# How Does Student Debt Affect Household Formation?

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**Abstract:**

This paper investigates the impact student debt has on household formation. In order to determine what the impact is, an existing model around household formation was used and that model expanded it to include additional variables in order to add student debt into the model. Overall student debt at the individual and household levels has increased tremendously in the last 30 years. With student loan debt taking up a greater share of income for individuals and households, this research seeks to demonstrate that as student loan debt increases, the rate at which households are formed decreases. The findings of this analysis were that student debt does indeed influence household formation.

JEL Classification: I21, I22, I23, C51
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## 1.0 INTRODUCTION

Over the last several decades, the amount of debt students have incurred has increased tremendously. Due to the rising costs of education, students are now burdened with borrowing more money than before in order to finance their educations. Unlike other debt that is typically gained in exchange for a good, such as a house or a car, education loans are more of an investment in the future with no tangible goods exchanged. Also, unlike any other type of debt, it is debt that will continue no matter the circumstances with the individual throughout his or her life as one cannot default on student loans and debts.

This study aims to enhance the understanding of the effect student loan debt has on household formation. Significant research has been conducted around the amount of student debt. The findings have all concluded that the average student debt has increased significantly over the last three decades. If the amount of average debt increases and the number of graduates leaving college with debt is also increasing, then those two factors are going to have a substantial impact on the students' ability to form new households. The Wall Street Journal defines a household as forming "when an adult leaves the home of another adult and finds his or her own place" (Morath 2015). Adults with large amounts of debt may be slower to move out on their own. As one reporter noted, "More formation is good news. It suggests more people getting jobs, getting apartments, getting married, having kids" (Thompson 2012). It is critical to understand how the presence of student debt affects all of these major life decisions that will ultimately influence an individual's or a couple's decision to form a household.

This paper differs slightly from the focus of most other research on student loan debt impacts. This fairly unexplored area of research is around how student loan debt impacts housing formation. Housing formation, in this instance, is defined as the change in housing units over time and thus requires the addition of other factors during analysis. Other factors critical to understanding household formation include the marriage rate, number of births, and unemployment. This study looks at the possibility of a correlation between average debt of graduates and the factors of household formation. Following that analysis, it then seeks to examine how it influences household formation itself. Finally, it looks at the relationship of the factors within household formation. There has been little

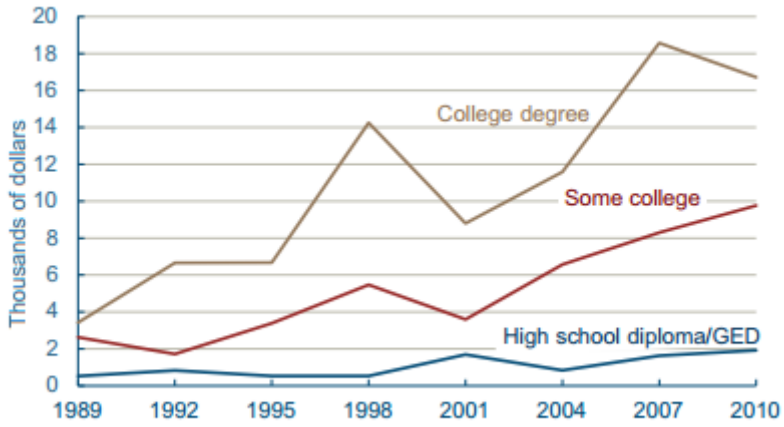
empirical work that focuses on all aspects of research relating student debt and household formation. This paper successfully fills this void.

The rest of the paper is organized as follows: Section 2 gives a brief literature review. Section 3 outlines the empirical model. Data and estimation methodology are discussed in section 4. Finally, section 5 presents and discusses the empirical results and section 6 a simulation and its results. This is followed by a conclusion in section 7.

