The Distributional Effects of Student Debt Forgiveness in General Equilibrium: the Role of Housing

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Abstract

I study the redistributional effects of a universal $10,000 student debt forgiveness policy in a heterogeneous-agent overlapping generations model with incomplete markets and discrete housing choices, calibrated to the 2023 SCF data. Debt relief modestly raises aggregate welfare: particularly, beneficiaries gain 0.82 percent consumption-equivalent welfare on average, primarily through accelerated homeownership among middle-wealth households. The policy increases housing demand and raises house prices by 0.11 percent, generating general equilibrium effects that benefit older homeowners but harm high-school graduates who face higher housing costs, lower returns to saving, and weaker gains, compared to college graduates, from market wage rise. College enrollment responds little. Transitional dynamics initially show aggregate welfare losses for new generations due to elevated house prices and later on gains for newer generations as increased housing supply from retiring beneficiaries drives the prices below the steady state level. The results highlight the central role of housing-market channels in shaping distributional effects of government policies.

1 Introduction

Homeownership and college education are among the most consequential household decisions, both due to their significant economic impact and their timing. Early homeownership provides long-term housing services at relatively low cost, while the college attendance decision—typically at eighteen—permanently shifts an individual's labor productivity. Although these choices are intertwined over the life cycle, the literature has paid comparatively little attention to their interaction when evaluating the distributional impact of education-related fiscal policy. Given the interdependence of housing and education decisions, it is important to quantify the effects of such policies, decompose the underlying mechanisms, and understand how these household choices jointly respond.

I study the redistributional effects of student loan forgiveness. Welfare changes are shaped by housing transactions, wealth accumulation, and general equilibrium effects that operate through the housing, capital, and labor markets. Beneficiaries of the policy experience an average welfare gain of 0.82 percent. These gains are modest for both the bottom decile and upper-income households, becoming substantial only for those for whom debt relief significantly accelerates homeownership. Aggregate housing demand rises and house prices rise by 0.11 percent on impact. Saving behavior adjusts: the aggregate capital–labor ratio increases sharply, reflecting both higher housing costs and the infusion of a lump-sum transfer. This ratio converges more slowly than house prices, consistent with the mechanism in Kaplan and Violante [2014], in which large purchases induce subsequent liquid-asset accumulation to smooth consumption.

In aggregate, general equilibrium effects favor older generations—particularly potential home sellers—through higher house prices. In particular, retired homeowners gain 1.9 basis points on average. Changes in wages and interest rates play a limited role for those retirees, as cash transfers from home sales are comparatively larger. By contrast, high-school graduates with relatively high labor productivity are adversely affected: higher housing costs — a rise in house prices overrides the decline in interest rates — and a stream of lower interest rates slows down wealth accumulation toward homeownership, with the absence of the college premium lowering wage gains. To highlight, working class high school graduates with no homeownership lose 1.77 basis points on average. The general equilibrium effects are sizable and operate in rather a regressive manner notably.

The paper develops a life-cycle, heterogeneous-agent model with incomplete insurance and credit markets in the spirit of Aiyagari [1994], incorporates discrete housing choices following Ortalo-Magne and Rady [2006], and embeds the framework in an overlapping-generations context. Individuals choose whether to attend college in their early twenties and subsequently make discrete housing choices alongside continuous consumption–saving decisions. College education requires tuition payments, with a 9-year repayment plan, and results in multiplicative college premia. Matriculation depends on initial assets, labor productivity, and idiosyncratic opportunity costs. Housing requires a standard 30-year mortgage with a down payment and delivers a stream of service flows from home ownership. Households pay a fixed amount of repayment each period for both types of debt. The recurrent payment is actuarially fair compared to a one-time payment. Households face uninsurable idiosyncratic labor-income shocks. The government redistributes income using a progressive tax schedule.

The housing decision primarily determines welfare gain/loss. Particularly, households in the bottom second decile in asset distribution, among the beneficiaries, experience 1.5% welfare gain, the largest compared to other deciles. For them, the loan forgiveness effectively foster homeownership by accelerating home purchase.[1] On the other hand, the "middle-class" of the non-beneficiaries suffer from welfare loss due to general equilibrium effects. The main mechanism is the delay in home purchases. In fact, the bottom second, third, and fourth deciles in the asset distribution of high school graduates suffer the most losses, approximately -1.1 basis points each. The welfare loss is more modest for college graduates, with the welfare loss the largest for the seventh and the eighth deciles, -0.55 basis points. College graduates are partially compensated through the rise in market wages, which offset lower interest rates that hamper wealth accumulation. High school graduates benefit less from the market wage rise and their accumulation of wealth suffers.

The model is calibrated to the 2023 Survey of Consumer Finances to match the joint initial distribution of assets and wage income, as well as key empirical wealth moments. The positive correlation between assets and early-career income plays a central role in determining college enrollment choices. The opportunity cost of college—capturing non-pecuniary or "psychic" costs—is drawn from a uniform distribution whose upper bound is calibrated using the simulated method of moments. Targeted moments include homeownership dynamics, the college graduation rate, and a range of wealth statistics from the SCF. Despite the well-known difficulty of matching wealth moments, the model achieves a reasonably close fit. The ratio of lump-sum transfers to tax revenue follows Hubmer et al. [2018]. Labor-income process parameters follow Heathcote et al. [2010], and remaining parameters align with standard values in the quantitative macro literature.

I then examined transitional dynamics using perfect foresight. Upon implementa-

[1] In the spirit of Stigler [1970] is the idea that public expenditures are made for the primary benefit of middle classes and are financed with taxes considerably borne by the poor and the rich counterparts

tion, all outstanding student loans are reduced by \$10,000 and all loans are refinanced to accommodate changes in future relative prices. House prices rise by 0.11 percent on impact. Through general equilibrium effects in the housing market, existing homeowners aged 74 and older gain consumption-equivalence-welfare, as defined following Mukoyama [2013], by 0.053 percent. The relative price of labor increases while that of capital falls. High-school graduates are disproportionately harmed: their wage gains are weaker than those of college graduates, and lower interest rates hinder their wealth accumulation for homeownership. This result is robust to assumptions about labor substitutability between skilled and unskilled, although this paper assumes high substitutability as in Bils et al. [2024]. College enrollment changes negligibly, and compositional effects are minimal.

