Universal Basic Income in an Entrepreneurial Economy

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Abstract

Entrepreneurs play an outsize role in capital accumulation and wealth creation, yet the macroeconomic literature on universal basic income (UBI) abstracts from entrepreneurial dynamics. We extend a heterogeneous-agent model with entrepreneurship and wealth, calibrated to the U.S. economy, to evaluate the long-run effects of a $10,000 annual UBI. The policy reduces welfare by 6.2 percent in consumption-equivalent terms and requires additional government expenditure of 7.8 percent of GDP, financed through a 43 percent proportional increase in income taxation. While UBI substantially reduces inequality, it depresses capital accumulation and entrepreneurial investment, leading to lower aggregate output. Distributional effects are heterogeneous: workers, retirees, and non-college households gain, whereas entrepreneurs and college-educated households lose. These results are robust to alternative calibrations and asset-tax financing. In contrast, consumption-tax financing preserves capital formation and generates welfare gains.

JEL Classification Codes: E60, E64, H24 and H53

Key Words: Universal Basic Income, Welfare, Income and Wealth Inequality

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1 Introduction

Universal basic income (UBI), an unconditional lump-sum transfer to all individuals, has attracted growing attention in both policy debates and economic research.[1] Advocates emphasize its redistributive potential, arguing that UBI could reduce inequality, alleviate poverty, simplify the welfare system, and facilitate labor market adjustment in response to structural economic changes. By providing financial security, UBI can relax subsistence constraints and encourage risk-taking and innovation. Consistent with this perspective, the literature on wealth inequality identifies differences in entrepreneurial ability as a leading driver of persistent inequality (Cagetti and De Nardi, 2008), suggesting that entrepreneurship represents a key margin through which UBI could operate.

Existing quantitative macroeconomic studies of UBI, such as Daruich and Fernandez (2024), Guner et al. (2023), Luduvice (2024), and Conesa et al. (2023), do not incorporate entrepreneurship as a distinct margin of adjustment. As a result, we know little about how UBI interacts with entrepreneurial decisions and how those decisions feed back into long-run inequality and aggregate outcomes. In this paper, we address this gap by extending a heterogeneous-agent model with entrepreneurship and wealth to evaluate the macroeconomic, distributional, and welfare consequences of UBI.

Table 1: Median Net Worth (2019 dollars)

Ref.-Person Type:	College	Non-College	Total
Entrepreneurs	1,625,000	379,800	758,100
	(3.14%)	(3.35%)	(6.48%)
Workers	221,000	53,900	90,200
	(22.33%)	(35.59%)	(57.91%)
Overall Population	308,800	70,500	121,760
	(36.32%)	(63.68%)	(100.00%)

Federal Reserve Board (2019), Survey of Consumer Finances; authors' calculations. Percentages in parentheses indicate the share of each household type in the overall U.S. population.

Adding entrepreneurship to the macroeconomic analysis of UBI is important. Entrepreneurs earn higher incomes and hold more wealth than workers, a disparity we refer to as the entrepreneurial premium. Tables 1 and 2 show that this premium is at least as important as the college premium in explaining income and wealth disparities. For example, the median

[1]For surveys of the UBI literature, see Banerjee et al. (2019), Hoynes and Rothstein (2019), Hanna and Olken (2018), and Gentilini et al. (2019).

Table 2: Median Income (2019 dollars)

Ref.-Person Type:	College	Non-College	Overall
Entrepreneurs	152,718	72,286	96,721
Workers	105,884	54,978	70,250
Overall	95,703	44,797	59,051

Source: Federal Reserve Board (2019), Survey of Consumer Finances; authors' calculations.

net worth of entrepreneurs is 8.4 times that of workers ($758,100 vs. $90,200), while college graduates hold 4.4 times the wealth of non-graduates ($308,800 vs. $70,500). Combining both dimensions, a college-educated entrepreneur has 30 times the wealth of a non-college worker. Similar, though less stark, differences appear in income: entrepreneurs earn 1.4 times more than workers, college graduates 2.1 times more than non-graduates, and college-educated entrepreneurs nearly three times more than non-college workers.

Because entrepreneurs command a large share of income and wealth, their decisions are central to how savings are transformed into investment and innovation. Through this channel, they influence not only aggregate capital accumulation but also the distribution of long-run output. Failing to account for this margin risks understating the macroeconomic implications of UBI. On the one hand, UBI may depress entrepreneurial investment by raising taxes or diluting high-return savings. On the other hand, by relaxing liquidity and subsistence constraints, it can broaden entry into entrepreneurship and stimulate innovation.

Motivated by this evidence and the absence of the entrepreneurial sector in recent quantitative macroeconomic studies of UBI, we extend the canonical model of entrepreneurship and wealth accumulation developed by Cagetti and De Nardi (2006), hereafter referred to as CD. This framework is a Bewley–Huggett–Aiyagari (BHA)-type model (Bewley, 1983; Huggett, 1993; Aiyagari, 1994) that closely matches the U.S. wealth distribution, featuring incomplete markets, heterogeneity in earnings and entrepreneurial ability, endogenous occupational choice between entrepreneurship and work, and intergenerational wealth transmission. We extend this framework along four dimensions: (i) incorporating college decisions, (ii) introducing labor supply choice, (iii) modeling the government sector in detail following Bruggemann (2021) and Conesa et al. (2009), and (iv) introducing UBI.

We calibrate the model to U.S. data and validate it against targeted and untargeted features of the income and wealth distributions. We then evaluate the introduction of a universal basic income of $10,000 per adult, financed by a proportional increase in income taxation.

The results reveal a stark equity–efficiency trade-off. On the equity side, UBI substantially redistributes resources, with the income and wealth shares of the top quintile falling sharply (the top quintile's share of income falls from 65% to 52%, and its share of wealth from 85% to 65%) and gains concentrated among the bottom half of the distribution. On the efficiency side, however, UBI depresses savings and investment, leading to a large contraction in capital accumulation and output. Aggregate welfare falls by 6.2 percent in consumption-equivalent terms, reflecting both the fiscal burden of the policy and the general equilibrium effects operating through capital markets.

The adverse effect on the entrepreneurial sector is significantly larger. UBI expands entry on the extensive margin, but higher borrowing costs suppress investment on the intensive margin. Higher interest rate raises borrowing costs and sharply curtail the ability of entrepreneurs to leverage their own assets into larger projects. The resulting contraction in capital formation reduces entrepreneurial output and lowers their income and wealth shares. The corporate sector exhibits similar patterns, albeit more modestly. At the individual level, the distributional effects of UBI are heterogeneous. Workers and retirees benefit, while entrepreneurs and college graduates are disadvantaged. The number of college graduates increases, but the influx of graduates and general equilibrium responses compress the college wage premium. By contrast, non-college households and retirees benefit directly from the transfer with minimal tax obligations.

The welfare implications of UBI hinge critically on its effects on capital accumulation. Through a sequence of counterfactual experiments, we show that when the aggregate capital stock is held fixed at its benchmark level, welfare losses under UBI are substantially reduced. Fixing the interest rate at its benchmark level, which sustains investment by lowering borrowing costs, further shrinks the welfare loss. In an additional off-equilibrium exercise, where the capital stock remains fixed but the income tax rate is raised to the UBI level, the economy even exhibits welfare gains. While this last experiment does not impose government budget balance, it isolates the capital accumulation channel. These findings indicate that redistribution under UBI is not inherently costly; rather, it is the contraction in savings and investment induced by higher taxation that erodes aggregate welfare. In other words, the adverse effect of UBI primarily operates through its distortion of capital accumulation, rather than through redistribution itself.

Financing choices are pivotal for the welfare effects of UBI. Funding the transfer through a wealth tax requires a 2.2 percent levy on all asset holdings. This financing option raises the interest rate to 9.3 percent, depresses capital accumulation, and lowers welfare by 2.1 percent, while modestly reducing inequality. By contrast, shifting the burden to consumption

generates far smaller distortions. Increasing the consumption tax rate from 5 percent to 12.3 percent finances the program with minimal impact on aggregate capital and yields a welfare gain of 3.7 percent.

Finally, we assess the sensitivity of our findings to alternative calibrations of the baseline model. We vary the entrepreneurial span of control, borrowing limits, entrepreneurial ability, and the degree of altruism, and evaluate the introduction of UBI relative to the steady state of each recalibrated economy. Across these exercises, the qualitative results are unchanged: UBI financed by income taxation consistently generates sizable welfare losses.

Some related literature. Empirical evidence on unconditional cash transfers stems largely from small-scale pilots and randomized trials, such as the U.S. Income Maintenance Experiments, the Alaska Permanent Fund, and programs in developing countries, rather than universal, permanent policies. While informative about labor supply and poverty, these studies cannot capture the economy-wide or general equilibrium effects of a true UBI. For comprehensive reviews, see Gentilini et al. (2019), Hoynes and Rothstein (2019), Banerjee et al. (2019), and Hanna and Olken (2018).

Early theoretical work, including Atkinson (1995), framed UBI within optimal tax theory but abstracted from macroeconomic feedback. Recent advances employ heterogeneous-agent models to examine fiscal requirements, behavioral margins, and aggregate implications. Key contributions include Daruich and Fernandez (2024), Guner et al. (2023), Jaimovich et al. (2022), Luduvice (2024), Conesa et al. (2023), and Rauh and Santos (2022). Daruich and Fernandez (2024) incorporate life-cycle models, imperfect capital markets, and parental investment in child skills, finding overall welfare losses from UBI. In contrast, Guner et al. (2023) and Luduvice (2024) abstract from intergenerational motives but introduce richer demographic structures, such as fertility and marriage, and more detailed income-security systems. Luduvice (2024) finds welfare gains under a large UBI reform financed by consumption taxes, while Guner et al. (2023) show that replacing means-tested transfers with a negative income tax yields positive welfare effects. Conesa et al. (2023) highlight the role of consumption heterogeneity, showing that UBI leads to welfare losses unless paired with progressive consumption taxation. Yet these models abstract from entrepreneurship and occupational choice, despite their central role in wealth concentration and capital formation.

The remainder of the paper is organized as follows. Section 2 introduces the model and describes the estimation strategy. Section 3 validates the model and presents the UBI results, including aggregate effects, fiscal implications, welfare, and alternative financing schemes. Section 4 discusses the findings, and Section 5 concludes.

2 Model

We build on the model in CD, which is a BHA-type model with borrowing constraints, altruism across generations, and occupational choice to become either an entrepreneur or a worker. These features of the model are important for our purpose because the literature on wealth inequality has identified inheritance and entrepreneurial ability as the two main determinants of wealth (Cagetti and De Nardi, 2008; Huggett, 1993), and the borrowing constraints are an important feature of the data.[2]

We make some additions to the model in CD to better capture the features of the economy that are relevant to understanding the various mechanisms through which unconditional cash transfers, such as UBI, are likely to affect the macroeconomy. First, we add a college decision. As demonstrated in the introduction, individuals' income and wealth profiles vary considerably depending on whether they have a four-year college degree. Second, we add labor supply decisions along the intensive and extensive margins. A major concern about UBI policies is that they may reduce the incentive to work. Third, we model the government sector in more detail following Bruggemann (2021) and Conesa et al. (2009). Lastly, we add UBI to the model and introduce a wealth tax as a potential source of revenue to finance UBI. We now provide details of the model.

2.1 Household Sector

Time is discrete and the model period is a year. Each household consists of an individual who goes through two phases in their life: young and old. The durations of both phases are random. An individual enters the model as an adult with inherited assets from their parent. They make their college decision before entering the first phase of their life. After the college decision, they draw their entrepreneurial and earning abilities. Entrepreneurial ability is the ability to invest capital productively, and earning ability is the ability to generate income from labor. Based on their assets (a), entrepreneurial ability (θ_1^i) ($i = \{C, NC\}$, where C is for college and NC for no-college) and earning ability (θ_2^i), they choose whether to become an entrepreneur or a worker. At the end of the period, they either stay young with probability π_y and repeat the occupational choice to become an entrepreneur or a worker, or move to the second phase of their life with probability $1-\pi_y$, become old and retire. During retirement, they receive pension benefits and income from their assets. At the end of each

[2]In the SCF 2019, 14.0% of respondents reported having been turned down credit in the last five years (variable: turndown), 13.3% reported fearing that they might be denied credit (variable: feardenial), and 21.3% reported at least one of the two (variable: turnfear).

period of phase two, they either stay old with probability π_o or die with probability $1-\pi_o$. If they die, they are replaced by a descendant who inherits their assets. The entrepreneurial and earning abilities follow separate Markov processes during phase one. These abilities do not play any role in phase two.