## 2.0 STUDENT LOAN DEBT TRENDS AND HOUSEHOLD TRENDS

**Figure 1** shows the increasing trend of incurring debt for both those who attend but do not complete college degrees and those who complete college degrees. Since the late 1980s, those who receive college degrees have increased their amount borrowed significantly. According to the graph, in 1989 the average student loan debt was under $4,000 and by 2010, the average had increased to over $16,000 (Carroll and Higgins 11). Even those individuals who attend college but never graduate have seen a substantial increase in the amount of loans taken out. This graph clearly displays the rising issue and severity of student loan and debts incurred.

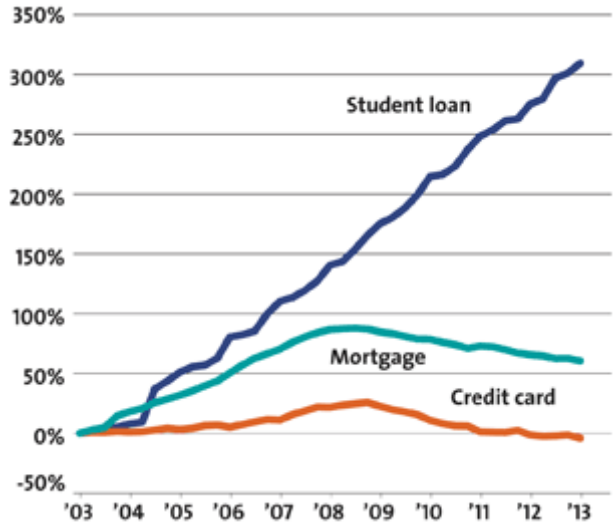
**Figure 1: Average Student Loan Debt**




Source: Carroll and Higgins

**Figure 2** shows how student loan debt is increasing not only at the individual level, but at a macroeconomic one as well. As of 2013, the total student loan debt was nearly $1 trillion, "310% more than a decade ago" (Gilson 5). As shown in this figure, student loan debt is now substantially larger than both mortgage and credit card debt. This is a bit of an alarming trend because mortgage and credit card debt, as shown in this figure, peaked in the 2008-2009 timeframe while student loan debt has been skyrocketing since 2004.

**Figure 2. Change in Total Amount of Debt Since 2003**




Source: Gilson

**Figure 3** displays the overall trend of the percentage of individuals who have incurrent student debt is increasing. As shown in the graph, in 1989 approximately 16% of individuals had student debt. That number has grown to 37% by 2010, a mere 21 years later (Fry).

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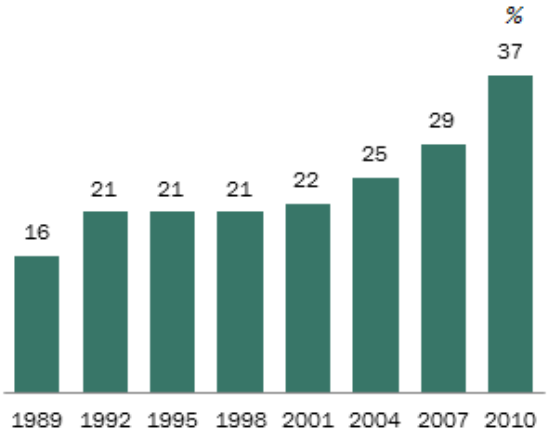
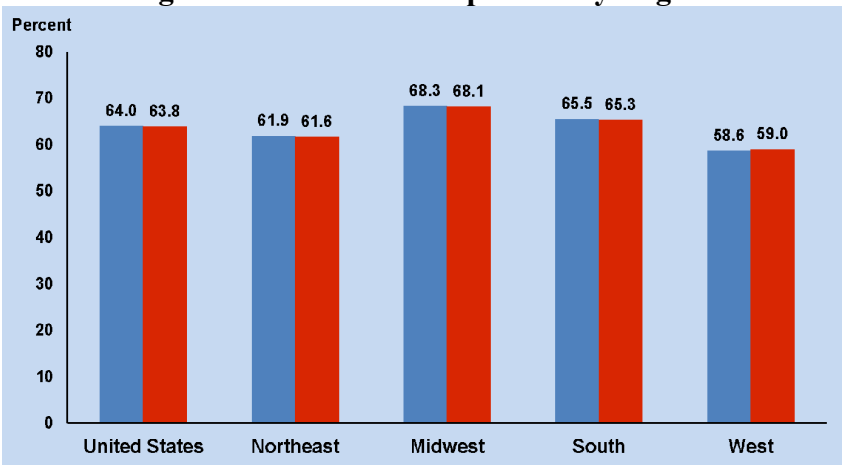
**Figure 3. Record Share of Young Households Owe Student Debt**




