The Self-Perpetuating Student Loan Debt Crisis

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American student loan debt has become the largest category of non-mortgage debt among American households in the last decade and a half. Figure 1 shows that outstanding student loan debt has risen from 240 billion USD in 2003 to 1.49 trillion USD in 2019 (New York Fed, 2019). This represents an increase in share from 12% to 37% of all non-housing related American debt. Moreover, women and minorities are more likely to have student loan debt, and conditional on having debt have more of it (Atkinson, 2010; Houle and Addo, 2018).

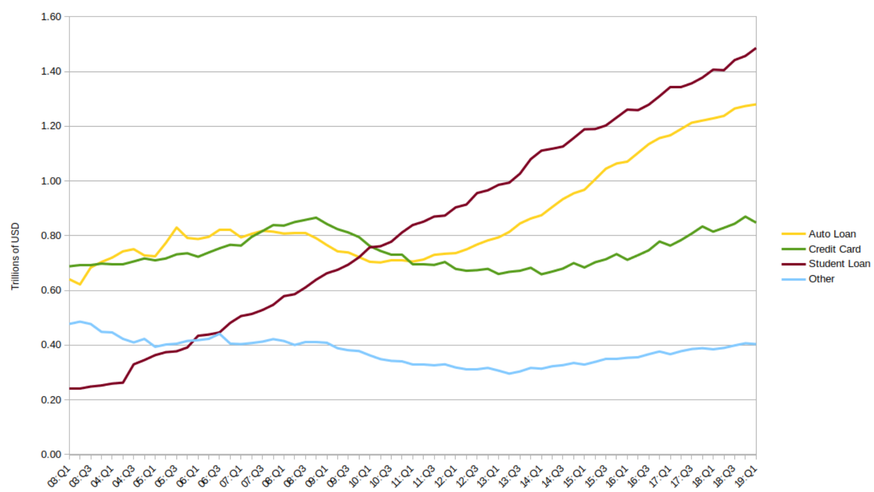


Figure 1: Total American Non-Housing Household Debt by Category

Political proposals to cancel some or all outstanding student debt have increased over the last decade. The first nationally prominent politician to propose canceling student loan debt was Green Party candidate Jill Stein in the 2016 presidential election (Stein, 2016). In the current US Democratic primary for the presidential election of 2020, three of the front running candidates–Harris, Sanders, and Warren–have campaigned on student loan debt cancella-

*The idea in this paper came out of thought-provoking discussion with Moira Daly. The usual disclaimer applies.

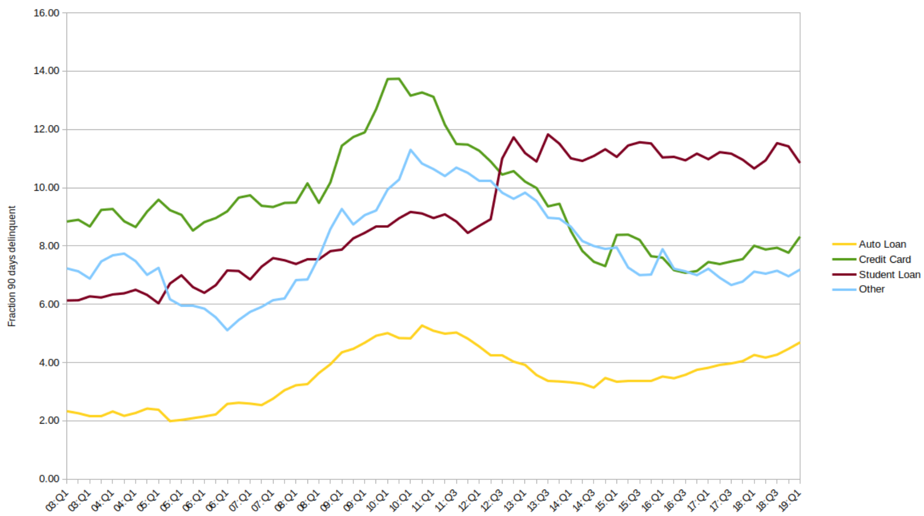


Figure 2: American 90+ Day Delinquency by Debt Category

tion(Market Watch, 2019). There is a non-trivial chance that there will be some form of student loan debt cancellation in the near future.

In this paper, I argue that the presence of student loan debt cancellation as a political topic has made the student loan debt crisis worse. Borrowers with outstanding debt are hesitant to repay it when there is a chance that the debt will be canceled. The less borrowers repay, the more outstanding debt there is, and the more likely some sort of debt cancellation policy is taken up by a politician. I call this spiral the self-perpetuating student loan crisis. Some preliminary evidence for this hypothesis can be seen in Figure 2 (New York Fed, 2019). Delinquency in student loan debt has been the highest among all non-mortgage debt categories since 2013. This statistic is consistent with the expectation among the holders of student loan debt that debt cancellation legislation may be passed in the future.