Welfare effects for subsequent generations evolve over time. Aggregate welfare is negative for the first twelve years but turns positive in the longer run. This dynamic is driven by both housing demand and supply changes: house prices initially rise due to heightened demand but later fall below the steady-state level as policy beneficiaries supply more housing after retirement. Future generations benefit from these lower prices.

Although the empirical literature has not reached consensus, this paper demonstrates a strong relationship between student debt and first-time homeownership. Early survey-data studies—Stone et al. [2012], Houle and Berger [2015], Letkiewicz and Heckman [2018], and Scott III and Bloom [2022]—generally find limited effects of student debt on home-buying decisions. By contrast, administrative-data studies such as Mezza et al. [2020] and Bleemer et al. [2021] document a clear link between student debt and delayed homeownership. In particular, this paper generates substantial increases in later homeownership among affected borrowers, consistent with the non-targeted empirical moments in those papers. Robb et al. [2020], using B&B panel data, finds that increases in private student debt reduce the likelihood of homeownership, while increases in federal loan balances have no significant effect. This paper does not impose an explicit structural linkage between student debt and homeownership.

This study contributes to the literature on the distributional effects of fiscal policy following the tradition of Benabou [2002] and Werning [2007]. Much of the education-policy literature focuses on policy's effect on human capital accumulation and thus aggregate output (e.g., Heckman et al. [1998a], Heckman et al. [1998b], Heckman and Carneiro [2003], Abbott et al. [2019], Lucca et al. [2019]). Building on the research of the role of liquidity constraints and resource misallocation, this paper evaluates a large-scale student debt forgiveness policy in a quantitative general equilibrium model. I benchmark the universal forgiveness program proposed by the Biden administration, which reduces existing balances by up to $10,000 and, by construction, does not directly affect college enrollment. Recent work by Catherine and Yannelis [2023] shows that universal forgiveness is regressive, as debt balances overstate repayment burdens for low earners, while high earners tend to hold larger balances. Mazzone and Folch [2024] studies the link between early-career choices and homeownership in partial equilibrium.

Like college education, homeownership requires substantial up-front resources, making financial constraints central to policy transmission. The seminal contribution of Favilukis et al. [2017] shows how financial frictions shaped the housing boom and bust in a general equilibrium. A large related literature examines the role of housing in business cycles (e.g., Campbell and Hercowitz [2005], Eggertsson and Krugman [2012], Kiyotaki et al. [2011], Rognlie et al. [2018], Greenwald and Guren [2021]). This paper aligns more closely with work studying inequality and welfare effects transmitted through the housing market, such as Kiyotaki et al. [2024].

The remainder of the paper is organized as follows. Section 2 presents the model. Section 3 describes calibration. Section 4 discusses the main results. Section 5 concludes.

2 Model

I build a general equilibrium overlapping generations model to study the effects of student loan forgiveness. Time runs forever. A unit measure of each generation appears in my model at the beginning of the working age. An individual is heterogeneous in wealth (k), labor productivity (l), and opportunity cost of college education ($\bar{c}$). An individual makes a college decision only when entering the economy and the higher education is costly in terms of the associated output cost ($\bar{c}$). The time frequency is three years and each generation lives for twenty periods. An individual may choose to buy or sell a house whenever she has enough assets for down payment. A diagram for this timeline appears in Figure 1.

2.1 Environment

Preferences. Utility before working age is not considered. An individual maximizes expected lifetime CRRA utility over composite consumption (x), which consists of both

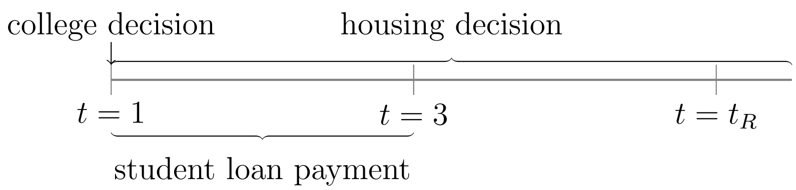


Figure 1: Timeline

non-durable consumption (c) and service flow from housing (s). That is,

$$u(c,s) = \frac{x^{1-\sigma} - 1}{1-\sigma} \tag{1}$$

where $x = c^{\zeta} s^{1-\zeta}$ and σ is the relative risk aversion parameter. ζ is the weight on non-durable consumption compared to service flow from housing. Homeownership is discrete and an individual is either a renter or homeowner, $s \in \{s_r, s_o\}$, $s_r < s_o$.

Income. Individuals earn both labor and capital income. An individual supplies labor inelastically and earns stochastic labor income. Labor productivity evolves exogenously according to a Markov process. Education level then has a multiplicative effect on labor productivity. In sum, labor earnings can be expressed as

$$\tilde{w}_t(l_t; e) = w l_t e. \tag{2}$$

w is the market wage. l_t is the efficiency units of labor. $e \in \{e_C, e_H\}$ is the education level where higher education amplifies the efficiency units of labor, $e_C > e_H = 1$. Labor income is taxed in a progressive manner, i.e.

$$\tau(\tilde{w}) = \tau_1 \tilde{w}^{1-\tau_2}. \tag{3}$$

Next, individuals earn capital income from saving in liquid assets (a). r is the market interest rate and the total capital income is ra. Borrowing of liquid assets is not allowed so $a' \geq 0$. The borrowing is only allowed to finance college education and home purchases. The description of the debt financing follows below.

Student Loans and Mortgage. Although borrowing on liquid assets is not feasible, individuals may borrow money to pay for either tuition fees or housing. The borrowing rate is the same as the saving rate. Borrowers pay a fixed amount of money each period, where the present value of the payment must be equal to the size of the debt. For example, borrowing on tuition fees will incur a fixed payment P_τ for a total of three periods, equivalently nine years, including the current one.[2] Given tuition fees (d_0), an equation for solving the fixed payment (P_τ) looks as follows:

$$\left(1 + \frac{1}{1 + r_{t+1}} + \frac{1}{1 + r_{t+2}}\right) P_\tau = d_0. \tag{4}$$

Mortgage repayment (P_λ) can be defined similarly as follows:

$$\left(1 + \frac{1}{1 + r_{t+1}} + ... + \frac{1}{1 + r_{t+9}}\right) P_\lambda = (1 - \lambda) P_0, \tag{5}$$

where λ is the downpayment rate and P_0 is the house price.