2.1.1 College Decision

Individuals enter the model with inherited assets (a). As in Heathcote et al. (2010), before entering the first phase of their life, they draw an idiosyncratic utility cost $\psi \geq 0$ of attaining a college degree from a cumulative distribution function $H(\psi)$. In a reduced-form way, this cost captures cross-sectional variability in the psychological and financial costs of acquiring a college degree, such as variation in academic ability, cost of college, parental support, personal assets, and access to credit. On average, college results in superior entrepreneurial and earning abilities. After learning their idiosyncratic cost, each individual compares it to the expected benefit of a college degree and becomes a college graduate if

$$\mathbb{E}\{V^C\left(a,\theta_1^C,\theta_2^C\right)\}-\mathbb{E}\{V^{NC}\left(a,\theta_1^{NC},\theta_2^{NC}\right)\}\geq\psi, \tag{1}$$

where $V^i\left(a,\theta_1^i,\theta_2^i\right)$, $i=\{C,NC\}$, is the value function of a young individual. The expectations of $V^i\left(\cdot\right)$ are with respect to the initial draws of entrepreneurial ability θ_1^i and earning ability θ_2^i from their respective invariant distributions. Hence, before drawing ψ, the probability that a person born with assets a would go to college is

$$\pi_c\left(a\right)=H\left(\mathbb{E}\{V^C\left(a,\theta_1^C,\theta_2^C\right)\}-\mathbb{E}\{V^{NC}\left(a,\theta_1^{NC},\theta_2^{NC}\right)\}\right). \tag{2}$$

2.1.2 Problem of a Young Individual

After making their instantaneous educational decision, each individual draws their initial entrepreneurial and earning abilities from separate invariant distributions for college and non-college. The value function of a young individual is

$$V^i\left(a,\theta_1^i,\theta_2^i\right)=\max\left\{V_e^i\left(a,\theta_1^i,\theta_2^i\right),V_w^i\left(a,\theta_1^i,\theta_2^i\right)\right\}, \tag{3}$$

where $V_e^i\left(\cdot\right)$ is the value function of a young individual who chooses to be an entrepreneur and $V_w^i\left(\cdot\right)$ is the value function of one who chooses to be a worker.

Problem of a Young Entrepreneur

The value function of a young entrepreneur is

$$V_e^i\left(a,\theta_1^i,\theta_2^i\right)=\max_{c,k,a'}\{u\left(c,l\right)+\beta\left[\pi_y\mathbb{E}\{V^i\left(a',\theta_1^{i\prime},\theta_2^{i\prime}\right)\}+\left(1-\pi_y\right)W^i\left(a'\right)\right]\}, \tag{4}$$

subject to

$$a'=\left(1-\tau_a\right)a+y_e^i-t_y\left(y_e^i-d\right)-\left(1+\tau_c\right)c, \tag{5}$$

where

$$y_e^i\equiv\theta_1^i k^\nu-\delta k-r\left(k-a\right)+y_{\text{UBI}}, \tag{6}$$

$$a\geq 0, \tag{7}$$

and

$$k\leq\phi a. \tag{8}$$

In (4), $u\left(c,l\right)$ is the period utility function, l is labor supply, c is consumption, and β is the discount factor. Entrepreneurs own their businesses, use their own labor and invest their own wealth as capital.[3] In addition to choosing consumption and next-period assets (a'), a young entrepreneur also chooses how much to borrow.[4] Their borrowing, $k-a$, is the difference between the capital that they employ in their business (k) and their own asset holdings (a). $V^i\left(\cdot\right)$ is the value function of a young individual and the expectation is with respect to the future entrepreneurial and earning abilities, $\theta_1^{i\prime}$ and $\theta_2^{i\prime}$, respectively. The abilities evolve over time according to separate first-order Markov processes $F_1^i\left(\theta_1^{i\prime}|\theta_1^i\right)$ and $F_2^i\left(\theta_2^{i\prime}|\theta_2^i\right)$. The probability that at the end of the current period a young individual will stay young is π_y. Its complement, $1-\pi_y$, is the probability that at the end of the current period a young individual will move on to the next phase of their life and become old. $W^i\left(\cdot\right)$ is the value function of an old individual. An old individual neither works nor engages in entrepreneurial

[3]We define entrepreneurs as the individuals who own a business and actively manage it. In the 2019 Survey of Consumer Finances, this corresponds to respondents whose primary occupation is listed as self-employed/partnership (`occat1`), and who report a non-zero value for actively managed business assets (`actbus`). For more details, see Cagetti and De Nardi (2006).

[4]We follow CD, Kitao (2008) and Bruggemann (2021), and model borrowing constraints as asset-based collateral constraints. There is some recent evidence that firms also face earnings-based borrowing constraints (Drechsel (2023)).

activity.[5]

In (5), a' is the next-period assets. The first term on the right-hand side, $(1-\tau_a)\,a$, is the current period assets after the payment (if applicable) of wealth tax (τ_a). The second term, y_e^i, is the total income defined in (6). The third term, $t_y\left(y_e^i - d\right)$, is the income tax function. The taxable income is net of deductions (d). The fourth and final term, $(1+\tau_c)\,c$, is consumption plus the consumption tax.

The right hand side of (6) includes entrepreneurial profits, $\theta_1^i k^\nu - (\delta + r)\,k$, asset income ($ra$) and the UBI ($y_{\text{UBI}}$) (if applicable). ν is the span of control parameter, δ is the depreciation rate of capital and r is the real interest rate.

Equation (7) is the non-negativity constraint on assets.

The amount of borrowing, as in Bruggemann (2021), depends on the entrepreneur's desired level of capital (k) and the borrowing constraint (8), where $\phi \geq 1$. If we subtract a from both sides of (8), we get

$$k - a \leq (\phi - 1)\,a, \tag{9}$$

which says that the borrowing cannot be greater than a fraction $\phi - 1$ of assets.

Problem of a Young Worker

The value function of a young worker is

$$V_w^i\left(a, \theta_1^i, \theta_2^i\right) = \max_{c,l,a'}\{u\left(c,l\right) + \beta\left[\pi_y \mathbb{E}\{V^i\left(a', \theta_1^{i\prime}, \theta_2^{i\prime}\right)\} + \left(1-\pi_y\right)W^i\left(a'\right)\right]\}, \tag{10}$$

subject to

$$a' = (1-\tau_a)\,a + y_w^i - t_y\left(y_w^i - d\right) - t_{ss}\left(y_w^i\right) - t_u\left(y_w^i\right)\mathbb{I}\left(\theta_2^i \neq 0\right) - (1+\tau_c)\,c, \tag{11}$$

$$y_w^i \equiv ra + w^i\theta_2^i l + b_u\mathbb{I}\left(\theta_2^i = 0\right) + y_{\text{UBI}}, \tag{12}$$

and (7). $V_w^i\left(\cdot\right)$ is the value function of a young worker. (10) is similar to (4) except that the young worker chooses labor supply (l) instead of the desired level of capital (k). The

[5] In an earlier version of the paper, we allowed the old the choice to become an entrepreneur. However, in equilibrium, the old entrepreneurs were just 0.004 fraction of the population. Removing this choice does not affect the main results but significantly reduces computation time.

right-hand side of (11) is similar to that of (5) except that the young workers have to pay a social-security tax, $t_{ss}(\cdot)$, and unemployment insurance, $t_u(y_w^i)$. The income of a young worker is given by (12). In addition to the asset income (ra) and the UBI (y_{UBI}) (if applicable), a young worker earns labor income ($w^i\theta_2^i l$). If a young worker is unemployed, they receive unemployment benefits equal to b_u.

2.1.3 Problem of an Old Individual

The value function of an old individual is

$$W^i(a) = \max_{c,a'}\{u(c,l) + \beta\left[\pi_o W^i(a') + (1-\pi_o)\,\eta\mathbb{E}\{V(a')\}\right]\}, \tag{13}$$

subject to

$$a' = (1-\tau_a)\,a + y_r^i - t_y\left(y_r^i - d\right) - (1+\tau^c)\,c, \tag{14}$$

$$y_r^i \equiv ra + b_{ss}^i + y_{\text{UBI}} \tag{15}$$

and (7). With probability π_o, an old individual will still be alive and remain retired over the next period. With probability $1-\pi_o$, an old individual will die and be replaced by a young descendant at the start of the next period. $V(\cdot)$ is the value function of the young. The expectation is with respect to their college decision before they draw ψ, their idiosyncratic cost of attaining a college degree. Specifcally,

$$\mathbb{E}\{V(a')\} = \pi_c(a')\,\mathbb{E}\{V^C\left(a', \theta_1^C, \theta_2^C\right)\} + (1-\pi_c(a'))\,\mathbb{E}\{V^{NC}\left(a', \theta_1^{NC}, \theta_2^{NC}\right)\}, \tag{16}$$

where $\pi_c(a')$ is defined in (2) and the value functions are defined in (3). Parameter $\eta \in [0,1]$ measures the degree of altruism.[6] The right-hand side of (14) is similar to (5) except that their income (y_r^i) is given by (15). In addition to the asset income and the UBI (y_{UBI}) (if applicable), a retiree receives social security benefits b_{ss}.

[6]This is the simplest form of intergenerational connection. In addition to the transfer of assets, there could be other channels, e.g. marriage networks and connections to other elite families, that result in persistence of wealth (Ager et al. (2021)).

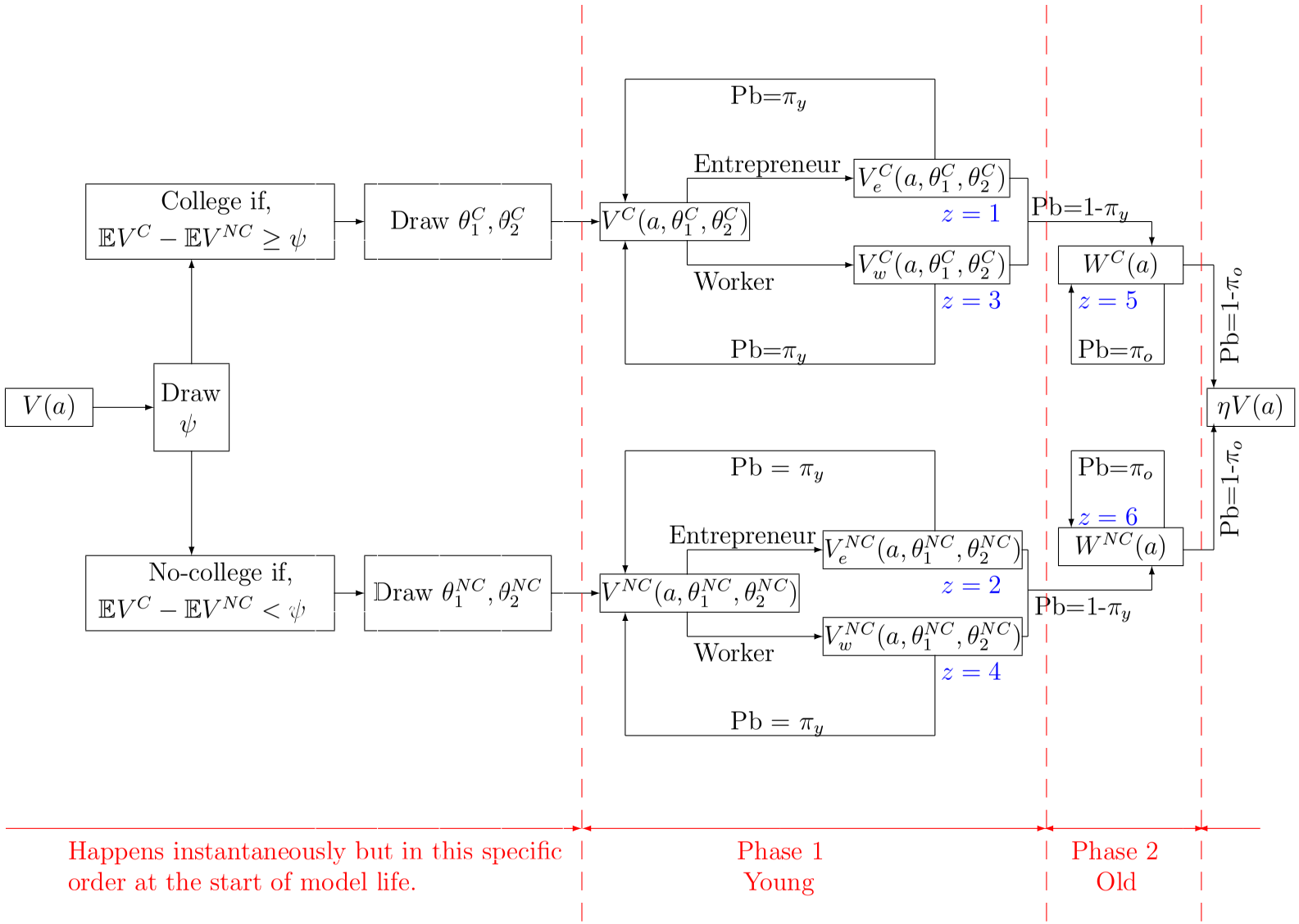
2.1.4 Timeline of an Individual's Life

The following is the timeline of an individual's life.