Source: Fry

**Figure 4** shows how, even in the span of one year, the homeownership rates of most regions of the US declined. This graph demonstrates how volatile the housing market is, which suggests that multiple kinds of variables like student debt and birth rate could be influencing the rate of homeownership.

**Figure 4. Homeownership Rates by Region**




Source: Census Bureau

## 3.0 LITERATURE REVIEW

Student debt is a growing trend, in research conducted by William Elliot and IlSung Nam, they found that "the average total household outstanding student loan debt in 2007 was $23,349 and rose to $26,683 by 2010" (2013). They also found that, depending on

household income, the percentage of income student debt takes up changes tremendously as household income changes (Elliot and Nam 406). While the exact calculations of how much debt students took on are slightly different, Daniel Carroll and Amy Higgins also found that student debt rose tremendously in the early 2000s. The research found that there was "nearly a 400 percent increase" during this time (11). Their findings also reveal that it is not just college graduates who are taking out substantial portions of debt. This increase in overall education debt reduces the amount of discretionary income individuals have once the loans are due. Another researcher, Gilson, notes in the results of his research that "larger student debt burdens are making it harder for recent college graduates to get home loans" (5). If it is becoming harder for recent college graduates to get home loans, then they may be hesitating to form new households altogether due to financial difficulty.

In terms of overall impact on the economy, the impact student debt has is growing. One researcher notes that "high student debt levels could 'lead to dampened consumption,' and the Consumer Financial Protection Bureau warns that unpaid student loans 'could be a drag on the recovery'" (Gilson 5). The number of individuals graduating with debt is also seeing a large incline. Richard Fry notes that, in terms of student debt, we are at "the highest share on record" (para 1). If the trend is that more and more students are graduating with debt, and it has been established that those graduating with debt are finding it harder and harder to get home loans, then this trend in decreasing household formation in recent college graduates is going to continue. Another realization that may be complicating this idea is that people are believing it less and less likely to afford college. In another research initiative, Mike Konczal notes that "self-identified middle-class people thought 'being able to pay for their children's college education' was the least realistic possibility in their economic future" (2015).

While there is much research including household rates, there is not quite as much on the actual household formation. A study completed by Jaclyn Hood is one particular research effort that focused primarily on "The Determinants of Home Ownership" (1999). In this study, Hood tested multiple factors including family income, race, gender, education attainment, parental home ownership, age and marital status to evaluate how effective each is at influencing home ownership (1999). By leveraging theories around human capital decisions and opportunity cost, Hood was able to create a model that predicts the rate of

homeownership for individuals (1999). One of the major findings in her study was the only factor that was highly significant was the family size (Hood 1999). Ultimately understanding how these factors influence the housing rate or at least an individual's decision in home ownership will help in looking at how student debt also affects it.

Education rate has also been proven to impact the either the fertility rate or the birth rate within a country or a population. What the substantial research in this area has found is that the higher the level of education a woman achieves, the lower the amount of children she has. In fact, Teresa Martin proved in her research this idea and concluded that "education generally exerts a negative influence on fertility" (1995). When the idea that higher educated women, who statistically may have more debt than non-college graduates, is offered further insight as to why the rate of housing formation may be slowing. These women who are having fewer children may be waiting to form or create a new household.