There are mainly two reasons for this type of modeling debt. To begin with, the repayment is actuarially fair by construction and, without loss of generality, all individuals borrow from the competitive financial institution to finance college education and home purchase. This makes the model much more solvable. Moreover, refinance implementation is easy. When an economy is shocked and interest rates fluctuate, any remaining debt will be refinanced to reflect the change. Any change in the future stream of relative price affects the payment in a smoothed fashion which is more realistic. The debt from the previous period sizes at the new interest rate, r_t. People choose a new payment plan to equate the debt size to the present value of remaining payments, again with the maturity being the same as before.

2.2 Household Problem

An individual enters each period with five state variables: saving in liquid assets (k), labor productivity (l), mortgage carryover (m), homeownership state (h), and education (e). A value function at period t is denoted

$$V_t(a, l, m, h; e). \tag{6}$$

Housing is identical and the regarding decision is binary that $h \in \{h_r, h_o\}$ where h_r denotes the renter state and h_o homeowner state. The education parameter is separated by a semicolon to imply that the parameter is permanent throughout one's life.

[2]Nine years in the model is the closest number to the ten years of a standard repayment plan.

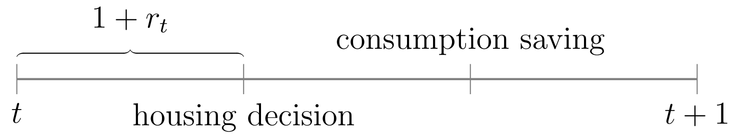


Figure 2: Timeline Within Period

An individual must choose to attend college as she enters the model by comparing the value function as a college graduate and that as a high school graduate at period 1. College education incurs an output cost of $\bar{c}$ only if she has enough initial assets to pay for it. That is, she goes to college if and only if

$$V_1(a - \bar{c}, l, m, h_r; e_C) > V_1(a, l, m, h_r; e_H). \tag{7}$$

The left-hand side of the equation is the value of attending college and the right-hand side is the value of not attending. No individuals inherit a house and all begins their life as a renter.

After the college decision, an individual solves for the value function maximization problem each period. Figure 2 illustrates the decision timeline within each period. Assets and debts grow at the current interest rate first. Then comes the binary housing decision. Given her state, she solves the following problem.

$$V_t(a, l, m, h; e) = \max \left\{ V_t^r(a, l, m, h; e), V_t^o(a, l, m, h; e) \right\} \tag{8}$$

where superscript r denotes the decision to live as a renter and o denotes the decision to live as a homeowner in the current period. Lastly, an individual makes a consumption-saving decision. Note that there are four different value function maximization problems to solve as the individual enters this period with two possible states, renter or home-owner, and chooses between the two possible states. I describe the value functions below.

1. A renter remains a renter $(h = h_r, h' = h_r)$

Should an individual remain as a renter, the value is

$$V_t^r(a, l, m, h_r; e) = \max_{c, a'} \left\{ u(c, s_r) + \beta E\big[V_{t+1}(a', l', m', h_r; e|l)\big] \right\} \tag{9}$$

subject to

$$
\begin{aligned}
c + a' + \bar{P}_\tau &= (1+r)a + \tau(\tilde{w}) + T \\
m &= m' = 0 \\
a' &\geq 0 \\
c &> 0.
\end{aligned}
$$

As defined in Equation 8, the superscript r in the left-hand side denotes the choice of homeownership this period. On the contrary, the fourth argument h_r implies that this individual has started off this period as a renter. Equation 9 shows the value of renter remaining as a renter. She maximizes the sum of utility of the current period and the discounted expected value of starting off as a renter the next period. Here, the service flow from rentership is s_r. The maximization arguments are non-durable consumption c and saving a'.

The sum of non-durable consumption (c), saving (a'), and tuition fees repayment ($\bar{P}_\tau$) must be equal to total cash-on-hand which consists of savings from the previous period (a), capital gain from them (ra), after-tax labor income ($\tau(\tilde{w})$), and lump-sum transfer (T). $\bar{P}_\tau$ is the tuition fees repayment only when it is applicable. Formally,

$$
\bar{P}_\tau = \begin{cases} P_\tau & \text{iff } e = e_C \text{ and } t = 1, 2, 3 \\ 0 & \text{Otherwise.} \end{cases}
$$

Renters have no mortgage, cannot borrow on liquid assets, and enjoy positive non-durable consumption.

2. A renter becomes a homeowner ($h = h_r, h' = h_o$)

If an individual chooses to buy a house, the value is

$$
V_t^o(a, l, m, h_r; e) = \max_{c, a'} \Big\{ u(c, s_o) + \beta E\big[V_{t+1}(a', l', m', h_o; e)|l\big] \Big\} \tag{10}
$$

subject to

$$
c + a' + (\lambda P_0 + P_\lambda) + \bar{P}_\tau = (1+r)a + \tau(\tilde{w}) + T
$$

$$
\begin{aligned}
m' &= ((1-\lambda)P_0 - P_\lambda)(1+r') \\
m &= 0 \\
a' &\geq 0 \\
c &> 0.
\end{aligned}
$$

V^o is the value of buying a house and the argument h_r indicates she was a renter in the previous period. She maximizes the sum of utility and the discounted expected value of next period, where utility is dependent on non-durable consumption c and service flow from homeownership of s_o that she enjoys in this period. Total expenditure, which is the sum of non-durable consumption, savings, downpayment, the first repayment on mortgage, and tuition fees repayment if applicable, must be equal to the total cash-on-hand, which is the sum of savings from the previous period, capital gain from them, after-tax labor income, and lump-sum transfer. The remaining mortgage (m') evolves according to the corresponding law of motion.

3. A homeowner remains a homeowner ($h = h_o, h' = h_o$)

Should an individual remain a homeowner, the value is

$$
V_t^o(a, l, m, h_o; e) = \max_{c,a'} \left\{ u(c, s_o) + \beta E\big[V_{t+1}(a', l', m', h_o; e)|l\big] \right\} \tag{11}
$$

subject to

$$
\begin{aligned}
c + a' + \bar{P}_\lambda + \bar{P}_\tau &= (1+r)a + \tau(\tilde{w}) + T \\
m' &= \begin{cases} (m - P_\lambda)(1+r') & \text{if } m > 0 \\ 0 & \text{Otherwise} \end{cases} \\
a' &\geq 0 \\
c &> 0.
\end{aligned}
$$

V^o again denotes an individual chose to become a homeowner and the argument h_o in the left-hand side indicates she was a homeowner in the previous period as well. $\bar{P}_\lambda$ is defined similar to $\bar{P}_\tau$. That is, the individual pays for the mortgage only when she has a positive remaining mortgage. Formally,

$$\bar{P}_\lambda = \begin{cases} P_\lambda & \text{if } m > 0 \\ 0 & \text{Otherwise.} \end{cases}$$

The remaining mortgage evolves according to the law of motion only if she is actively paying off the debt.