1. Start life with assets a inherited from the parent.
2. Draw ψ, the idiosyncratic cost of attaining a college degree.
3. Based on the ψ draw, decide whether to obtain a college degree.
4. Based on the college decision, $i = \{C, NC\}$, draw θ_1^i (entrepreneurial ability) and θ_2^i (earning ability) from their respective invariant distributions.
5. Based on the individual state $\{a, \theta_1^i, \theta_2^i\}$, make the occupational choice to become either an entrepreneur or a worker.
6. If the occupational choice is to become an entrepreneur, choose c, k and a'. If the occupational choice is to become a worker, choose c, l and a'.
7. If remained young, an event that happens with probability π_y, observe the next realizations of Markov processes $F_1^i\left(\theta_1^{i\prime}|\theta_1^i\right)$ and $F_2^i\left(\theta_2^{i\prime}|\theta_2^i\right)$ and go back to 5 above. If became old, an event that happens with probability $1 - \pi_y$, move on to 8 below.
8. Based on the individual state $\{a\}$, choose c and a'.
9. If remained old, an event that happens with probability π_o, go back to 8 above. If died, an event that happens with probability $1 - \pi_o$, be replaced by a young decendant who inherits the end-period assets a'.

Events 1 to 4 in the timeline happen instantaneously, though still in that order, before the start of the first phase of life. Events 5 and 6 constitute the first phase. Event 7 reveals whether the individual will remain in the first phase over the next period, or move on to the second phase. Event 8 constitutes the second phase. Event 9 reveals whether the individual will remain in the second phase over the next period, or die and be replaced by a descendant. In the latter case, the descendant will start their life from event 1 at the start of the next period. Figure 1 presents a schematic representation of the household problem.

Figure 1: A Schematic Representation of the Household's Problem



2.2 Production Sector

There are two production sectors: entrepreneurial and corporate. We model a separate entrepreneurial sector to represent the small units of production owned by self employed individuals. The corporate sector is standard and perfectly competitive.

2.2.1 Entrepreneurial Sector

The entrepreneurial sector consists of the young entrepreneurs. Each entrepreneur employs their own labor and produces according to the following production function:

$$f^i(k) = \theta_1^i k^\nu, \tag{17}$$

where θ_1^i is their entrepreneurial ability that evolves according to a Markov process $F_1^i(\theta_1^{i\prime}|\theta_1^i)$, and $\nu \in (0,1)$ is a span-of-control parameter. Depending on their entrepreneurial ability, some entrepreneurs may optimally choose $k \leq a$ and not borrow. Others may choose $k > a$ and borrow the difference $k-a$. However, they can only borrow up to a fraction $\phi-1$ of their assets. Two important features differentiate firms in the entrepreneurial sector from those in the corporate sector: the uninsurable entrepreneurial risk and the borrowing constraint.

2.2.2 Corporate Sector

The corporate sector uses labor supplied by the young workers and produces according to the following production function:

$$F(K_c, L_c) = K_c^\alpha L_c^{1-\alpha}. \tag{18}$$

where K_c is the capital employed by the corporate sector and L_c is a CES aggregate of college $\left(L_c^C\right)$ and non-college workers $\left(L_c^{NC}\right)$:

$$L_c = \left[\xi \left(L_c^C\right)^{\frac{\sigma-1}{\sigma}} + (1-\xi)\left(L_c^{NC}\right)^{\frac{\sigma-1}{\sigma}}\right]^{\frac{\sigma}{\sigma-1}}, \tag{19}$$

where $\xi \in (0,1)$ is a distribution parameter and $\sigma > 0$ is the elasticity of substitution between the two types of labor. The corporate sector is perfectly competitive and pays capital and both types of labor their marginal products.

2.3 Government Sector

We describe the government sector separately for the benchmark and UBI economies.

2.3.1 Benchmark Economy

The government in the benchmark economy has three types of expenses: (1) It pays the old retirees the retirement benefits (social-security payments) b_{SS}, which aggregate to B_{SS} (see the definition of equilibrium below for details); (2) it pays the unemployed workers unemployment benefits b_u , which aggregate to B_u; and (2) it has other expenses equal to G. This simple expenditure structure is the same as in Bruggemann (2021) except that we have added unemployment benefits to it.

On the revenue side, the government has four sources of financing: (1) Income tax (T_y); (2) Social-security tax (T_{ss}); (3) Consumption tax (T_c) and (4) Unemployment insurance (T_u). Income is taxed under a progressive tax system, approximated by a stepwise function with m tax brackets and corresponding marginal tax rates τ_i, where $i = 1, ..., m$. This stepwise tax function reflects the structure of the statutory federal income tax schedule in the United States. If y is the taxable income less deductions (d), the stepwise income tax function is

$$t^F(y) = \left\{ \begin{array}{ll} \tau_1 y & \text{if } y \leq Y_1 \\ \tau_1 Y_1 + \tau_2 (y - Y_1) & \text{if } Y_1 \leq y \leq Y2 \\ \vdots & \\ \tau_1 Y_1 + \tau_2 (Y_2 - Y_1) + \cdots + \tau_m (y - Y_m) & \text{if } Y_m \leq y \end{array} \right\} \tag{20}$$

where Y_i is the taxable income brackets. The exclusion of tax credits from deduction (d) creates a wedge between statutory and effective marginal tax rates. To correct for this, we follow Bruggemann (2021) and multiply $t^F(y)$ by an adjustment factor τ_{adj}:

$$t_y(y) = \tau_{adj} t^F(y). \tag{21}$$

The economy-wide income tax revenue is T_y.

We follow Conesa et al. (2023) in modeling consumption and social-security taxes. The consumption tax is a fixed fraction τ_c of consumption. The social-security tax is a fraction τ_{ss} of each young worker's income up to a maximum upper limit of $\hat{y}_{ss}$:

$$t_{ss}(y_w) = \tau_{ss} \min(y_w, \hat{y}_{ss}). \tag{22}$$

The aggregate consumption and social-security tax revenues are T_c and T_{ss}.

We assume that the total unemployment benefits are solely funded by unemployment insur-

ance contributions. Hence,

$$B_u = T_u. \tag{23}$$

When we compute the general equilibrium of this economy, we fix the individual unemployment benefits and adjust the unemployment insurance contribution rate until the above condition is satisfied.

The government's period constraint for the other items in its budget is

$$G + B_{ss} = T_{ss} + T_c + T_y. \tag{24}$$

Let parameter $\bar{g}$ denote the ratio of the total government expenditure to GDP. This implies $\bar{g} = (B_{ss} + G)/Y$. Because B_{ss} and Y are endogenously determined in general equilibrium, G is also endogenously determined and is equal to $\bar{g}Y - B_{ss}$. The total tax revenue on the right-hand side of the government's budget constraint is also endogenous. When we compute the numerical stationary equilibrium of this economy, we adjust τ_{adj} until the government's budget constraint is satisfied.

2.3.2 UBI Economy

In the UBI economy, every period, the government pays every individual a fraction κ_{UBI} of the annual wage of a person without college and with an average earning ability:

$$y_{\text{UBI}} = \kappa_{\text{UBI}} w^{NC} \bar{\theta}_2^{NC}. \tag{25}$$

The UBI expenses aggregate to Y_{UBI}. Our default financing option to pay for UBI is an across-the-board proportional increase in $t_y(y)$, the income tax payable, that balances the government budget.[7] We multiply each individual's payable tax $t_y(y)$ by a factor μ, which we call the *UBI tax multiple*. When computing equilibrium of the UBI economy, we adjust the tax multiple until the government budget is balanced while keeping τ_{adj} at the level of the benchmark equilibrium. In the benchmark economy, $\mu = 1$. We also consider alternative financing options that include increasing the consumption tax (τ_c) or introducing a wealth tax (τ_a). The reasons for considering these alternative modes of financing are the following. Consumption tax is already quite common and some of the existing macroeconomic studies of UBI use it as their default financing option. Some OECD countries have experimented

[7] The rationale behind designating income tax as the default financing option is its status as a primary revenue stream for the federal government, with its rate, particularly for top income earners, historically demonstrating significant volatility.

with wealth taxes and it regularly appears in academic and policy discussions as a potential source of government funds.[8] The government's budget constraint in the economy with the UBI is

$$G + B_{ss} + Y_{\text{UBI}} = T_{ss} + T_c + T_y + T_a. \tag{26}$$

The unmeployment benefits and insurance contributions work in the same way in the UBI economy as they do in the benchmark economy.

2.4 Stationary Equilibrium

Let $\mathbf{s} = \{a, \theta_1, \theta_2, z\} \in \mathcal{S}$ be the state vector of an individual. State variable a is relevant for all types of individuals. State variable θ_1 is relevant for young individuals and could be either θ_1^C or θ_1^{NC} depending on whether the person has a college degree. Similarly, state variable θ_2 is relevant for young individuals and could be either θ_2^C or θ_2^{NC}. State variable z distinguishes among the six types of individuals in the model. There are four types of young individuals: an entrepreneur with or without college, and a worker with or without college. There are two types of old individuals: retirees with or without college. See appendix Table $A.1$ for a description of each of the six z types.

A stationary equilibrium consists of a risk-free interest rate r, wage rates for college and non-college workers, w^C and w^{NC}, and adjustable tax rates τ_j, $j = \{adj, a, c, e\}$ and τ_u, decision rules $c(\mathbf{s})$, $l(\mathbf{s})$, $a'(\mathbf{s})$ and $k(\mathbf{s})$, and educational and occupational choices and a population invariant distribution $m^*(\mathbf{s})$ such that the following conditions are statisfied:

1. The decision rules $c(\mathbf{s})$, $l(\mathbf{s})$, $a'(\mathbf{s})$ and $k(\mathbf{s})$ solve the above maximization problems.
2. The capital market clears

$$\int a(\mathbf{s})\, dm^*(\mathbf{s}) = K_c + \int k(\mathbf{s})\, dm^*(\mathbf{s}).$$

3. Entrepreneurs use their own labor and work the average hours in the model. The aggregate labor supplied by the young workers (with or without college), adjusted for

[8] For an overview of the recent wealth tax policies of OECD countries, see Scheuer and Slemrod (2021). Guvenen et al. (2023) and Boar and Midrigan (2023) provide contrasting comparisons between wealth and capital income taxes. Also see Piketty (2014) and Saez and Zucman (2019).

their earning ability, is equal to the labor demanded by the corporate sector

$$\int \mathbb{I}\left(z=3\right)\theta_2^C l\left(\mathbf{s}\right)dm^*\left(\mathbf{s}\right)=L_c^C$$

and

$$\int \mathbb{I}\left(z=4\right)\theta_2^{NC} l\left(\mathbf{s}\right)dm^*\left(\mathbf{s}\right)=L_c^{NC}.$$

4. The wage rates are equal to the marginal products of the two types of labor in the corporate sector

$$w^C=\frac{\partial F\left(K_c,L_c\right)}{\partial L_c^C}=\left(1-\alpha\right)\left(\frac{K_c}{L_c}\right)^{\alpha}\xi\left(\frac{L_c^C}{L_c}\right)^{-1/\sigma}$$

and

$$w^{NC}=\frac{\partial F\left(K_c,L_c\right)}{\partial L_c^{NC}}=\left(1-\alpha\right)\left(\frac{K_c}{L_c}\right)^{\alpha}\left(1-\xi\right)\left(\frac{L_c^{NC}}{L_c}\right)^{-1/\sigma}.$$

5. The interest rate is equal to the marginal product of capital (net of depreciation) in the corporate sector

$$r=\alpha\left(\frac{K_c}{L_c}\right)^{\alpha-1}-\delta.$$

6. The unemployment benefits are funded by the unemployment insurance contributions:

$$B_u=T_u,$$

where

   (a) $B_u=b_u\int\left[\mathbb{I}\left(\theta_2^C=0\right)\mathbb{I}\left(z=3\right)+\mathbb{I}\left(\theta_2^{NC}=0\right)\mathbb{I}\left(z=4\right)\right]dm^*\left(\mathbf{s}\right)$, and

   (b) $T_u=\int\mathbb{I}\left(\theta_2^C\neq 0\right)\mathbb{I}\left(z=3\right)t_u\left(y_w^C\left(\mathbf{s}\right)\right)dm^*\left(\mathbf{s}\right)+\int\mathbb{I}\left(\theta_2^{NC}\neq 0\right)\mathbb{I}\left(z=4\right)t_u\left(y_w^{NC}\left(\mathbf{s}\right)\right)dm^*\left(\mathbf{s}\right).$

7. The rest of the government budget is balanced every period:

$$G+B_{ss}+Y_{\text{UBI}}=T_{ss}+T_c+T_y+T_a, \tag{27}$$

where

   (a) $B_{ss}=b_{ss}^C\int\mathbb{I}\left(z=5\right)dm^*\left(\mathbf{s}\right)+b_{ss}^{NC}\int\mathbb{I}\left(z=6\right)dm^*\left(\mathbf{s}\right)$,

   (b) $Y_{\text{UBI}}=y_{\text{UBI}}\int dm^*\left(\mathbf{s}\right)$,

   (c) $T_{ss}=\int\mathbb{I}\left(z=3\right)t_{ss}\left(y_w^C\left(\mathbf{s}\right)\right)dm^*\left(\mathbf{s}\right)+\int\mathbb{I}\left(z=4\right)t_{ss}\left(y_w^{NC}\left(\mathbf{s}\right)\right)dm^*\left(\mathbf{s}\right)$,

(d) $T_c = \tau_c \int c(\mathbf{s})\, dm^*(\mathbf{s})$,

(e) $T_y = \tau_{adj} \int t_y(y(\mathbf{s}))\, dm^*(\mathbf{s})$, and

(f) $T_a = \tau_a \int a(\mathbf{s})\, dm^*(\mathbf{s})$.