## 4.0 DATA AND EMPIRICAL METHODOLOGY

### 4.1 Data

The study uses annual data (panel data) from 2003 to 2013. In order to get an accurate look at the student loan and housing information, it was collected at a state level with data from all 50 states and the District of Columbia. In terms of information from education institutions, data were collected from all four-year public and private institutions, as well as two year institutions within each state. Data were obtained from numerous sites including: College-Insights.org, A college profile site that details, the research-level data for over 11,000 U.S. colleges and universities to capture the average debt of college students; the U.S. Census Bureau to capture the estimated number of homes, the number of births and the marriage rate; the U.S. Bureau of Labor Statistics captured the unemployment for each state; the St. Louis Federal Reserve (FRED) for the current total student debt; and state websites for various missing data. Due to the availability of additional data including divorce rate, out-of-state school attendance and state-level delinquency rates have not been included in this study. An additional limitation of the data is that state-level student loan data is only available consistently starting in 2003. Summary statistics for the data are provided in Tables 1 and 2.

**Table 1 Summary Statistic**

**Table 2 Summary Statistics**

| Variable | Observations | Mean | Std. Dev. | Minimum | Maximum |
|---|---|---|---|---|---|
| | | | | | |
| NB | 543 | 79829.93 | 93136.27 | 5975 | 566414 |
| ADG | 543 | 22300.71 | 4477.238 | 12362 | 33808 |
| CHU | 543 | 24796.8 | 38840.68 | -6496 | 287665 |
| MR | 543 | 7.952486 | 5.703125 | 4 | 63.9 |
| MHI | 543 | 49053.67 | 8109.98 | 32002 | 72472 |
| UR | 543 | 6.42655 | 2.171956 | 2.608333 | 13.78333 |

| Variable | Observations | Mean | Std. Dev | Minimum | Maximum |
|---|---|---|---|---|---|
| | | | | | |
| EHN | 543 | 24796.8 | 38840.68 | -6496 | 287665 |
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| NB | 543 | 79829.93 | 93136.27 | 5975 | 566414 |
| UR | 543 | 6.42655 | 2.171956 | 2.608333 | 13.78333 |

**4.2 Empirical Model**

Following Hood (1999), this student adapted and modified the model in order to include the student loan debt information and reduce the large number of independent variables.

The model (known as model A) used for this analysis can be written as follows:

$$\Delta \textbf{ Home Units} = \beta_0 + \beta_1 ADG + \beta_2 MR + \beta_4 MHI + \beta_5 NB + \beta_6 UR + \varepsilon$$

$\Delta$ **Home Units** is the change in the number of housing units on a monthly basis.

The Independent variables consist of five variables obtained from various sources. Appendix A and B provide data source, acronyms, descriptions, expected signs, and justifications for using the variables. First, ADG represents the average debt of graduates upon graduation. MR is the marriage rate within the state during the year, and is used to help count life events that may influence the number of new households that may be formed. MHI is the median household income for the state, to give a frame of reference as to the level of income within a state. NB is the number of births that occurred within the state during each calendar year. It is also included, like Marriage Rate, in order to help predict life events that may result in a change or new household formation. The final independent variable is the graduation rate, which is captured at a state level for each of the years in this study.

## 5.0 EMPIRICAL RESULTS

The empirical estimation results for the first test are presented in Table 3 and the results for the second simulation and test are in Table 4. In both empirical estimations, there is a negative relationship between student debt and the number of homes available and number of births.