4. A homeowner sells her house ($h = h_o, h' = h_r$)

Should an individual sell her house, the value is

$$V_t^r(a, l, m, h_o; e) = \max_{c,a'} \left\{ u(c, s_r) + \beta E\big[V_{t+1}(a', l', m', h_r; e)|l\big] \right\} \tag{12}$$

subject to

$$\begin{aligned} c + a' + \bar{P}_\tau &= (1 + r)a + \tau(\tilde{w}) + T + (1 - \kappa)P_0 - m \\ m' &= 0 \\ a' &\geq 0 \\ c &> 0. \end{aligned}$$

V^r is the value of being a renter and the argument h_o in the left-hand side indicates this person was a homeowner last period. Similarly, she maximizes the sum of utility and the discounted expected value of the next period. As she decides to sell her house in the current period, she does not pay for a round of mortgage repayment but rather receives a cash transfer, which is $(1 - \kappa)P_0$, and pays off any mortgage debt she has had. κ is the transaction cost imposed on the selling side.

2.3 Firm Problem

The production firm has a constant return to scale technology. That is,

$$Y = K^\alpha L^{1-\alpha}. \tag{13}$$

The total output is a function of aggregate capital and aggregate labor, with α being the capital share parameter. Prices are determined in a competitive manner such that

$$[r]: \frac{\partial}{\partial K}[Y - (r+\delta)K] = 0, \tag{14}$$

$$[w]: \frac{\partial}{\partial L}[Y - wL] = 0, \tag{15}$$

where r is the rate of return on capital, w is the wage, and δ is the capital depreciation rate.

A competitive financial firm is also operating in the loanable funds market. Individuals deposit their savings and the firm loans out to both production firm and individuals who borrow. Capital loaned out to the production firm is used as production input. Individuals borrow from the financial firm to pay for tuition fees and housing. Once they loan out, they repay the debt in the subsequent periods as seen in Equation 4 and Equation 5. Naturally, the aggregate capital used for production is equal to the total deposit of liquid assets by individuals minus net borrowing loaned out to individuals. To close the economy in the general equilibrium, the borrowing rate is the same as the saving rate.

2.4 Government

The government levies a progressive tax on labor earnings only. The tax revenue is used to finance both government expenditure, G, and lump-sum transfer, T. That is,

$$G + T = \int \tau(\tilde{w}) d\mu \tag{16}$$

where μ is the distribution of all households. The government expenditure has no welfare-enhancing role and a lump-sum transfer is equally redistributed among individuals.

2.5 Stationary Equilibrium

A steady state recursive equilibrium is a collection of value functions, $V_t(a, l, m, h; e)$; policy functions, $c(*)$, $a'(*)$, $h(*)$, and $e(a, l, \bar{c})$; measure of households, $\mu(a, l, m, h, t; e)$; the aggregate capital, K; the agreegate labor, L; the house price, P_0; the interest rate, r, and the wage, w; such that

1. given the set of relative prices, $\{r, w, P_0\}$, individuals solve for equations 9, 10, 11, 12 which engenders a stationary equilibrium, $\mu(a, l, m, h, t; e)$,

2. $\{r, w\}$ is competitively determined following Equations 14 and 15,

3. asset market clears by satisfying the following equation

$$K = \int a' d\mu - \int_{h=h_r, h'=h_o} P_0 d\mu + \int \bar{P}_\lambda d\mu - \int_{e_C, t=1} d_0 d\mu + \int \bar{P}_\tau d\mu,$$

4. labor market clears by satisfying the following equation

$$L = \int led\mu,$$

5. goods market clears by satisfying the following equation where T_h denotes the total transaction cost induced by selling houses

$$C + [K' - (1-\delta)K] + G + T + T_h = Y,$$

6. housing market clears by satisfying the following equation[3]

$$S_h = \int_{h'=h_o} 1 d\mu,$$

7. government budget balances satisfying equation 16, and

8. the measure of individuals is invariant.

2.6 Perfect Foresight Transitional Dynamics

I implement an unanticipated shock, which is a one-time loan forgiveness to college graduates. The capped loan forgiveness arrives at one point unexpectedly but is only given to age 23 and 26. At the beginning of age 20, individuals are considered to be high school graduates who have not made college decisions. They do not benefit from

[3]House price P_0 is later exogenously determined to match median house price and S_h becomes the target moment to match the aggregate homeownership. For the perfect foresight transitional dynamics, the supply of housing S_h is fixed at the steady state level and the house price, P_0, fluctuates to change the demand for housing and to matches the supply of housing, S_h.

the fiscal program directly.[4] However, they do react to changes in prices immediately. The loan forgiveness is capped in the sense that up to $10,000 will be knocked off the existing tuition fees debt balances.

Relative prices are interest rate, wage, and house price which fluctuate once the economy is shocked. All debts are refinanced at the beginning of the period. Balances of either assets or debts size at $1 + r_{t_e}$ first. Recall that the law of motion for mortgage is $m' = (1 + r')(m - \bar{P}_\lambda)$. Formally, the new repayment $\tilde{P}_\lambda$ satisfies

$$\left(1 + \frac{1}{(1 + r_{t_e=2})} + ... + \prod_{k=2} \frac{1}{1 + r_k}\right)\tilde{P}_\lambda = m_{t_e=1}.$$

In order to focus on the loan forgiveness impact, I do not consider a tax raise by the government, to balance a separate sheet for financing the program. The government expenditure absorbs the fluctuations in both government expenditure and tax revenue. In other words, the cost of the fiscal program on the day of arrival is paid by using up the non-welfare-enhancing government expenditure. Moreover, the tax revenue must change over time as the change in college decisions of new generations affects the total labor supply.[5] However, this part is not effective as well.

3 Calibration

I utilized the generalized EGM (GEGM) algorithm by Fella [2014] to solve for the non-concave value functions. Another unique feature of the model is the way the housing market is cleared. I assumed a perfectly inelastic supply of housing. Both the house price and the aggregate homeownership rate are calculated using the Survey of Consumer Finances data. In the policy experiment using the perfect foresight transitional dynamics, house prices will change accordingly in each period to match the supply and the demand of housing cross-sectionally.