8. The distribution m^* is the invariant distribution: $m^* = M(m^*)$, where M is a transition operator that gives the next-period distribution m', starting from the current-period distribution m: $m' = M(m)$.

2.5 Calibration

There are three sets of parameters in the model. The parameters in the first two sets (see Tables 3 and 4) are fixed and those in the third set (see Table 5) are calibrated to match certain targets in the data.

Table 3: Fixed Parameters

Parameter	Value	Comments
Utility		
ζ_c	1.5	Attanasio et al. (2022) , CD and Bruggemann (2021)
ζ_l	2.0	Daruich and Fernandez (2024)
Technology		
δ	0.06	Stokey and Rebelo (1995), CD and Bruggemann (2021)
α	0.33	Gollin (2002), CD and Bruggemann (2021)
σ	1.75	Daruich and Fernandez (2024)
ξ	0.47	Daruich and Fernandez (2024)
Demographic		
π_y	0.978	Avg. working life = 46 years
π_o	0.933	Avg. retired life = 15 years
Earning Ability		
θ_2^i	See text	Vector of college and non-college earnings abilities
$\mathbf{P}_{\theta_2^i}$	See text	Transition matrix of college and non-college earning abilities
Entrepreneurial Ability		
θ_1^i	See text	Vector of college and non-college entrepreneurial ability
$\mathbf{P}_{\theta_1^i}$	See text	Transition matrix of college and non-college entrepreneurial ability
Other		
η	1	CD and Bruggemann (2021)
ϕ	1.5	Kitao (2008) and Bruggemann (2021)

In Table 3, we report the first set of parameters. The first column of the table contains parameter symbols and the second, parameter values. In the third column, we either cite

the study or provide some other information about the parameter. We assume a separable utility function of the form

$$u(c,l) = \frac{c^{1-\zeta_c}}{1-\zeta_c} - \vartheta \frac{l^{1+\zeta_l}}{1+\zeta_l}, \tag{28}$$

where ζ_c denotes the coefficient of relative risk aversion, and ζ_l represents the inverse of the Frisch elasticity of labor supply. We set ζ_c equal to 1.5 and ζ_l equal to 2. The parameter ϑ is calibrated below.

The capital depreciation rate is set at 6 percent ($\delta = 0.06$), and the capital share in the corporate sector is 33 percent ($\alpha = 0.33$). The elasticity of substitution between college and non-college workers is $\sigma = 1.75$, and the distribution parameter in the CES aggregation of labor types is $\xi = 0.47$, implying a 47 percent weight on college-educated workers.

The probability that a young individual remains young at the end of a period, without transitioning to old age, is set to 97.8 percent ($\pi_y = 0.978$), corresponding to an average working life of 46 years, from age 18 to 64. Similarly, the probability that an old individual survives and remains old at the end of the period is 93.3 percent ($\pi_o = 0.933$), which implies an average retirement duration of 15 years.

The earning process is modeled separately for individuals with and without a college degree. For each group, we estimate an AR(1) earnings process using PSID data and discretize it into an eight-state Markov chain following Tauchen (1986). The resulting earnings grids (θ_2^{NC} and θ_2^{C}), transition matrices ($\mathbf{P}_{\theta_2^{NC}}$ and $\mathbf{P}_{\theta_2^{NC}}$), and invariant distributions ($\mu_{\theta_2^{NC}}$ and $\mu_{\theta_2^{C}}$) are reported in Appendix A.2.

The vector of entrepreneurial ability for college and non-college is fixed and the same as in CD:

$$\theta_1^{NC} = \theta_1^{C} = \begin{bmatrix} 0 & 0.50 \end{bmatrix}$$

and the transition matrix of non-college entrepreneurial ability is

$$P_{\theta_1^{NC}} = \begin{bmatrix} 1-\pi_{nc^{12}} & \pi_{nc^{12}} \\ \pi_{nc^{21}} & 1-\pi_{nc^{21}} \end{bmatrix}.$$

The entry rate, ($\pi_{nc^{12}} = 0.0314$), is set to match the observed fraction of non-college workers who transition into entrepreneurship. The exit rate, $\pi_{nc^{21}}$, representing the share of non-college entrepreneurs who return to wage work, is calibrated to match the fraction of the

observed non-college entrepreneurs.

The invariant distribution of non-college entrepreneurial ability is

$$\mu_{\theta_1^{NC}} = \begin{bmatrix} 0.85 & 0.15 \end{bmatrix}^T.$$

Similarly the transition matrix of college entrepreneurial ability is

$$P_{\theta_1^C} = \begin{bmatrix} 1 - \pi_{c^{12}} & \pi_{c^{12}} \\ \pi_{c^{21}} & 1 - \pi_{c^{21}} \end{bmatrix}.$$

The entry rate for college entrepreneurs is $\pi_{c^{12}} = 0.0627$ and the exit rate, $\pi_{c^{21}}$ is calibrated to match the fraction of the observed college entrepreneurs

The invariant distribution of college entrepreneurial ability is

$$\mu_{\theta_1^{NC}} = \begin{bmatrix} 0.78 & 0.22 \end{bmatrix}^T.$$

We set the altruism parameter $\eta = 1$, implying that individuals value the utility of their offspring equally to their own. The borrowing constraint parameter is set to $\phi = 1.5$, which allows entrepreneurs to borrow up to 50 percent of their own assets.

Table 4: Fixed Parameters (Government Sector)

Parameter	Value	Comments
b^{NC}	0.3953	Social Security Administration (2019)
b^C	0.2743	Social Security Administration (2019)
d	$0.2524 w^{NC} \bar{\theta}_2^{NC}$	Tax Policy Center (2020)
$\bar{g}$	0.21	Government expenditure as a fraction of GDP, Budget 2019
τ_i	See text	US statutory federal income tax code 2019
τ_c	0.05	Conesa et al. (2009)
τ_{ss}	0.124	Conesa et al. (2009)
$\hat{y}_{ss}$	$1.83 w^{NC} \bar{\theta}_2^{NC}$	Conesa et al. (2009)
$\hat{y}$	$7.02 w^{NC} \bar{\theta}_2^{NC}$	US statutory federal income tax code 2019

We report the second set of parameters in Table 4. These are the fixed parameters related to the government sector. Following Kotlikoff et al. (1999), we compute retirement benefit rates using the U.S. Social Security Administration's statutory formula, which applies progressive

bend points to average indexed monthly earnings (AIME). Using this structure, we obtain distinct average benefit rates for non-college retirees ($b^{NC} = 0.3953$) and college-educated retirees ($b^{C} = 0.2743$), reflecting differences in their lifetime earnings trajectories. The income tax deduction limit is set at 25.24 percent of the labor income of a non-college worker with average ability ($d = 0.2524 w^{NC} \bar{\theta}_2^{NC}$), which corresponds to the standard deduction of $18,350 available to heads of household in 2019.

We set the share of government expenditure in GDP at 21 percent ($\bar{g} = 0.21$). In 2019, the U.S. federal marginal income tax schedule included seven brackets with rates $\tau_i \in \{0.10, 0.12, 0.22, 0.24, 0.32, 0.35, 0.37\}$. The consumption tax rate is set at 5 percent ($\tau_c = 0.05$) and the Social Security tax at 12.4 percent ($\tau_{ss} = 0.124$). The Social Security income ceiling is set to 1.83 times the labor income of a non-college worker with average ability, corresponding to the 2019 cap of $132,900 in earnings ($\hat{y}_{ss} = 1.83 w^{NC} \bar{\theta}_2^{NC}$). Finally, the threshold for the highest federal income tax bracket is set at 7.02 times the average earning ability of a young non-college worker, also corresponding to the $510,300 cutoff ($\hat{y} = 7.02 w^{NC} \bar{\theta}_2^{NC}$).

Table 5: Calibrated Parameters

Parameter	Value	Comments
ϑ	20	Utility weight of labor
β	0.87	Discount factor
$\pi_{nc^{21}}$	2.40	Exit rate non-college entrepreneurs
$\pi_{c^{21}}$	2.65	Exit rate college entrepreneurs
ν	0.94	Entrepreneurial span of control
ψ	9	Mean utility cost of college

Table 5 reports the values of the calibrated parameters. These parameters are jointly chosen to match six empirical targets: the average working hours (1765 hours per year), the capital-output ratio (2.66), the fraction of entrepreneurs among non-college-degree holders (5.26%), the fraction of entrepreneurs among college-degree holders (8.63%), the wealth Gini coefficient (0.85), and the ratio of college to non-college in the population (0.57).

The utility weight on labor, ϑ, is calibrated to match the observed average working hours. The discount factor, β, is set to target the aggregate capital-output ratio. Entrepreneurial exit rates for non-college ($\pi_{nc^{21}}$) and college-educated ($\pi_{c^{21}}$) individuals are chosen to match the observed fraction of entrepreneurs within each education group. The entrepreneurial span of control, ν, is set to replicate the wealth Gini coefficient. Following Heathcote et al. (2010), the mean utility cost of college, ψ, is calibrated to reproduce the observed college-

to-non-college ratio in the population.[9]

2.6 Computation

We compute the numerical stationary equilibrium of the model in three steps:[10]

1. We set initial prices and tax adjustment parameter, and simultaneously solve for the value functions of the six types of consumers. The solution also generates numerical decision rules for each type.

2. Based on the optimal decision rules from the first step, we compute the invariant population distribution.

3. By combining the consumers' decision rules, the invariant population distribution and solutions to the firms' problems, we compute the aggregate quantities and check if the general equilibrium market clearing conditions and the government's budget constraint are satisfied. If they are, we stop. If not, we update the prices and tax adjustment parameter and repeat the above steps.

3 Results

We have divided this section into two subsections. In section 3.1, we discuss the results for the benchmark economy and in section 3.2, we present the main results of this paper by extending the baseline model to incorporate UBI.

3.1 Benchmark Economy

3.1.1 Calibration Targets

We calibrate six model parameters to target six empirical moments (see Table 5). As shown in Table 6, the model closely replicates these targets, with an average absolute deviation of only 2.2 percent. The largest deviation arises in the fraction of entrepreneurs among college-educated individuals, which the model computes to be 9.42 percent, compared to 8.63 percent in the data. This moment is sensitive to the exit rate of entrepreneurs with a college education. While lowering the exit rate helps bring the model moment closer to the data, it also amplifies wealth concentration and pushes the model away from other distributional

[9]The standard deviation of ψ is fixed and set eqaul to 3.

[10]The computational code is available upon request from the authors.

targets such as the wealth Gini and the share of wealth held at the top. Given that individual parameters influence multiple moments simultaneously, we chose the calibrated parameter values that minimized the average deviation of model moments from data.

