsubsidized loans, subsidized loans, and homeownership rates), an OLS regression was run. In order to perform the regression, the data was normalized to yearly data points and the values to 2018 dollars and percentages.

Due to constraints, the results collected from this study had to be analyzed with severe multicollinearity and a restricted time frame. These constraints were embedded in the aggregate data collected and proved difficult to remove. After discussing the results, suggestions for future studies will be provided.

The predictor variables and their results are provided in Table 1 within the Analysis and Results section. The results of this study help to break down student loans, subsidized and unsubsidized, and the relevant effects on U.S. homeownership rates along with other relevant predictors. The study used Median Home Prices across the U.S., Median Household Income within the U.S., Fixed Rate Mortgage Rates for 30 year mortgages, Two Year Default Rates for undergraduate student loans, Median Tuition for public four year institutions, Pell Grants and Unsubsidized Stafford Loans as predictors for Homeownership Rates. Not all the predictors had

significant effects on the dependent variable such as Median Income, Mortgage Rates, and contrary to the hypothesis, Unsubsidized Stafford Loans.

The results of this study found contrary evidence for the model used that Unsubsidized Stafford Loans have no significant correlation with U.S. homeownership rates. This result was close to being significant and is still relevant via the literature review. Further studies in accordance with the literature gathered could help to show a negative correlation with homeownership rates.

Through Pell Grants Subsidized Loans were observed as having a positive relationship with Homeownership Rates. This result was translated as Pell Grants, and subsequently Subsidized Loans, increase, then the amount of debt taken out earlier is lessened and helps for future borrowing. As the debt earlier on is lessoned by grants and better rates to borrow at, then the opportunity to borrow later is seen in a rise in Homeownership Rates.

Despite results, this study should continue to be explored with the possibility of creating a new model and adding other relevant predictors. Areas for future research include other possible variables which could be introduced to and improve the model including ethnicities, age groups, and regions amongst borrowers. This would help narrow other areas for variance and include important factors that are unique and important to the size of the United States.

This study is important to continue researching and talking about government educational support versus post-graduation economic mobility. The necessity for economic growth per capita is essential to U.S. GDP. The aggregate number at which student loans are being taken out is a unsustainable for proper growth in homeownership and post-graduation economic mobility.

References

Board of Governors of the Federal Reserve System. Retrieved November 13, 2017, from

    https://www.federalreserve.gov/publications/2017-economic-well-being-of-us-housholds-

    in-2016-education-debt-loans.htm

Davidson, R., & MacKinnon, J. G. (2009). *Econometric theory and methods*. New York, NY:

    Oxford Univ. Press.

Dickerson, A. M. (2016). Millennials, Affordable Housing, and the Future of Homeownership.

    Journal Of Affordable Housing & Community Development Law, 24(3), 435-465.

Dornbusch, R. (2017). *Macroeconomics.* New York, NY: McGraw-Hill Education

Friedman, Z. (2018, October 26). Student Loan Debt Statistics In 2018: A $1.5 Trillion Crisis.

    Retrieved from https://www.forbes.com/sites/zackfriedman/2018/06/13/student-loan-

    debt-statistics-2018/#3e053f3f7310

Housing's Contributions to Gross Domestic Product (GDP). (n.d.). Retrieved November 13,

    2017, from https://www.nahb.org/en/research/housing-economics/housing-economic-

    impact/housing-contributions-to-gross-domestic-product-gdp.aspx

Inflation Rate for Education between 2016-2018. (n.d.). Retrieved from

    https://www.officialdata.org/Education/price-inflation/2016-to-2018?amount=1

"Interest Rates and Fees." (August 03, 2017). Federal Student Aid. Retrieved November 07,

    2017. http://studentaid.ed.gov/sa/types/loans/interest-rates#rates.

Kusisto, L. (2017, November 7). Millennial Home Buyers Send a Chill Through Rental Markets.

    Retrieved November 13, 2017, from https://www.wsj.com/articles/millennial-home-

    buyers-send-a-chill-through-rental-markets-1510056001

Student Loan Forgiveness (and Other Ways the Government Can Help You Repay Your Loans).

(2015, June 05). Retrieved November 13, 2017, from

https://blog.ed.gov/2015/04/student-loan-forgiveness-and-other-ways-the-government-

can-help-you-repay-your-loans-3/

U.S. Bureau of Labor Statistics. (n.d.). Retrieved November 14, 2017, from https://bls.gov/

(n.d.). Retrieved from https://www.bloomberg.com/news/articles/2019-01-16/high-student-debt-

is-driving-low-millennial-homeownership-rates

Tuition and Fees and Room and Board over Time. (n.d.). Retrieved from

https://trends.collegeboard.org/college-pricing/figures-tables/tuition-fees-room-and-

board-over-time