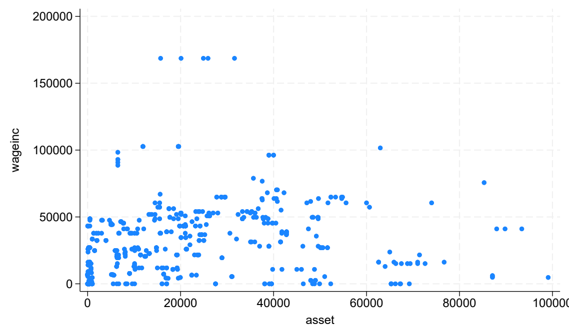


Figure 3: Initial Distribution of Assets and Labor Income

3.1 Initial Distribution

I estimate the two-dimensional initial distribution using the Survey of Consumer Finances 2023 data. Figure 3 depicts a scatter plot of the joint distribution of assets and labor income under age 26.[6] The resulting median labor income in the model has to match the initial guess of the median labor income in order to accurately transform the SCF initial distribution to the model one. I do this by guess-and-verify. Particularly, individuals' decisions change the college graduation rate, which eventually leads to a change in labor productivity. Also, the market wage is derived from solving for the stationary equilibrium. The median labor income in the model is 1.24 when the corresponding number in SCF is \$45,398.3.[7] Lastly, the opportunity (output) cost of attending college is assumed to be orthogonal to both assets and labor income. The cost is drawn from a uniform distribution ranging from 0 to $\hat{c}$, i.e. $\bar{c} \sim U[0, \hat{c}]$ where the upper bound is later calibrated.

3.2 Parameters

Four variables are internally calibrated using the simulated method of moments; they are lump-sum transfer (T_L), service flow from homeownership (s_o)[8], upper bound of opportunity cost of college ($\hat{c}$), and weight on non-durable consumption (ζ).

[4] There are many possible variations to it. The main focus of this paper is to investigate the welfare effects of the unanticipated loan forgiveness.

[5] However, I find the change in tax revenue to be nearly negligible. As the loan forgiveness does not directly affect the newcomers' college decisions, the impact on labor supply is second-order.

[6] The right tail is cut at \$100,000 for assets.

[7] The median labor productivity of the AR(1) labor productivity process is 1.0 and the college premium is 1.84.

[8] Service flow from rentership s_r is normalized to 1.

	parameter	value	description
timeline			
	T	20	total years lived
	T_r	15	retirement age
	T_m	10	mortgage repayment plan years
	T_c	3	tuition fees repayment plan years
labor income			
	ρ	0.921	persistence of AR(1) process
	σ_z	0.215	s.t.d. of transitory shock
	ϕ	0.336	pension rate
production			
	α	0.33	capital share
	δ	0.193	capital depreciation rate
housing			
	κ	0.18	transaction cost
	λ	0.2	downpayment rate
	P_0	8.36	median first house price ($230,000)
education			
	e_C	1.84	college premium
	d_0	5.17	tuition fees ($35,551 annual)
household preference			
	σ	1.5	CRRA coefficient
	β	0.885	time discount factor
taxation			
	τ_1	0.58	tax parameter 1 (proportionate)
	τ_2	0.181	tax parameter 2 (progressive)

Table 1: Parameters

In the model, an individual appears at age 20, retires at age 65, and dies at age 80. A standard mortgage repayment plan is thirty years and a tuition fees repayment plan is nine years. Labor income process, time discount factor, and capital depreciation rate are adjusted to fit a three-year time frequency. Annualized numbers are 0.973 for persistence of labor productivity process, 0.124 for standard deviation of the transitory shock, 0.96 for time discount factor, and 6.9% for capital depreciation rate. A retired individual earns 33.6% of the last realized labor income as a pension. Capital share of the constant-return-to-scale aggregate production is 0.33. Selling a house incurs 18% of the current house price as transaction cost. Downpayment rate is 20%. House price, P_0, is estimated to target $230,000, which is the median house price of homeowners aged 30 in SCF. Similarly, tuition fees are set to target median tuition fees of a 4-year undergraduate institution ($35,551 annually for four years). The constant relative risk aversion parameter of the utility function is 1.5. Lastly, tax parameters are respectively 0.58 and 0.181 as in Equation 3.

The resulting calibration yields the following numbers: 0.7506 (T_L), 1.8767 (s_o), 0.7012 ($\hat{c}$), 0.5231 (ζ). Target moments are shown in Table 2. As the model considers the indirect channel through the housing market and analyzes redistributional effects of the loan forgiveness over time, the dynamics of both homeownership rate and wealth share are included. Those moments regarding the dynamics and college graduation rate are computed using the SCF data. The transfer to revenue ratio comes from Hubmer et al. [2018].

	Data	Model	Desc.
hr41	62.85%	56.86%	age 41 homeownership rate
hr50	72.68%	67.32%	age 50 homeownership rate
hr59	80.44%	77.61%	age 59 homeownership rate
hr71	77.58%	86.21%	age 71 homeownership rate
clgrad	40.01%	39.16%	college graduation rate
tx2tr	60.00%	63.13%	transfer to revenue ratio
nw50p29y	99.70%	90.71%	top 50% net wealth share at age 29
nw50p41y	97.36%	81.59%	top 50% net wealth share at age 41
nw50p50y	96.75%	77.11%	top 50% net wealth share at age 50
nw10p29y	68.13%	55.32%	top 10% net wealth share at age 29
nw10p41y	50.85%	39.43%	top 10% net wealth share at age 41
nw10p50y	28.77%	34.15%	top 10% net wealth share at age 50

Table 2: Target Moments

4 Main Results

I examine the transitional dynamics using perfect foresight following a one-time capped loan forgiveness. I benchmark a policy proposed in 2019.[9] Up to $10,000 will be knocked off any existing student debt. To exclusively focus on the unanticipated nature of the policy, I would remove (partially) only the existing college debts. In other words, the individuals newly entering the economy would not benefit as they had not made a college decision yet. However, relative prices in the future can still affect those individuals' decisions, including college, housing, consumption, and saving.