Table 6: Calibration Targets: Model vs. Data

Calibration Target	Data	Model
Average weekly working hours	33.9	33.7
Capital-output ratio	2.66	2.66
Fraction of entrepreneurs among non-college graduates (%)	5.26	5.29
Fraction of entrepreneurs among college graduates (%)	8.63	9.42
Wealth Gini coefficient	0.85	0.85
Ratio of college graduates to non-college	0.57	0.56

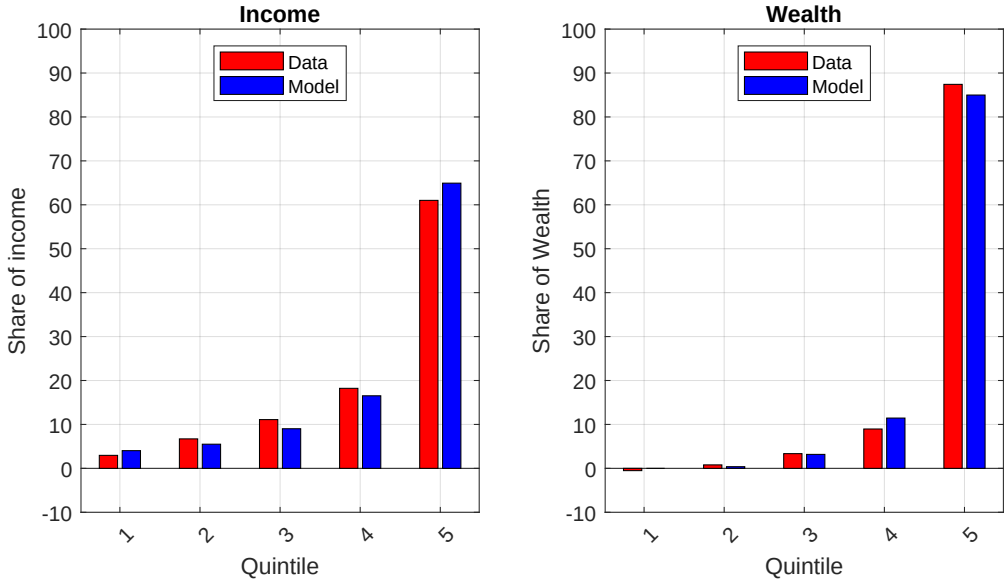
3.1.2 Some Nontargeted Statistics

When calibrating the parameters, we aim at some overall income or wealth-related targets like the capital-output ratio and wealth Gini coefficient, but do not specifically target the entire income and wealth distributions. An important test of external validation of the model is how well it matches the broad income and wealth distributions. In Figure 2, we compare the model's predictions with the observed income shares (left panel) and wealth shares (right panel) across population quintiles. The model closely matches the income and wealth distributions in the data. For wealth, the top quintile holds 87.4 percent in the data, compared to 85 percent in the model. Conversely, the model overstates the fourth quintile's share (11.5% vs. 9.0%) while slightly understating the third and second quintiles (3.2% and 0.4% vs. 3.4% and 0.8%). The bottom quintile holds negative wealth in the data, but zero in the model, reflecting the constraint of non-negative assets in the model. For income, the model assigns 64.9 percent to the top quintile, compared to 61 percent in the data, and closely approximates the remaining quintiles (16.5%, 9.0%, 5.5%, and 4.0% vs. 18.2%, 11.1%, 6.7%, and 3.0%).[11]

Accurately capturing the full distribution is essential for our analysis, as we aim to assess how a universal, unconditional transfer financed by taxation impacts the distribution of income and wealth. Similarly, since both the incidence of taxation and the general equilibrium effects of UBI hinge on the concentration of resources at the top, the model's strong fit to

[11]Daruich and Fernandez (2024) present a similar figure (their Figure 3), using labor earnings as their income measure. While their model provides a closer fit to the income distribution, our framework delivers a better match to the wealth distribution.

Figure 2: Model Validation: Income and Wealth Distributions



these distributional moments strengthens its credibility for policy evaluation. Given that a disproportionate share of income and wealth is held by a small fraction of the population, Table 7 zooms in on the top percentiles of the distribution. The model closely replicates the observed concentration; for example, it matches the wealth held by the top 1% (37.3% in the data and 38.6% in the model) and the top 5% (64.9% in the data and 64.7% in the model).

Table 7: Wealth at the Top: Data vs. Model

	Percentage Wealth in Top				
	1%	5%	10%	20%	40%
Data	37.3	64.9	76.5	87.4	96.4
Model	38.6	64.7	76.2	87.5	97.2

3.2 UBI Economy

We evaluate the macroeconomic and welfare implications of introducing a UBI policy that provides all adults with an unconditional, lump-sum transfer of $10,000 per year,[12] measured in 2019 dollars. This amount of UBI is similar to that used in recent quantitative macroeconomic studies. For example, Golosov et al. (2024) consider a UBI of the same magnitude

[12]In section 3.2.2, we show the welfare effects of different amounts of UBI

and emphasize its sizable effects on labor supply and fiscal efficiency. Likewise, Daruich and Fernandez (2024) analyze a long-run UBI policy of $8000 in 2010 dollars (calibrated at $1,000 per month in 2020 dollars) and document significant general equilibrium and intergenerational effects. By adopting a policy amount grounded in both academic and public discourse, our analysis remains consistent with the leading literature while also reflecting a level that has received serious policy consideration.[13]

To ensure fiscal sustainability, our baseline analysis assumes that the program is revenue-neutral, with the full cost of the UBI financed through an increase in payable income taxes. In Section 3.2.4, we explore alternative financing mechanisms to assess the sensitivity of the results.

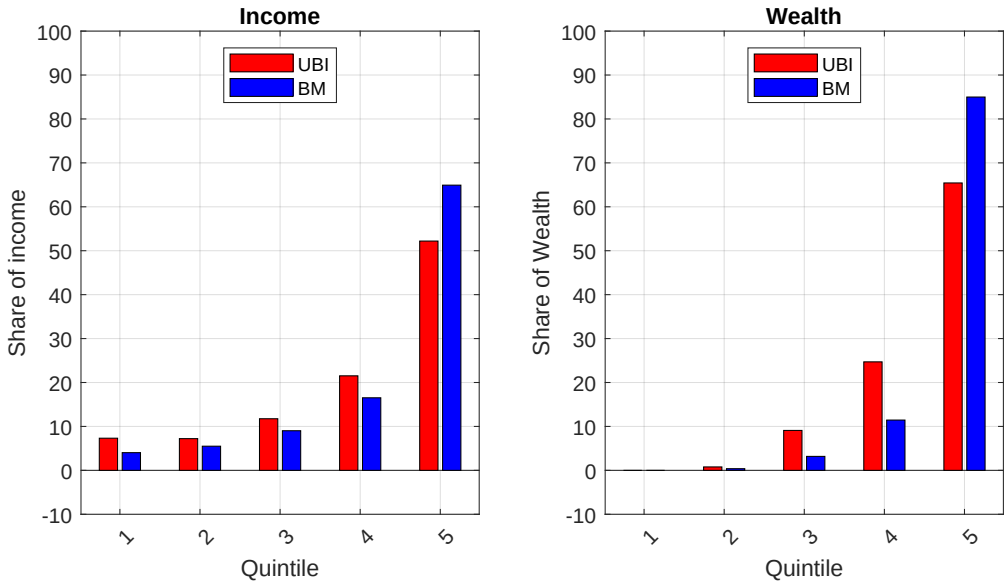
3.2.1 Long-term Effects of the UBI Policy

A central motivation for UBI is its potential to reshape the distribution of resources and to influence macroeconomic aggregates through behavioral responses. At the same time, the program must be financed, raising questions about the trade-offs between redistribution, efficiency, and fiscal cost. To structure the analysis, we address the following questions: (1) How does UBI affect income and wealth distributions? (2) What are the effects on key aggregates such as capital accumulation and output? (3) What is the impact on the entrepreneurial sector? (4) How are different types of individuals affected? (5) What is the fiscal cost of financing UBI in terms of higher taxes?

Income and Wealth Distributions: Figure 3 presents the distributional consequences of a UBI policy by comparing the benchmark economy to the policy scenario. The introduction of UBI significantly compresses the distribution of both income and wealth. The income share of the top quintile falls from 65 percent to 52 percent, with gains accruing across the bottom four quintiles. The effects on wealth inequality are even more pronounced: the top 20 percent of the population sees its wealth share decline from 85 percent to 65 percent, with gains accruing across the bottom quintiles. The Gini coefficient for wealth drops from 0.85 to 0.69. These findings are broadly consistent with Daruich and Fernandez (2024), Guner et al. (2023), and Luduvice (2024), all of whom report significant reductions in inequality under comparable UBI schemes. In each case, the introduction of UBI shifts resources away from higher-income households and compresses the income and wealth distributions.

[13]The annual UBI mirrors the "Freedom Dividend" proposed by Andrew Yang during the 2020 U.S. presidential campaign, which called for an unconditional cash transfer of $1,000 per month to every American adult.

Figure 3: Effects of UBI on Income and Wealth Distributions



Aggregate Effects: In Table 8, we show some aggregate effects of UBI. The policy discourages capital accumulation by reducing incentives to save, which leads to a contraction in private savings. As a result, the aggregate capital stock declines, with total capital demand falling from 1.43 to 0.68 in model units.[14] This reduction in capital supply causes a sharp increase in the equilibrium interest rate, rising from 5.6 percent to 11.9 percent. Capital becomes more expensive for firms and entrepreneurs. Consequently, the share of total capital absorbed by the entrepreneurial sector falls from 37.2 percent to 31.3 percent, reflecting the increased difficulty of financing large scale investments under higher borrowing costs.

The overall size of the economy contracts under the UBI policy, with GDP declining from 0.54 to 0.34 in model units.[15] The composition of output also shifts, with the share of consumption rising from 67.8 percent to 73.9 percent, while investment falls from 16.0 percent to 11.1 percent of GDP. These patterns reflect a reallocation of resources toward current consumption and away from productive investment, consistent with reduced savings and diminished capital accumulation. The decline in investment exceeds the decline in output, resulting in a lower capital-to-output ratio, which falls from 2.7 in the benchmark economy to 1.9 under UBI. Interestingly, the share of entrepreneurs in the population increases modestly from 6.8 percent to 7.1 percent. This rise reflects an extensive-margin adjustment, as the

[14] A model unit is equal to the average earnings of a non-college worker in equilibrium, and the population is normalized to one.

[15] This corresponds to a drop from \$66,515 (GDP per capita) in the benchmark economy to \$53,005 (GDP per capita) in the UBI economy, using average earnings of a non-college worker for calibration.

Table 8: Some Aggregate Effects of UBI

	BM	UBI
Capital Demand (in model units)		
Entrepreneurial Sector	0.53	0.21
(Percent of total)	(37.2%)	(31.3%)
Corporate Sector	0.90	0.47
(Percent of total)	(62.8%)	(68.7%)
Total	1.43	0.68
Consumption, Investment and GDP (in model units)		
Consumption	0.36	0.25
(Percent of GDP)	(67.8%)	(73.9%)
Investment	0.09	0.04
(Percent of GDP)	(16.0%)	(11.1%)
GDP	0.54	0.34
Capital-Output Ratio		
Entrepreneurial Sector	2.4	2.2
Corporate Sector	2.8	1.8
Overall	2.7	1.9
Entrepreneurs (% of population)	6.8%	7.1%

Note: The sum of individual items does not always add up to the total due to rounding.

unconditional income provided by UBI relaxes subsistence constraints and enables a broader set of individuals to become entrepreneurs. The transfer is large enough to support initial business activity or reduce the need for external financing, thereby lowering the threshold for entrepreneurial entry.

Impact on the Entrepreneurial Sector: The entrepreneurial sector is sensitive to UBI because returns depend heavily on access to external finance and the scale of capital investment. By relaxing subsistence constraints, UBI expands the pool of potential entrepreneurs. However, higher interest rate raises borrowing costs and sharply curtail the ability of entrepreneurs to leverage their own assets into larger projects. As reported in Table 9, entrepreneurial borrowing falls by 60 percent, driving a 59 percent decline in entrepreneurial capital demand, substantially larger than the 47.8 percent decline observed in the corporate sector. Entrepreneurial output contracts by 55.9 percent, compared with only 19.7 percent in the corporate sector. This reallocation translates into a 12.5 percent decline in the median net worth of entrepreneurs, while the workers in the perfectly competitive corporate sector

experience a 39.1 percent increase in their median net worth. These patterns show that UBI disproportionately reduces capital deepening in the entrepreneurial sector, highlighting the sector's heightened vulnerability to borrowing costs and capital market distortions.

Table 9: Impact of UBI on the Entrepreneurial and Corporate Sectors

Sector	Capital Demand	Borrowing	Output	Median Net Worth
Entrepreneurial	–60.0%	–60.0%	–55.9%	–12.5%
Corporate	–47.8%	-	–19.7%	+39.1%

Individual Effects: In this section, we examine the effects of UBI across heterogeneous individual types in the model. Individual types are defined along two dimensions: occupational choice (entrepreneurs, workers, retirees) and educational attainment (college or non-college).