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**Table 3: Regression Results I for Change in Home Units**

| | Change in Home Units |
|---|---|
| | I |
| Constant | 76367.16***<br>( 7545.79) |
| ADG | -0.758**<br>( 0.277) |
| MR | 459.380<br>( 183.309) |
| MHI | -0.645***<br>( 0.133) |
| NB | 0.318***<br>( 0.011) |
| UR | -4980.82***<br>(515.353) |
| $R^2$ | 0.650 |
| F-Statistic | 200.118*** |
| Number of Obs. | 543 |

Note: *** , **, and * denotes significance at the 1%, 5%, and 10% respectively. Standard errors in parentheses

Overall, the model accomplished its goal. The results displayed in Table 3 are that of the changes in home units. All except marriage rate (MR) are highly significant, all at the 5 % level or below. The variables Average Debt of Graduates (ADG) and Unemployment Rate (UR) have the largest impact on the change in home units. Both variables Medium Household Income (MHI) and Number of Births (NB) represent the smallest significant variables which means they have the smallest impact when it comes to affecting change in home units. The ADG variable estimate was significant at the 5% level. The parameters around the significance level are similar to that of Hood (1999), however, the signs differ from those in the earlier study. In order to examine how other factors that may ultimately affect housing, like the number of births, are impacted by student loans, an additional regression was performed. In Table 4 below, the dependent variable, Change in Home Units (CHU), is replaced with Number of Births (NB).

When interpreting these results the first regression, the model displays the results that were expected as well as results that could not be explained. The first and foremost when interpreting the results for Average Student Debt, the model suggests that for every

$1,000 the average student obtains decreases the change in home units by .758, or 758 units. As explained previously, this is expected because as students take on more debt compared to the other money sources they may have, it will decrease the amount of money that they can put towards their housing. What this means is that individuals may live with parents or roommates longer than recorded historically, which would negatively impact the number of household units. This follows various studies done by the FED and other sources that the average student debt is prolonging or altogether keeping individuals from starting a new household.

Another factor worth noting is Median Household Income (MHI). Based on the results of this study, for every $1000 increase in medium household income, the change in home units will decrease .645 or 645 units. This is also can be expected, because as Individuals make money, they will tend to buy more homes but not necessarily creating a new household. The last most significant factor effecting the change in home unit's available is the unemployment. This variable was the most significant and for every 1% increase in unemployment, the change in home units will decrease by 4980.82 units. As individuals lose their jobs or become unemployed, the less likely they are to move out, or the more likely they are to move in with someone else. Each of these findings is supported by basic economic theory. If an individual has lost his or her job or has limited income, as in their supply of funds for housing, it will impact or constrict the kinds of decisions that can be made about housing. In example, an individual without a job, or with a lower paying job, may choose to rent a room instead of an entire apartment, or rent an apartment instead of taking on a mortgage and may be forced to share their dwelling with roommates instead of establishing their own household. Of the variables included in this study, the Marriage Rate (MR) in the regression results found above in Table 1 is found to be not significant. This result makes sense because individuals getting married could be forming a new household altogether, if both were living in a roommate housing arrangement, or could be decreasing the number of households if each lived separately and now they are forming a single household.

A similar scenario will occur with the Number of Births (the size of the family). The results of this second simulation are included in the table below. As the number of births increase by 1, the change in home units will decrease by .318 or 318 units. As the

number of children increase, the home availability will decrease due to the idea that children are a major life event that may spur individuals living with others to form their own household.

**6.0 SIMULATION:** *Impact of Student Debt on Number of Births*

| | Number of Births (per 1000) |
|---|---|
| | II |
| Constant | -137432.1***<br>(19461.48) |
| ADG | -1.613**<br>(0.672) |
| CHU | 1.863***<br>(0.067) |
| MR | -2121.159***<br>(437.138) |
| MHI | 1.968***<br>(0.319) |
| UR | 14178.19***<br>(1206.266) |
| $R^2$ | 0.643 |
| F-Statistics | 0.640*** |
| Number of Obs. | 543 |

Note: *** , **, and * denotes significance at the 1%, 5%, and 10% respectively. Standard errors in parentheses

The model used for this simulation is the same as Model (A) except for the dependent variable represented is the Number of Births. As stated in the introduction of this study, this simulation is trying to reinforce the notion that an increase in student debt yields a negative effect when it comes to major life choices such as the number of children a person will have.

$$\textbf{Number of Births} = \beta_0 + \beta_1 ADG + \beta_2 MR + \beta_4 MHI + \beta_5 CHU + \beta_6 UR + \varepsilon$$

**Table 4: Regression II results for Number of Births**

In this simulation the average student debt has a significantly lager coefficient and impact than it did in Model A. Average student debt displays a significance at the 5% which is the same as it was in Model A. The rest of the independent variables doubled in their impact and the marriage rate variable became significant at the 1% level. This simulation

was conducted and, with great results, signifies that student debt has a significant impact on the way individuals make important, life decisions.