4.1 The Fluctuations of the Aggregate Variables

To begin with, Figure 4 shows that house price rises by 0.108% once the loan forgiveness takes place. The price changes due to the change in housing demand, which is induced by the direct beneficiaries of the loan forgiveness. Two types respond to the debt relief. One is the individuals buying houses earlier than their previous plan and the other is the individuals switching to buy houses who would not have bought one without the loan forgiveness. The former is dominant as the "long-term" rise in homeownership of the beneficiaries is negligible. The program is especially effective in accelerating

[9] The loan forgiveness appeared as a campaign promise during the presidential race. The plan has two parts. One is a moratorium on debt repayment during the COVID era. The other part, which this paper mainly considers, is a knock-off plan to remove $10,000 off existing student debts with income restriction.

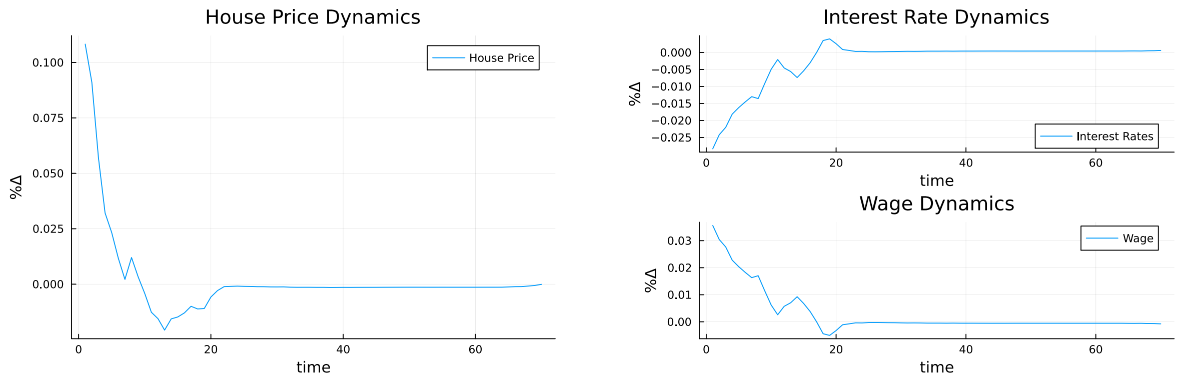


Figure 4: Aggregate Variables Dynamics

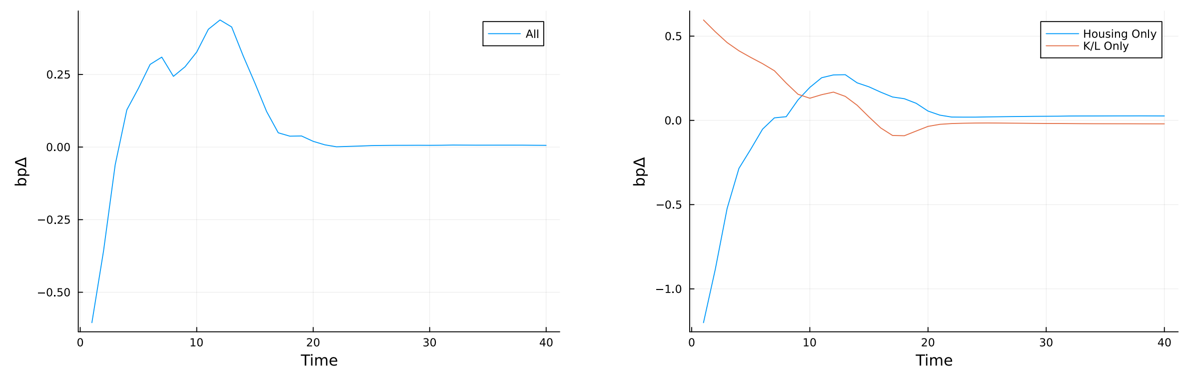
homeownership. In the longer run, the house prices fall below the steady state value when the beneficiaries retire. More households are willing to sell their houses so that they can live off the cash flow from home sales. The price drop is largely driven by the supply side.

The oscillation around the steady state engenders the dynamics of the subsequent generations. Particularly, Figure 5 depicts the aggregate welfare gain/loss of the subsequent generations on the left and the welfare decompositions of the housing market and labor/capital market on the right. Starting from the very generation that arrives on the policy date, the first four generations are worse off than the steady state on average. Housing plays the more dominant role. In other words, the increased house prices during the early phase of the transitional dynamics lead to less homeownership among the new generations, and thus lower welfare.

However, the aggregate loss of welfare turns into a gain for the fifth generation. The housing channel indicates that the welfare loss quickly vanishes as the house price drops back to the steady state level. Also, newer generations foresee the price decrease below the steady state value in period 15 as in Figure 4 which leads to positive aggregate welfare gain for the ninth generation and afterwards. The capital and labor channel, on the other hand, indicates a positive aggregate welfare gain. A rise in the aggregate capital-to-labor ratio results in higher market wages which benefits poor households. The welfare gains are larger for the poor households given the same monetary benefits.

Next, a rise in market wage would be followed by a more delayed convergence to the steady state compared to the house prices. Households accumulate more wealth for more expensive housing. Then, households accumulate wealth again to smooth consumption after the large-scale economic decision, home purchase. Because the aggregate labor

Figure 5: Subsequent Generations' Welfare Change



supply depends on college decisions which is the indirect effect, the aggregate savings play an important role in moving the aggregate capital-to-labor ratio. The infusion of a lump-sum transfer results in a decline of the interest rate by 0.283% on the impact.

4.2 The Welfare Change Heterogeneity

This paper primarily focuses on the incumbents' welfare changes. In large, two groups exist: one is the beneficiaries and two is the others. The biggest gains of the consumption-equivalent welfare are shown among age 2 and 3 college graduates, the direct beneficiaries of the program.[10] On average, those college graduates gain 0.823%.

The roles of housing and capital are different in nature. In sum, the house price fluctuation favors home sellers and disfavors home buyers which leads to large generational heterogeneity. On the other hand, the capital and labor market channel affects different levels of assets and labor productivity. By construction, wage rises and interest rates fall that low-wealth households are better off.

The retired generations with housing favor significantly higher welfare compared to the steady state. That is, the welfare gains of homeowners of age 20, 19, 18 are 0.092%, 0.045%, and 0.021%, respectively. This welfare gain vanishes when the general equilibrium effects of house prices are shut down, as is shown in Figure 6 mid-left panel (homeowner CEW change with only housing market). The welfare gains of those retirees mostly come from the house price rise. Towards the end of their lives, individuals sell their house to earn cash flow and spend the money for the rest of their lives. The house

[10]The definition of consumption-equivalent welfare change follows Mukoyama [2013] in a way that the number indicates a rise/fall in the rest-of-the-life consumption percentage in the stationary equilibrium the individual is indifferent to the policy change.

price rises sharply with the arrival of the policy and this translates to larger cash flow for the older generations.