Table 10: Shares in Population, Wealth, Income and Consumption (in Percentages) Benchmark Economy vs. UBI Economy

	Population		Wealth		Income		Consumption	
Individual Type (z)	BM	UBI	BM	UBI	BM	UBI	BM	UBI
Entrepreneurs (C)	3.4	3.5	14.8	13.6	20.4	11.7	11.5	9.1
Entrepreneurs (NC)	3.4	3.6	10.0	8.8	14.1	8.1	7.9	6.0
Workers (C)	23.7	23.5	34.1	36.9	27.1	32.5	32.3	32.8
Workers (NC)	45.0	44.8	29.6	31.6	30.5	36.9	34.9	36.8
Retirees (C)	8.8	8.8	6.6	5.4	3.5	4.6	6.3	7.0
Retirees (NC)	15.7	15.7	4.9	3.6	4.5	6.1	7.0	8.3

Notes: C denotes college and NC denotes non-college. All values are expressed as percentages of the column total, and columns sum to 100 by construction.

Table 10 presents the distribution of population, wealth, income, and consumption across individual types in the benchmark and UBI economies. The shares are expressed as percentages of each respective aggregate: population, total wealth, total after-tax income, and total consumption. The introduction of UBI leads to modest changes in population composition. The fraction of entrepreneurs increases slightly, from 3.4 to 3.5 percent among college-educated individuals and from 3.4 to 3.6 percent among non-college individuals. In contrast, the shares of college and non-college workers decline marginally. The population shares of retirees remain the same.

Although the overall size of the UBI economy is smaller, reflected in lower total wealth, income, and consumption compared to the benchmark economy (see Table 8), the allocation

of these aggregates shifts significantly across types. Entrepreneurs, both college and non-college, experience significant declines in their shares of wealth and income. For example, the income share of college entrepreneurs falls from 20.4 to 11.7 percent, and their wealth share declines from 14.8 to 13.6 percent. A similar pattern holds for non-college entrepreneurs. These reductions reflect the diminished scale of entrepreneurial activity and the decline in returns to capital under the UBI policy.

By contrast, workers, especially those without a college degree, benefit in relative terms. Non-college workers experience increases in their income share (from 30.5% to 36.9%), wealth share (from 29.6% to 31.6%), and consumption share (from 34.9% to 36.8%). College workers also gain modestly across these dimensions. These changes suggest that the UBI policy compresses the income and wealth distributions by shifting resources away from high-income, capital-intensive households toward individuals who rely primarily on labor income.

Retirees also experience relative gains. Although their population shares are unchanged, both college and non-college retirees see increases in income and consumption shares, consistent with the effect of the transfer on households with limited labor income. Overall, these results indicate that UBI generates meaningful reallocation effects across population groups. Entrepreneurial households, which depend more heavily on capital income, lose relative to workers and retirees, who benefit directly from the uniform transfer. The largest relative gains accrue to non-college workers, who emerge as the primary beneficiaries of the policy.

Tax Burden: To finance the UBI policy while maintaining a balanced government budget, we introduce a proportional scaling of the payable income tax across all households. Under this scheme, balancing the budget requires raising income taxes by 43 percent.[16] To put these figures in perspective, Daruich and Fernandez (2024) demonstrate that implementing a UBI of $8,000 per adult (in 2010 dollars) requires a substantial increase in labor taxation. Specifically, the average marginal labor-income tax rate must initially rise by 28.6 percentage points, eventually increasing by a total of 34.7 percentage points over the transition period.

Another way to look at the tax burden of the UBI policy is to look at the overall public finances. In Table 11, we show the components of government expenditure and revenue as percentages of GDP for both the benchmark and UBI economies. Because the government budget is always balanced in our model, the total expenditure and revenue are equal. The introduction of UBI expands the size of the government from 21 percent of GDP to 28.8 percent. The cost of UBI is 7.8 percent of GDP, and it comes at the expense of other

[16]This means that a person paying $10,000 in income tax in the benchmark economy will have to pay $14,300 in the UBI economy.

Table 11: Public Finances
Benchmark and UBI Economy

	BM	UBI
Expenditure Item (% of GDP)		
Other Govt. Expenditure (G)	16.2	15.0
Retirement Benefits (B)	4.8	6.0
Expenditure on UBI (Y_{UBI})	-	7.8
Total	21.0	28.8
Revenue Item (% of GDP)		
Income Tax (T_y)	13.1	18.7
Social-Security Tax (T_{ss})	4.5	6.4
Consumption Tax (T_c)	3.4	3.7
Total	21.0	28.8

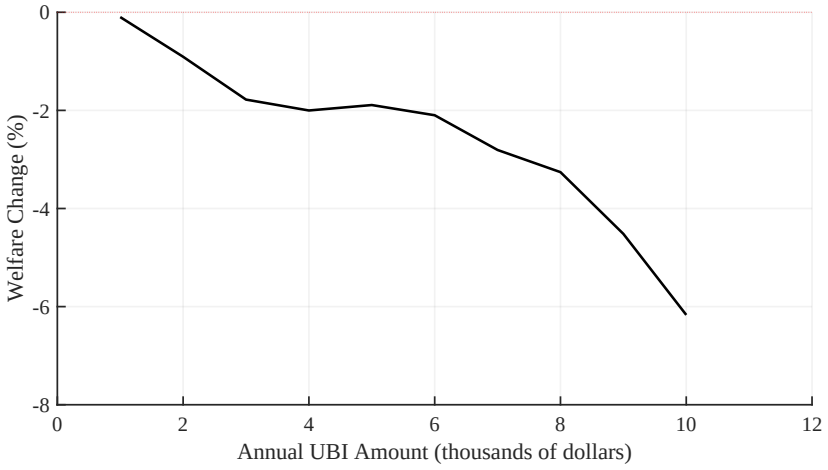
government expenses (G). Expenditure on retirement benefits rises as a share of GDP in the UBI economy. This occurs because the overall output is lower under UBI, while the level of retirement benefits remains fixed at 40 percent of the average income of a non-college worker. On the revenue side, the share of income tax in GDP increases from 13.1 to 18.7 percent. Social security and consumption tax also increase marginally.

3.2.2 Welfare Effects

We now turn to the welfare implications of implementing a UBI. Our primary objective is to assess whether providing an unconditional transfer to all individuals improves overall welfare in the economy. Figure 4 plots welfare changes across a range of UBI levels under our benchmark financing scheme, which entails a proportional increase in income taxes. Consistent with the broader literature, we observe that welfare declines as the size of the UBI transfer increases.

Our steady-state results show that an annual UBI of $10,000 financed through higher income taxes leads to an aggregate welfare loss of 6.2 percent in consumption-equivalent terms. This magnitude is substantial, though broadly consistent with findings in the existing quantitative literature evaluating the long-run effects of UBI. For instance, under a similar generous UBI amount, Daruich and Fernandez (2024) report a 6 percent welfare loss to the adult population born before the policy's implementation and a 22 percent welfare loss to their children or the population born after the reform. These findings highlight large efficiency costs associated with financing sizable unconditional transfers through distortionary taxation.

Figure 4: Welfare Effects of UBI



Other macroeconomic studies of UBI also estimate welfare losses that depend on the size of the transfer. Conesa et al. (2023) document that welfare losses rise monotonically with UBI generosity, particularly under income tax financing, although they do not report aggregate losses at the $12,000 level. Guner et al. (2023) estimate a 1.3 percent welfare loss from a much smaller, revenue-neutral UBI equivalent to only 3.2 percent of mean household income (approximately $3,100), and find that larger transfers further erode welfare. Taken together, these comparisons reinforce the view that the long-run efficiency costs of UBI rise sharply with generosity, especially under income-tax-based financing schemes.

Understanding the welfare results: The welfare effects of a UBI arise from a combination of insurance provision, financing distortions, and equilibrium adjustments. By offering a guaranteed transfer, UBI enhances consumption smoothing and reduces the need for precautionary savings, particularly among young individuals facing income uncertainty or borrowing constraints. At the same time, sustaining the program requires higher taxes, which may generate disincentives to work and alter savings behavior. These individual-level responses aggregate into general equilibrium effects that shift prices, wages, and returns to capital, with further implications for resource allocation and long-run growth. To disentangle these channels and better understand the welfare impact, Table 12 reports a series of experiments that sequentially introduce UBI, allow for price adjustments, and impose tax financing.

In the first experiment (row 1), we introduce UBI while holding all prices fixed at their benchmark values and abstracting from any tax financing. This setup corresponds to a pure

Table 12: Partial and General Equilibrium Exercises

		Changes Relative to the Benchmark Economy (%)							
Balanced Budget	General Equil.	Welfare	Inequality	K/Y	Taxes (t_y)	Hours Worked	Interest rate	College wage	Non-college wage
No	No	6.1	1.9	-9.1	-	-1.7	-	-	-
No	No	9.6	1.2	-1.9	-	-2.6	7.0	3.1	-5.5
Yes	Yes	-6.2	-17.9	-32.5	42.8	-1.9	111.5	-16.2	-21.0

Note: "Budget balanced" indicates whether taxes are adjusted to balance the government budget. The first row reports results from a partial equilibrium experiment in which a UBI is introduced without any tax adjustment and prices are held fixed as the benchmark economy. The second row allows for price adjustments while holding taxes constant as the benchmark. The third row presents the full general equilibrium scenario with a tax-financed UBI. Inequality is measured as the percentage change in the wealth Gini coefficient. K/Y denotes the capital-output ratio.

income transfer in a partial equilibrium environment. Under these assumptions, aggregate welfare increases by 6.1 percent as individuals benefit from the transfer and reduce their weekly labor supply by 1.7 percent. The capital-output ratio declines by 9.1 percent relative to the benchmark economy, reflecting lower savings and investment. Inequality, measured as a percentage change in the wealth Gini coefficient, rises slightly, likely due to the uniform nature of the transfer combined with heterogeneous behavioral responses across the population.

In the second experiment (row 2), we relax the fixed-price assumption while still abstracting from tax financing. This enables prices, wages, and interest rates to respond endogenously to behavioral changes. Welfare gains rise to 9.6 percent, driven by reallocations across individuals and markets. Although labor supply continues to decline (2.6%), the composition of labor shifts: the college wage rises (by 3.1%), while the non-college wage declines (by 5.5%), consistent with a relative reduction in college attendance. The capital-output ratio falls only slightly (1.9%) compared to the initial case (row 1: fixed prices and no tax consequences), as endogenous price adjustments mitigate the contractionary effects on investment.

In the third experiment (row 3), we present the full general equilibrium impact of a tax-financed UBI (our default experiment). The transfer is now funded by a uniform increase in income taxation, preserving budget balance. In this scenario, welfare declines by 6.2 percent, reversing the gains observed in the previous experiments. The capital-output ratio falls sharply by 32.5 percent, triggering a more than 100 percent increase in the equilibrium interest rate and substantial declines in both college and non-college wages (–16.2% and –21.0%, respectively). The labor supply response shows a decline across the three experiments, suggesting that the welfare decline is not primarily driven by labor disincentives.

Taken together, these results suggest that the welfare effects of UBI depend significantly on the financing mechanism and the general equilibrium responses. The fall in capital accumulation and associated factor price distortions emerge as the dominant channels driving long-run welfare losses when UBI is financed through distortionary taxation. The next two subsections examine the role of capital accumulation in shaping these outcomes and explore alternative modes of financing UBI.

3.2.3 Mechanism: The Role of Capital Accumulation

To assess the role of capital accumulation in driving the welfare consequences of UBI, we construct a series of counterfactual experiments that suppress the general equilibrium feedback between household saving decisions and aggregate capital formation. This design isolates the extent to which welfare costs in the baseline UBI economy reflect general equilibrium effects on capital accumulation.

Table 13: The Role of Capital Accumulation

		Changes Relative to the Benchmark Economy (%)							
	Balanced Budget	Int. Rate (r)	Capital (K)	Welfare	Inequality	Taxes (t_y)	Hours Worked	College Wage	Non-college Wage
Fixed r	Yes	-	-22.1	-0.8	-2.2	48.8	0.2	4.8	-3.9
Fixed K	Yes	-47.9	-	-2.3	-4.4	104.5	1.5	21.1	8.1
Fixed K & t_y	No	-36	-	6.2	0.8	43	0.3	16.2	4.8

Note: "Balanced Budget" indicates whether taxes are adjusted to balance the government budget. In row 3, the UBI tax multiple is fixed at $t_y = 1.43$ without imposing a budget balance, providing an off-equilibrium counterfactual that isolates the capital accumulation channel. Inequality is measured as the percentage change in the wealth Gini coefficient.

Row 1 of Table 13 reports outcomes when the interest rate is held fixed at its benchmark value. With borrowing costs constant, aggregate capital demand declines by 22 percent, substantially less than in the baseline UBI economy, and welfare losses shrink dramatically, from –6.2 percent in the baseline to only –0.8 percent. This exercise highlights how the increase in borrowing costs under UBI amplifies the contraction in investment and drives welfare losses.