In the rest of this short paper, I develop a simple economic model to explore this mechanism. My analysis shows that in extreme cases, the possibility of debt forgiveness can nearly double outstanding student loan debt. This level of student debt burden in turn makes debt forgiveness legislation a near certainty.

This paper contributes to a large literature on student loan policy and student loan debt. Among other topics, there has been work on the interplay between subsidized student loans and rising cost of education (Howard, 2010), on the implications of the non-dischargability of student loan debt in bankruptcy (Roots, 1999; Austin, 2013), on student loan debt and individual outcomes (Minicozzi, 2005; Rothstein and Rouse, 2011; Gicheva, 2016), and on student loans as risky lotteries (Avery and Turner, 2012). This paper adds to this literature by analyzing some political and economic ramifications of proposals for student loan debt forgiveness.

1 Model

In this section I write down a partial equilibrium model of student loans. People live for three periods, and there are overlapping generations. There is no population growth, so the size of each generation is the same. There is a constant exogenous interest rate r. The lifetime utility of a person is:

$$U(C) = \ln(c_1^i) + \beta \ln(c_2^i) + \beta^2 \ln(c_3^i) \tag{1}$$

Period income is given by $w^i = h^i l^i$, where $h^i = 1$ if person i has not been to college, and $h^i = h$ if the person is a college graduate. College is costly, both in terms of both time and money. A student does not have time to work in period 1, and must pay tuition of T.[1] The period budget constraint is:

$$c_t^i + T_t^i + b_{t+1}^i = h_t^i l_t^i - (1+r) b_t^i \tag{2}$$

I force loans to be paid off at the end of the third and final period ($b_4^i = 0$). Since the agent is representative, I drop the superscript i. In all that follows, I will assume that $\beta(1+r) = 1$. This assumption is not critical to any of the results, but it makes the derivations more intuitive. I consider only the case in which college is chosen, since otherwise there is no student loan debt.[2] Under these assumptions, maximizing (1) with respect to (2) shows that people will consume the same amount $\bar{c}$ in each period:

$$\bar{c} = \frac{\left(\frac{1}{1+r} + \frac{1}{(1+r)^2}\right) h - T}{1 + \frac{1}{1+r} + \frac{1}{(1+r)^2}} > 1$$

Intuitively, the numerator is discounted lifetime income, which is split among the three periods by the denominator. I know this level of consumption must be greater than one, because otherwise people would not go to college and consume one unit each period. This level of consumption induces optimal borrowing as follows:

$$b_2^* = \frac{\frac{1}{1+r} + \frac{1}{(1+r)^2}}{1 + \frac{1}{1+r} + \frac{1}{(1+r)^2}} (h+T) \tag{3}$$

$$b_3^* = \frac{\frac{1}{1+r}}{1 + \frac{1}{1+r} + \frac{1}{(1+r)^2}} (h+T) \tag{4}$$

[1] If people go to college, they will choose to do so in period 1 so as to get as much benefit from the increase in h^i as possible.

[2] This choice will be taken if the discounted lifetime income of college graduates is higher than non-college graduates. Formally, I consider only parameters such that $\frac{h}{1+r} + \frac{h}{(1+r)^2} - T > 1 + \frac{1}{1+r} + \frac{1}{(1+r)^2}$.

1.1 Student loan forgiveness

Suppose that due to high levels of debt the government publicly considers a (surprise) policy of canceling all outstanding student loan debt. The more debt there is carried forward, the worse the crisis and the more likely that the debt cancellation legislation is passed. Suppose that the probability of debt cancellation $p(\bar{b})$ is increasing in the average amount of end of period debt $\bar{b} = \frac{1}{2}b_2 + \frac{1}{2}b_3$. Individuals take p as given. If the policy is considered when an individual is in period 1, then the individual's problem becomes:

$$\max_{b_2,b_3} \ln(b_2-T)+(1-p)\left[\beta \ln\left(h-(1+r)\,b_2+b_3\right)+\beta^2 \ln\left(h-(1+r)\,b_3\right)\right]+p\left(\beta+\beta^2\right)\ln(h)$$

If an individual is in period 2, then the problem becomes:

$$\max_{b_3} \ln(h-(1+r)b_2^*+b_3)+\beta(1-p)\ln(h-(1+r)b_3)+p\ln(h)$$

Optimal levels of borrowing in these two situations are:

$$b_2^*(p) = b_2^* + \frac{p\left(\frac{1}{1+r}+\frac{1}{(1+r)^2}\right)}{1+\frac{1}{(1+r)}+\frac{1}{(1+r)^2}-p\left(\frac{1}{1+r}+\frac{1}{(1+r)^2}\right)}\bar{c} \quad (5)$$

$$b_3^*(p) = b_3^* + \frac{\frac{p}{(1+r)^2}}{\frac{1}{(1+r)}+\frac{1}{(1+r)^2}-\frac{p}{(1+r)^2}}\bar{c} \quad (6)$$