On the other hand, the rise in house prices adversely affects the potential buyers (of housing). The mid-right panel of Figure 6 reflects the difference in home purchasing patterns between college graduates and high school graduates. College graduate renters display approximately 3 basis points of welfare loss before the retirement age, whereas high school renters show a constantly decreasing welfare over ages before retirement, when only housing is present. 91.6% of college graduates become homeowners by age 5. Most of them are already homeowners and the remaining renters are rather low on assets or labor productivity that they do not hold enough assets for homeownership. Nevertheless, those college graduates are sensitive to house price increases. High school graduates, however, accumulate assets for a long time to buy houses. Older high school graduate renters are closer to home purchases and this leads to the downward trend in welfare over age (before retirement).

Next, young high school graduates are disproportionately affected by the capital and labor market. The welfare losses of age 2 and age 3 high school graduates are 3.36 basis points and 3.32 basis points, respectively (upper left panel of 6). Particularly, the initial distribution of assets and labor plays a critical role. High school graduate homeowners are of two types; one is rich in assets and low in productivity the other is highly productive but low in assets that the homeowners were not able to afford a college education. The loss is primarily driven by the rich and less productive individuals because they now face low interest rates. Age 2 and 3 above-the-median-labor-productivity high school graduate homeowners gain 1.85 basis points and 0.91 basis points, respectively, whereas the below-the-median-labor-productivity counterparts lose 4.92 basis points and 4.96 basis points.

Another implication lies in generational heterogeneity based on accumulated wealth. Older renters are worse off due to their damage from lower interest rates, especially for high school graduates. The lower-right panel of 6 demonstrates the distinct pattern among high school graduates where the welfare loss becomes larger for older households. This is closely related to the home purchasing pattern mentioned above. High school graduates accumulate wealth over a long time to buy houses. The indirect effect, i.e., the lower interest rates, adversely affects the stacked wealth.

In terms of asset distribution, the middle are damaged the most due to indirect effects. First of all, wealth-poor households are better off because they favor wage increases. However, this result applies to the bottom decile only. The left panel of

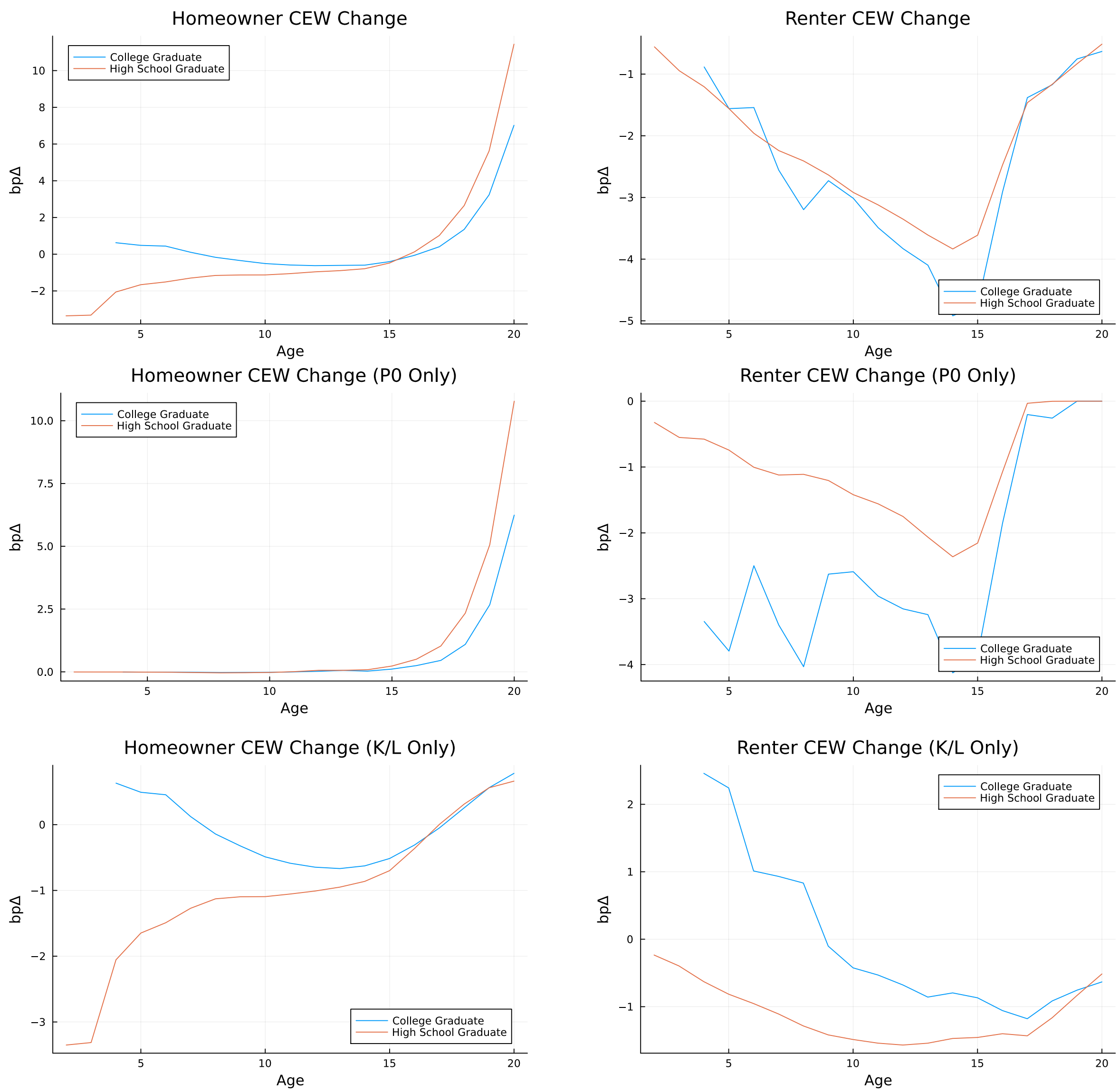
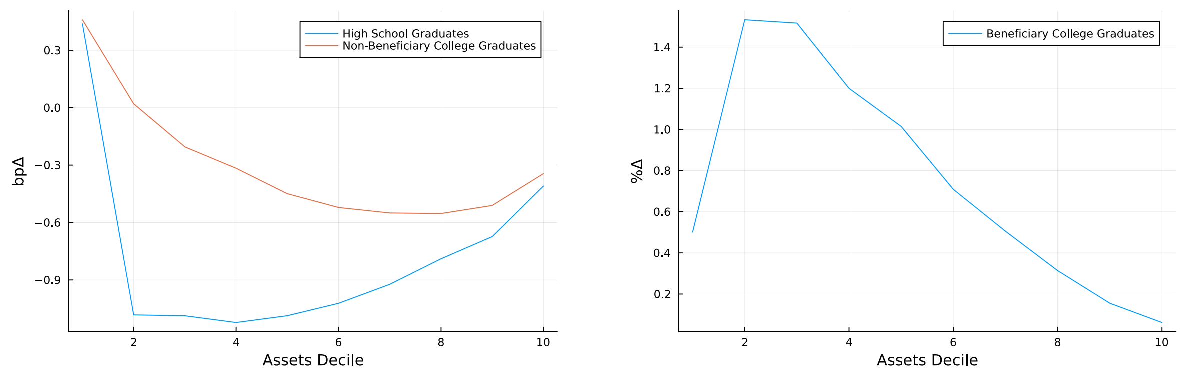