Row 2 fixes the aggregate capital stock at its benchmark level while allowing the interest rate to adjust endogenously. Agents can still save and borrow individually, but aggregate capital is pinned to its pre-UBI level. In this environment, welfare improves slightly (–2.3% relative to –6.2% in the baseline), yet the fiscal burden becomes considerably heavier: the income tax must rise by more than 100 percent to finance the transfer. The result indicates

that preventing capital from contracting attenuates welfare losses, but only at the cost of very large tax distortions.

Row 3 fixes both the capital stock and the income tax rate. Capital stock is fixed at the benchmark level without UBI, while the income tax multiple is fixed at the higher UBI baseline level, dropping the requirement of government budget balance. This "off-equilibrium" counterfactual cleanly isolates the capital accumulation channel. Thus, if UBI were financed at the same higher tax rate as in the baseline, but capital formation remained unaffected, welfare would increase by 6.2 percent. Although not a feasible policy environment, the experiment demonstrates that redistribution under UBI is welfare-improving once the contraction in capital is avoided.

These counterfactuals demonstrate that the principal source of welfare loss in the UBI economy lies in its adverse impact on savings and investment. Redistribution itself is not inherently costly; rather, it is the contraction in capital accumulation induced by higher taxation that overturns the modest gains from redistribution and generates aggregate welfare losses.

3.2.4 Different Modes of Financing UBI

An important feature of a general equilibrium macroeconomic framework is its ability to account for the full fiscal implications of policy interventions such as UBI. This stands in contrast to microeconomic evaluations based on pilot programs or randomized control trials, which typically focus on individual-level benefits while abstracting from the economy-wide budgetary adjustments required to scale such programs nationally.

As described in Section 2.3.2, our default UBI financing option involves a proportional increase in the income tax $t_y(y)$, applied uniformly across all taxpayers while maintaining a balanced government budget. In this section, we broaden the analysis by considering two alternative financing modes: (1) an increase in the consumption tax, and (2) the introduction of a flat wealth tax. In each case, the annual UBI transfer is fixed at \$10,000 (in 2019 dollars), and we ensure that government revenues adjust accordingly to preserve budget balance.

Table 14 reports the welfare gains and key macroeconomic indicators under the alternative UBI financing schemes, benchmarked against our default income tax scenario. When financed through a higher consumption tax, the UBI policy yields a welfare gain of 3.7 percent, in contrast to the welfare loss observed under income tax financing. However, this requires a substantial rise in the consumption tax rate, from 5 percent in the benchmark economy to 12.3 percent. Inequality also increases moderately. Despite more than doubling the consumption tax rate, the effect on the interest rate is limited (rising from 5.6 percent

Table 14: Alternative Financing: Welfare and Macroeconomic Effects of UBI

	Modes of Financing		
	Income Tax	Consumption Tax	Wealth Tax
Tax Rate	$1.43 \times t_y(y)$	12.3%	2.2%
(Benchmark Tax Rate)	($t_y(y)$)	(5%)	(-)
Interest Rate (r)	11.9%	6.1%	9.3%
Capital-Output ratio (K/Y)	1.94	2.61	2.22
Inequality Change (%)	-17.9%	1.2%	-0.9%
Welfare Change (%)	-6.2%	3.7%	-2.1%

Note: $t_y(y)$ is the income tax payable in the benchmark economy on an income level of y.

to 6.1 percent), which implies relatively modest disincentives for capital accumulation and minimal contraction in output.

By shifting the tax burden toward consumption, this financing mode reduces distortions to saving behavior and capital formation, thereby supporting long-run output and welfare. In contrast, wealth tax financing requires a 2.2 percent flat tax on wealth to fund the same UBI transfer. This option reduces inequality by 0.9 percent. However, it depresses capital accumulation (capital-output ratio declines from 2.66 to 2.22) and raises the interest rate to 9.3 percent, leading to a 2.1 percent decline in welfare.[17]

These findings highlight the sensitivity of macroeconomic and welfare outcomes to the chosen method of UBI financing. Distortionary taxes on labor or capital income impose sizable efficiency costs by discouraging work effort and investment, resulting in long-run output losses and lower welfare. In Appendix Table A2, we show the details of government finances under different UBI financing options. Regardless of the option, the expenditure on UBI ranges from 5.3 to 7.2 percent of GDP and results in a substantially bigger government.

3.3 Sensitivity Analysis

In this section, we examine the sensitivity of our results to key parameters used in calibrating the baseline model. Since our policy conclusions hinge on how the model disciplines heterogeneity in entrepreneurship, wealth accumulation, and preferences, it is essential to

[17] An across-the-board wealth tax of 2.2% is huge. See Saez and Zucman (2022) for some historical examples of wealth tax. In most examples, a wealth tax has a very narrow base and a much lower rate.

A wealth tax, especially at this high rate, will increase capital flight. Even in the absence of a wealth tax, high net worth individuals have the tendency to keep money is foreign accounts (Johannesen et al. (2023)).

assess whether the results are driven by particular parameter choices. We therefore conduct a series of sensitivity exercises that vary the entrepreneurial span of control, borrowing limits, entrepreneurial ability, and altruism. For each recalibrated economy, we reintroduce UBI and report outcomes relative to the corresponding steady state, thereby isolating the dependence of our results on specific modeling assumptions.

Entrepreneurial span of control (ν): In the baseline model, $\nu = 0.94$. ν is calibrated to match the wealth Gini coefficient. This parameter determines how effectively entrepreneurial ability scales across larger projects: higher values imply greater returns on capital investment. We increase ν to 0.96 and recalibrate the economy. Row 2 of Table 15 shows that the welfare loss from UBI remains largely unchanged (–6.2% in the baseline versus –7.7% with higher ν). The decline in the capital–output ratio is similar, inequality falls by a comparable margin, and relative prices adjust in much the same way. These results indicate that our main findings are not sensitive to the span of control.

Borrowing parameter (ϕ): In the baseline model, $\phi = 1.5$, which allows entrepreneurs to borrow up to 50 percent of their assets. A higher value relaxes borrowing constraints, enabling entrepreneurs to finance larger projects. We increase ϕ to 1.8 and recalibrate the economy. Row 3 of Table 15 shows that the welfare loss from UBI is nearly identical (–6.2% in the baseline versus –6.3% with higher ϕ). The decline in the capital–output ratio is similar, inequality falls by a comparable margin, and relative prices adjust in the same fashion.

Entrepreneurial ability (θ_1): Following Cagetti and De Nardi (2008), the baseline model sets $\theta_1 = 0.5$. This parameter, combined with optimal investment, determines the return to entrepreneurship. We increase θ_1 to 0.52. As shown in row 4 of Table 15, the welfare loss from UBI is again very similar (–6.2% in the baseline versus –7.3% with higher θ_1). The capital–output ratio declines by a comparable amount, inequality falls by a similar margin, and relative prices adjust in the same way.

Altruism (η): In the baseline model, $\eta = 1$, so that parents fully value their children and transfer all resources upon death. To test sensitivity, we reduce η to 0.66, following Daruich and Fernandez (2024). Row 5 of Table 15 shows that the welfare loss from UBI changes only slightly (–6.2% in the baseline versus –7.0% with lower η). The decline in the capital–output ratio is similar, inequality falls by a comparable margin, and relative prices adjust in the same way.

Overall, across all these parameter changes, the welfare effects, inequality reductions, and price adjustments from UBI remain qualitatively unchanged. This confirms that our main results are robust to alternative parameter values.

Table 15: Sensitivity to Key Model Parameters

	Changes Relative to the Benchmark Economy (%)							
	Welfare	Inequality	K/Y	Taxes (t_y)	Avg. hrs worked	Interest rate	College wage	Non-college wage
Baseline experiment	-6.2	-17.9	-32.5	42.8	-1.90	111.5	-16.2	-21.0
Higher ν	-7.7	-20.7	-21.6	46.3	-3.00	143.5	-20.2	-22.7
Higher ϕ	-6.3	-7.5	-25.0	21.8	-3.41	386.7	-20.4	-23.9
Higher θ_1	-7.3	-21.3	-20.8	44.9	-3.01	146.3	-20.4	-23.0
Lower η	-7.0	-18.4	-29.1	42.2	-2.72	122.4	-18.9	-22.4

Note: Negative values indicate declines relative to the benchmark; positive values indicate increases. K/Y is the capital–output ratio. t_y is the tax multiplier.

4 Discussion

Our main result is that a UBI policy will have particularly adverse effects on the entrepreneurial sector of the economy. The entrepreneurial sector makes an outsize contribution to economic activity and wealth creation. The entrepreneurial activity in the US has already been in a secular decline. According to Decker et al. (2014):

> The rate of business startups in the US economy has been declining in recent decades, and business dynamism, as measured by the pace of job creation and job destruction, has declined as well. ... The decline in entrepreneurial activity is present in all broad industrial sectors and in all US states. [p. 21]

Since Decker et al. (2014) wrote these words, the decline in the entrepreneurial activity has continued. In Figure 5, we show the annual growth rates in the total number of firms and establishments in the US over a 43-year period from 1979 to 2021. Despite a lot of variability, the declining trend in the growth rates is quite obvious.

Although there is no consensus in the literature on the causes of this downward trend (Decker et al., 2014), we should be wary of any new policy proposal that is likely to exacerbate this trend.

Our results that UBI policies cause declines in aggregate capital accumulation and economic activity are shared by the other recent papers that use macroeconomic models of incomplete markets (Conesa et al., 2023; Daruich and Fernandez, 2024; Guner et al., 2023; Jaimovich et al., 2022; Luduvice, 2024; Rauh and Santos, 2022). This is despite the many differences in the details of the models employed by these papers. The economic mechanism for these effects

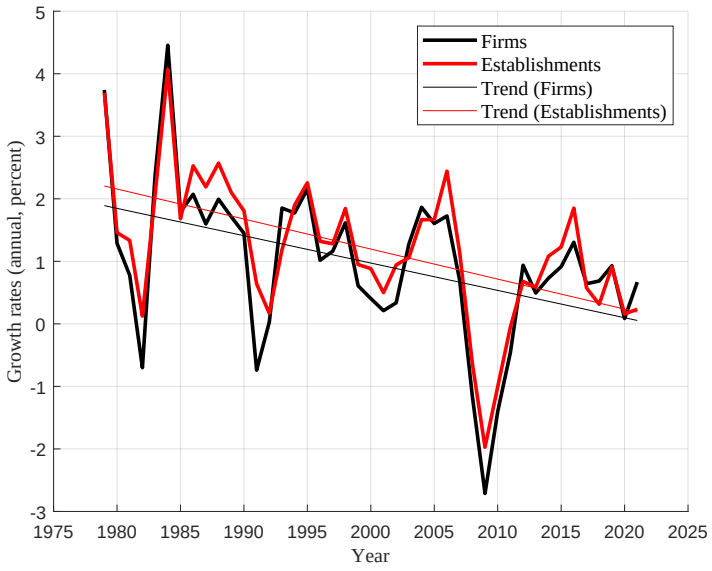


Figure 5: Growth in the Total Number of Firms and Establishments in the US (1979-2021)
Source: `https://data.census.gov/table/BDSTIMESERIES.BDSEAGE`

is the same: when markets are incomplete and there are labor-market shocks, consumers save more to self insure against the uncertainty. However, with an unconditional transfer like the UBI, there is less need to self insure and consumers save less. In a closed economy, a lower saving reduces the supply of capital, increases interest rate and discourages capital accumulation.

Our model allows labor supply to adjust on both intensive and extensive margins. The introduction of UBI generates modest declines in work effort, with average weekly hours falling by 2.4 percent, and labor-force participation declining slightly as some individuals transition into entrepreneurship. These findings are consistent with the broader macroeconomic literature on UBI, which also reports reductions in labor supply, though the magnitudes differ across model environments. For example, in Guner et al. (2023), if UBI replaces all current transfers, aggregate hours will decrease by 0.9 percent and labor-force participation of all married females will decrease by 3.4 percent. By explicitly modeling labor supply alongside entrepreneurial choice, our framework captures two key margins of adjustment that shape the aggregate and distributional effects of UBI.

A UBI financed through higher taxes reduces overall income and wealth inequalities as measured by the Gini coefficients or the fractions of income and wealth going to different quintiles of the population.[18] However, at a more granular level, different groups of individuals will be

[18]Should we care about income or wealth inequality *per se*? There is no scientific answer to this question.

affected differently, and there will be winners and losers. Who wins and who loses depends on the type of consumer heterogeneity in the model. For example, in Guner et al. (2023), the replacement of current transfers by a UBI will decrease the welfare of unskilled single females by 2.5 percent but increase the welfare of unskilled married couples by 2.1 percent. In our framework, which emphasizes the entrepreneurial sector, we find that UBI disproportionately harms entrepreneurs. The share of wealth, income, and consumption going to entrepreneurs declines. Workers gain across these margins, and the income and consumption of retirees increase.