## 7.0 CONCLUSION

In summary, the effects of the growing issue of student debt are just beginning to be revealed. This study reveals that there is a negative correlation between average student debt and the change in household/formation as well as the number of births. Although the study revealed different results of that of Hood (1999), the significance levels were similar. If the current trend of increasing student loans continues, more individuals will see challenges when they go to make major life decisions like forming households, moving, or starting a family. There are numerous opportunities for future research in this area. In particular, the divorce rate within the United States is very high. When a divorce takes place, two individuals who once shared a household are now splitting to form two households. There could be a potential relationship between debt, divorce and household formation. Another area of opportunity for future studies is around the delinquency rate and understanding how that could be used to influence housing decisions. With the percent of graduates continuing to increase, so will the number of people becoming delinquent on their loans. An additional area of research or consideration could include the potential impact students who leave their home state to attend school in another state. This research has just started to delve into the far-reaching impact student loans have on individuals and how it may influence life decisions. As the trend of taking on student debt continues and more students are taking on more debt, the impacts are going to continue and potentially worsen.

## Appendix A: Variable Description and Data Source

| Acronym | Description | Data source |
|---|---|---|
| CHU | Estimates of housing unit change per State | U.S Census Bureau |
| NB | Number of births (per 1000) by state | US. Census Bureau |
| AGD | Average debt of graduate in thousands by state | College Insight |
| MR | Marriage rate by state | U.S. Census Bureau |
| MHI | Median household income in thousands of dollars | U.S. Census Bureau |
| UR | State unemployment rate | Bureau Labor of Statistics |

## Appendix B- Variables and Expected Signs

| Acronym | Variable Description | What it captures | Expected sign |
|---|---|---|---|
| ADG | Average Student Debt | How much Debt the average student holds | - |
| MR | Marriage rate | The change from being single to marriage | + |
| MHI | Median Household income | The average household income | + |
| NB | Number of Births | The number of babies born in one year | + |
| UR | Unemployment rate | Number of people unemployed | - |

**Appendix C- Correlation Matrix** (Number of housing units available)

| | NB | ADG | ENH | MR | MHI | UR |
|---|---|---|---|---|---|---|
| NB | 1.000000 | | | | | |
| ADG | -0.367049 | 1.000000 | | | | |
| ENH | 0.012837 | -0.244170 | 1.000000 | | | |
| MR | -0.126900 | 0.334358 | -0.030065 | 1.000000 | | |
| MHI | 0.718314 | -0.153944 | -0.116222 | 0.044705 | 1.000000 | |
| UR | -0.192903 | 0.362300 | -0.030507 | -0.018179 | 0.153504 | 1.000000 |

**Appendix D- Correlation Matrix** (Number of Births)

| | NB | ADG | ENH | MR | MHI | UR |
|---|---|---|---|---|---|---|
| NB | 1.000000 | | | | | |
| ADG | -0.153944 | 1.000000 | | | | |
| ENH | 0.718314 | -0.367049 | 1.000000 | | | |
| MR | -0.116222 | -0.244170 | 0.012837 | 1.000000 | | |
| MHI | 0.044705 | 0.334358 | -0.126900 | -0.030065 | 1.000000 | |
| UR | 0.153504 | 0.362300 | -0.192903 | -0.030507 | -0.018179 | 1.000000 |

**Note: 0.5 is used as a benchmark for multi-linearity**

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