Here b_2^* and b_3^* are taken from (3) and (4). They are the optimal borrowing levels when there is no possibility of debt cancellation. Both (5) and (6) are a strictly increasing functions bounded below by b_2^* and b_3^* respectively. Any probability of debt relief raises debt above its original level. Intuitively, as the probability of debt cancellation p approaches one, households borrow the discounted value of all future consumption. They do not borrow more because the slope of utility approaches infinity as consumption approaches zero, and even with a p close to one there is a small probability of no debt relief.

Finally, assume that p is a logistic function which is conveniently bounded between zero and one:

$$p(\bar{b}) = \frac{1}{1+e^{-k_2\left(\bar{b}-k_1\right)}} \quad (7)$$

Any equilibrium value of p^* will satisfy the fixed point condition $p(\bar{b}^*(p^*)) = p^*$.

An equilibrium must exist, but it is not necessarily unique. A simple argument is as follows: The logistic function $p(x)$ is in $(0,1)$ for all finite x. $\bar{b}^*(0) = \bar{b}^* > 0$, so $p(\bar{b}^*(0)) > 0$. Since $\lim_{p\to 1} \bar{b}^*(p) = h < \infty$, there is an $\bar{\epsilon} > 0$ such that for all $\epsilon \in [0, \bar{\epsilon}]$, $p(\bar{b}_3^*(1-\epsilon)) < 1-\epsilon$.[3] Since $p(\bar{b}^*())$ is continuous on $[0,1)$, by the intermediate value theorem a fixed point must exist.

[3] There is a discontinuity when $p = 1$, as then debt will not need to be paid back for certain. Borrowing at $p = 1$ is unbounded.

2 Simulation

In this section, I simulate the model with two different parameterizations. The parameterizations are identical except for the two parameters in the function giving the probability of debt cancellation p. I call the first parameterization moderate, because the political possibility of debt cancellation raises both the probability of debt cancellation and outstanding debt a small amount. In the extreme case, the possibility of debt cancellation dramatically raises both the probability of debt cancellation and outstanding debt. Both the parameters and the results are presented in Table 1.

		Moderate	Extreme
College wage prem.	h	1.8	1.8
Tuition	T	0.2	0.2
Interest rate	r	0.05	0.05
Cancel midpoint	k_1	1.5	1.3
Cancel curve	k_2	2.0	4.0
Pre policy cancel prob		26.2%	22.0%
Post policy cancel prob		41.3%	99.2%
Pre policy debt		0.98	0.98
Post policy debt		1.32	2.50

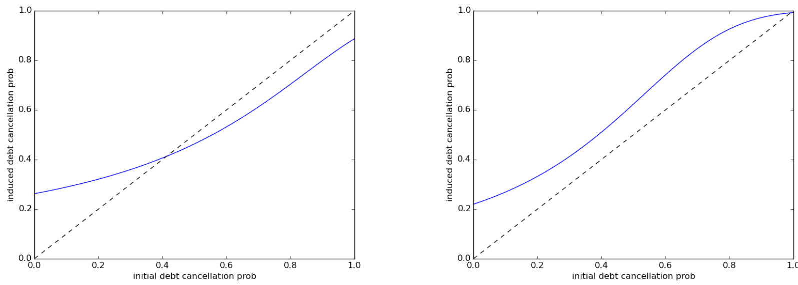
Table 1: Simulation parameters and results

To provide further intuition about the way the model works, I plot the induced probability of debt cancellation $p(\bar{b}^*())$ in Figure 3. Since a fixed point of this function is an equilibrium, I also plot the identity function as a dashed line. An equilibrium is where these two lines intersect. The sigmoid shape induced by the logistic function is apparent.[4] In words, my analysis shows that the possibility of debt cancellation can as much as double the level of outstanding student loan debt.

3 Conclusion

The possibility of debt forgiveness for student loans makes students less likely to repay their loans. The resulting increase in debt burden makes debt forgiveness policy more likely to be taken up by politicians. In extreme cases this interplay between expectations and policy may lead to dramatically higher levels of debt. This mechanism may partially explain the rapid ramp up in outstanding student loan debt in the United States over the last decade.

[4] In addition to the two sets of parameters I present in Table 1, it would be easy to find a parameterization with two stable equilibria, one moderate and one extreme. Except for noting that the model can be indeterminate, there is no additional insight from this case so I do not discuss it further.



(a) Moderate

(b) Extreme

Figure 3: Equilibrium fixed points under two parameterizations

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