A sizable UBI program entails substantial fiscal costs. We find that an annual UBI of $10,000 would require expenditures amounting to 7.8 percent of GDP, comparable to the 8.5 percent estimate for a $12,500 UBI reported by Rauh and Santos (2022). However, the method of financing is critical. While income-tax financing proves prohibitively distortionary, we corroborate findings from Luduvice (2024) and Conesa et al. (2023) that consumption-tax financing can render UBI both fiscally viable and welfare-enhancing.

We study the long-term effects of UBI on the economy and do not compute the transitional dynamics from one steady state to another. The other papers that have looked at the transitional dynamics have generally found that the short-term effects of UBI are worse than the long-term effects. This is because the negative effects on the labor market are immediate, whereas the effects operating through savings and capital accumulation take time.

5 Conclusion

In this paper, we analyzed the long-term macroeconomic and distributional effects of a UBI using a model that explicitly incorporates entrepreneurial dynamics, a key channel for wealth accumulation. Calibrated to the U.S. economy, our framework successfully replicates the observed distributions of income and wealth.

Our central contribution is to highlight the impact on the entrepreneurial sector. UBI disproportionately harms the entrepreneurial sector, with significant consequences for capital accumulation, long-run output, and overall welfare. UBI relaxes borrowing and subsistence constraints, slightly increasing the share of entrepreneurs; however, it severely curtails capital investment due to higher interest rates.

Saez (2021) argues that if we take the social nature of humans, which is absent from most macroeconomic models, into account, society should care about inequality.

Our finding reveals a critical trade-off. A $10,000 annual UBI financed through a proportional income tax substantially reduces income and wealth inequality. However, this comes at a substantial cost. The policy triggers a decline in labor supply and a collapse in capital accumulation, leading to a significantly smaller economy and a net welfare loss. The primary mechanism behind this loss is the decline in self-insurance incentives, which reduces savings and raises borrowing costs, together eroding capital accumulation. The financing mechanism is paramount. While an income-tax-financed UBI is welfare-reducing, we demonstrate that a consumption-tax-financed alternative can be both fiscally viable and welfare-enhancing.

Our conclusions are broadly similar to the recent macroeconomic literature on UBI. We provide further support to the idea that, being a new and untested policy, a UBI may have serious macroeconomic consequences.

There are several directions in which our work can be extended. The most significant of these is a model with a richer household structure. The model in this paper has a simplistic household structure: each household consists of a single individual, who is replaced by a single descendant upon death. But the current transfers in the US economy are highly dependent on the household structure. Also, an unearned income like the UBI will have non-trivial implications for retirement decisions and family formation or dissolution (Golosov et al. (2024)). A UBI is also likely to affect fertility and health outcomes. A model with a richer household structure will be able to address these issues.

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A Appendix

A.1 Tables

Table A1: State Variable z and the Six Types of Individuals

z	Description
	A young individual who
1	holds a college degree and decides to become an entrepreneur
2	does not hold a college degree and decides to become an entrepreneur
3	holds a college degree and decides to become a worker
4	does not hold a college degree and decides to become a worker
	An old retiree who
9	holds a college degree
10	does not hold a college degree

Table A2: Public Finances: Different UBI Financing Options

Mode of Finance	BM	UBI		
		Income Tax	Cons. Tax	Wealth Tax
Expenditure Item (% of GDP)				
Other Govt. Expenditure (G)	16.2	15.0	16.2	15.7
Retirement Benefits (B)	4.8	6.0	4.8	5.3
Expenditure on UBI (Y_{UBI})	-	7.8	6.4	7.0
Total	21.0	28.8	27.4	28.0
Revenue Item (% of GDP)				
Income Tax (T_y)	13.1	18.7	14.1	13.9
Social-Security Tax (T_{ss})	4.5	6.4	4.9	5.6
Consumption Tax (T_c)	3.4	3.7	8.4	3.5
Wealth Tax (T_a)	-	-	-	5.0
Total	21.0	28.8	27.4	28.0

Note: The sum of individual items may not add up to the total due to rounding.

A.2 Earning Processes

We estimate the following random-effects model using PSID data:

$$\ln Y_{i,t} = \beta_0 + \beta_1 \ln Y_{i,t-1} + \beta_2 d\left(\ln Y_{i,t-1}\right) + u_i + \varepsilon_{i,t},$$

where $Y_{i,t}$ are earnings of individual i in year t, β_0, β_1 and β_2 are parameters, d is college dummy, u_i is unobserved heterogeneity and $\varepsilon_{i,t}$ are i.i.d. errors. We use Tauchen's method (Tauchen, 1986) to convert the estimated AR(1) process into a Markov chain. The estimated Markov chain is conditional on a person being employed. We then use labor-force flow statistics for year 2019 to determine probabilities of moving in and out of unemployment and employment. The resulting vector of earning abilities for individuals without college is

$$\theta_2^{NC} = \begin{bmatrix} 0 & 0.13 & 0.24 & 0.44 & 0.81 & 1.48 & 2.73 & 5.03 \end{bmatrix}.$$

Conditional on being employed, the average earning ability of a person without college is normalized to 1. The estimated transition matrix is[19]

$$\mathbf{P}_{\theta_2^{NC}} = \begin{bmatrix} 0.02 & 0.01 & 0.07 & 0.24 & 0.36 & 0.24 & 0.07 & 0.01 \\ 0.04 & 0.29 & 0.50 & 0.17 & 0.01 & 0.00 & 0.00 & 0.00 \\ 0.04 & 0.06 & 0.38 & 0.43 & 0.09 & 0.00 & 0.00 & 0.00 \\ 0.04 & 0.01 & 0.12 & 0.47 & 0.33 & 0.04 & 0.00 & 0.00 \\ 0.04 & 0.00 & 0.02 & 0.21 & 0.50 & 0.21 & 0.02 & 0.00 \\ 0.04 & 0.00 & 0.00 & 0.04 & 0.33 & 0.47 & 0.12 & 0.01 \\ 0.04 & 0.00 & 0.00 & 0.00 & 0.09 & 0.43 & 0.38 & 0.06 \\ 0.04 & 0.00 & 0.00 & 0.00 & 0.01 & 0.17 & 0.50 & 0.29 \end{bmatrix}.$$

The invariant distribution of earning ability based on transition matrix $\mathbf{P}_{\theta_2^{NC}}$ is

$$\mu_{\theta_2^{NC}} = \begin{bmatrix} 0.036 & 0.008 & 0.064 & 0.232 & 0.356 & 0.232 & 0.064 & 0.008 \end{bmatrix}.$$

The vector of earning abilities of individuals with college is

$$\theta_2^{C} = \begin{bmatrix} 0 & 0.2431 & 0.4531 & 0.8445 & 1.5741 & 2.9340 & 5.4688 & 10.1935 \end{bmatrix}.$$

he transition matrix is

[19] Some rows of the transition matrix may not add up to one due to rounding. All transition probabilities are greater than zero.

$$\mathbf{P}_{\theta_2^C} = \begin{bmatrix} 0.0203 & 0.0080 & 0.0661 & 0.2358 & 0.3598 & 0.2358 & 0.0661 & 0.0080 \\ 0.0210 & 0.3194 & 0.5078 & 0.1454 & 0.0064 & 0.0000 & 0.0000 & 0.0000 \\ 0.0210 & 0.0628 & 0.4049 & 0.4336 & 0.0757 & 0.0020 & 0.0000 & 0.0000 \\ 0.0210 & 0.0047 & 0.1225 & 0.4920 & 0.3249 & 0.0344 & 0.0005 & 0.0000 \\ 0.0210 & 0.0001 & 0.0136 & 0.2133 & 0.5249 & 0.2133 & 0.0136 & 0.0001 \\ 0.0210 & 0.0000 & 0.0005 & 0.0344 & 0.3249 & 0.4920 & 0.1225 & 0.0047 \\ 0.0210 & 0.0000 & 0.0000 & 0.0020 & 0.0757 & 0.4336 & 0.4049 & 0.0628 \\ 0.0210 & 0.0000 & 0.0000 & 0.0000 & 0.0064 & 0.1454 & 0.5078 & 0.3194 \end{bmatrix}.$$

The invariant distribution of earning ability based on transition matrix $\mathbf{P}_{\theta_2^C}$ is

$$\mu_{\theta_2^C} = \begin{bmatrix} 0.0210 & 0.0080 & 0.0661 & 0.2356 & 0.3595 & 0.2356 & 0.0661 & 0.0080 \end{bmatrix}.$$

A.3 Welfare Computations

The aggregate welfare in the benchmark economy is

$$\mathbf{W}_{BM} = \int V_{BM}(\mathbf{s})\, dm^*_{BM}(\mathbf{s}) = \int \mathbb{E}_0 \left[\sum_{t=0}^{\infty} \beta^t u\left(c_{t,BM}(\mathbf{s}), l_{t,BM}(\mathbf{s})\right) \right] dm^*_{BM}(\mathbf{s}),$$

where BM in the subscripts is for benchmark. Similarly, the aggregate welfare in the UBI economy is

$$\mathbf{W}_{UBI} = \int V_{UBI}(\mathbf{s})\, dm^*_{UBI}(\mathbf{s}) = \int \mathbb{E}_0 \left[\sum_{t=0}^{\infty} \beta^t u\left(c_{t,UBI}(\mathbf{s}), l_{t,UBI}(\mathbf{s})\right) \right] dm^*_{UBI}(\mathbf{s}).$$

To compare welfare, we use consumption equivalent variation. We ask, by how much every individual's consumption in the benchmark steady state will need to change for them to be indifferent between the benchmark and the UBI steady states. Let Δ denote the change. We need to find Δ such that

$$\int \mathbb{E}_0 \left[\sum_{t=0}^{\infty} \beta^t u\left(c_{t,UBI}(\mathbf{s}), l_{t,UBI}(\mathbf{s})\right) \right] dm^*_{UBI}(\mathbf{s}) =$$

$$\int \mathbb{E}_0 \left[\sum_{t=0}^{\infty} \beta^t u\left((1+\Delta)\, c_{t,BM}(\mathbf{s}), l_{t,BM}(\mathbf{s})\right) \right] dm^*_{BM}(\mathbf{s}).$$

If $\Delta > 0$, the aggregate welfare in the UBW economy is $100\Delta\%$ greater than the aggregate welfare in the benchmark economy. For example, if $\Delta = 0.02$, the aggregate welfare in the UBW economy is 2% higher. To compute Δ, note that

The reform scales consumption by $(1+\Delta)$ but leaves labor (l) unchanged. Thus, the labor

term cancels out in welfare differences

$$\begin{aligned}
\mathbf{W}_{UBI} - \mathbf{W}_{BM} &= \int \mathbb{E}_0 \left[\sum_{t=0}^{\infty} \beta^t \left(\frac{\left[(1+\Delta) c_{t,BM}(\mathbf{s})\right]^{1-\zeta}}{1-\zeta} - \frac{c_{t,BM}(\mathbf{s})^{1-\zeta}}{1-\zeta} \right) \right] dm^*_{BM}(\mathbf{s}) \\
&= \int \mathbb{E}_0 \left[\sum_{t=0}^{\infty} \beta^t \frac{\left[(1+\Delta) c_{t,BM}(\mathbf{s})\right]^{1-\zeta}}{1-\zeta} \right] dm^*_{BM}(\mathbf{s}) - \mathbf{W}_{BM} \\
&= (1+\Delta)^{1-\zeta} \int \mathbb{E}_0 \left[\sum_{t=0}^{\infty} \beta^t \frac{\left[c_{t,BM}(\mathbf{s})\right]^{1-\zeta}}{1-\zeta} \right] dm^*_{BM}(\mathbf{s}) - \mathbf{W}_{BM} \\
&= (1+\Delta)^{1-\zeta} \mathbf{W}_{BM} - \mathbf{W}_{BM} \\
&= \mathbf{W}_{BM} \left[(1+\Delta)^{1-\zeta} - \mathbf{1} \right],
\end{aligned}$$

which gives

$$\Delta = \left(\frac{\mathbf{W}_{UBI}}{\mathbf{W}_{BM}} \right)^{\frac{1}{1-\zeta}} - 1.$$

A similar derivation gives Δ by state:

$$\Delta(\mathbf{s}) = \left(\frac{V_{UBW}(\mathbf{s})}{V_{BM}(\mathbf{s})} \right)^{\frac{1}{1-\zeta}} - 1.$$