Figure 6: Welfare Gain/Loss of Non-Beneficiaries and Decompositions

Figure 7: Welfare Change by Assets



the Figure 7 shows that the bottom decile, in assets distribution, of the high school graduates experience a 0.44 basis points rise. The number is 0.46 for college graduates. High school graduates show a more extreme drop with both college graduates and high school graduates non-beneficiaries welfare displaying a U-shape in asset distribution. The large welfare losses of the middle-class high school graduates come from two sources. One is limited gain from a wage rise due to the absence of a college education. The multiplicative effects of higher wages are smaller for high school graduates. The other is the homeownership state. High school graduates with large assets are more likely to own housing. This was especially true for younger generations. Renters are disproportionately affected the most by the general equilibrium effects among high school graduates.

The debt relief is financed by switching the use of the government expenditure that previously had no welfare-enhancing role. Tax rates do not adjust to balance a separate balance sheet for the government. Hence, the model does not have both crowding out and taxation effects. Although the paper focuses on the regressive aspect of the universal debt forgiveness, I have ruled out those two effects to simplify the mechanism underlying the model.

In fact, a robustness check shows that the two effects operate to exacerbate the regressive perspectives. First, crowding out effects lead to a drop in the aggregate capital-to-labor ratio on the impact day. This leads to a wage decrease and an interest rate increase. The short-run impact largely impairs low-wealth households' welfare. Second, raising the proportionate part of the tax schedule negatively affects the low-wealth households.

Lastly, I insist the change in homeownership due to the policy is aligned with the empirical numbers provided by both Bleemer et al. [2021] and Mezza et al. [2020]. This paper assumes \$10,000 amount of loan forgiveness. Particularly, the generation of age 2, on the policy arrival, shows a 1.61%p increase in homeownership after 3 years and 11.74%p increase after 6 years. Also, the generation of age 3 shows a 2.26%p increase after 3 years and a 0.36%p increase after 6 years.[11] Bleemer et al. [2021] documented that \$5,707 student debt growth across state-cohorts from 2003 to 2011 is able to explain 3.84 percentage points of the observed 7.74 percentage points decline in homeownership. This is a four-year-later age 28-30 homeownership. Mezza et al. [2020] also documented \$1,000 increase in student debt leads to 1.8%p decline in mid-20s homeownership rate.

5 Conclusion

This paper shows that student loan forgiveness, even when delivered as a one-time and non-anticipated transfer, generates rich distributional consequences through the joint determination of education, housing, and saving decisions. Because homeownership is a lumpy, forward-looking investment, the policy's primary effects operate through the housing market rather than through earnings or human-capital channels. The policy accelerates home ownership for a subset of liquidity-constrained borrowers, delivers modest average welfare gains for beneficiaries, and produces sizeable through-price redistribution toward older homeowners. These results follow directly from the interaction of debt relief with existing wealth heterogeneity and the life-cycle timing of housing purchases, demonstrating that even policies targeted at educational debt can have first-order implications for household portfolio decisions.

The transitional dynamics highlight how general equilibrium effects alter the mapping from individual lump-sum transfer to aggregate welfare. While house prices rise on impact due to increased demand, the capital–to-labor ratio adjusts more gradually as households rebuild liquid wealth following a large discrete purchase. This differential speed of convergence amplifies intergenerational heterogeneity: subsequent entrants to the economy face temporarily higher housing costs and thus lower welfare, but ultimately benefit once the retiring beneficiaries expand housing supply and future prices fall below steady-state levels. The analysis also clarifies the opposing roles of the two markets: the housing channel generates substantial cross-sectional redistribution, whereas the capital–labor channel modestly favors low-asset households through higher

[11] This paper provides the results of student debt forgiveness. Therefore, the student debt is rather decreasing, where Bleemer et al. [2021] and Mezza et al. [2020] both explore student debt rise.

wages and lower returns to wealth.

The results underscore that the incidence of student debt forgiveness is far from uniform. Among the non-benficiary incumbents, welfare gains are concentrated among young college graduates and older homeowners, whereas high-school graduates in the middle of the wealth distribution suffer the largest losses. These households are doubly exposed: they lack access to the college premium that would amplify wage gains, and they are in the midst of a prolonged asset-accumulation phase toward homeownership, making them sensitive to both higher house prices and lower interest rates. The analysis thus complements recent empirical work showing that student debt affects the timing of homeownership and adds a general-equilibrium perspective to the emerging literature documenting the regressive features of broad-based debt relief.

Taken together, the findings provide a cautionary interpretation for the design of education-related fiscal policy. Universal loan forgiveness, though simple to implement and politically salient, interacts strongly with preexisting heterogeneity in assets, productivity, and housing positions, generating redistribution effects. The model clarifies the channels through which such policies can unintentionally disadvantage high school graduate households and delay homeownership for new cohorts. These insights suggest that future policy design should account for the intertwined nature of education and housing choices. More broadly, the framework provides a foundation for studying alternative interventions—such as income-driven repayment reforms or tuition subsidies—within a unified life-cycle environment where college education and housing are jointly determined.

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