Universal Basic Income and the City*

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Abstract

We study the introduction of Universal Basic Income (UBI) with a particular focus on how it affects real estate and the urban environment. The main effect of UBI is a trade-off between i) decreased inequality, leading to higher welfare due to a redistribution towards poorer households with high marginal utility, and ii) a less efficient and productive economy, caused by distortional income taxes used to pay for UBI. In our calibration, a $5,000 UBI is welfare improving for the equal weighted welfare measure as i) is quantitatively more important than ii). The poorest half of households see large welfare gains, but the remaining half see smaller welfare losses. Prices, rents, and the ownership rate all fall, as households supply less labor in response to higher taxes. The wage rises, due to the decline in labor supply. The makeup of the city's inner core versus outer suburbs also changes, although these changes depend on exactly how UBI is financed. The more progressive the financing scheme, the more likely high income households are to leave the city center, leading to urban blight.

JEL classification: .

*PRELIMINARY AND INCOMPLETE

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1 Introduction

The increase in job automation, and the potentially related rise in income inequality has brought on calls for Universal Basic Income (UBI), or a fixed payment to every legal resident. Prominent figures, including presidential candidate Andrew Yang and entrepreneur Elon Musk, have endorsed UBI. Since UBI is largely untested, and would drastically change existing U.S. fiscal policy, it would likely lead to many consequences, both intended and not. This paper studies some of these consequences, with a particular focus on real estate and the urban environment.

To study this question, we start with a model identical to Favilukis et al. (2018) and calibrated to New York City. We extend the model by allowing for UBI – a guaranteed, fixed transfer of $5,000 per year to every household. UBI is financed by income taxes which are, in their nature, distortionary. As is typical with distortionary income taxes, they reduce the incentive to work, resulting in households choosing more leisure hours and fewer working hours. This leads to lower city-wide output, income, and consumption. At the same time, UBI is a net transfer from wealthier to poorer households. Since poorer households have higher marginal utility, this is a transfer to those who need money the most. Under an equally weighted social utility measure, UBI is welfare improving. This is because, despite creating large distortions through the taxes needed to finance UBI, it provides a large benefit to those who need it most. Of course, this result crucially depends on risk aversion, which is related to society's desire for equality and redistribution, and on the elasticity of labor supply, which measures how strongly labor supply responds to distortionary income taxes.

The most important results for the housing market are that the lower income leads to lower rents and prices per square foot, and a lower home ownership rate. The housing expenditure to income ratio falls as well, suggesting that affordability improves as the real cost of housing falls. However, despite the lower cost of housing, less housing is built and used, since the city is, on average, poorer.

There are also interesting effects by neighborhood, however they depend the progressivity of the tax system. The central core can become more or less dense, more or less wealthy relative to the rest of the city, younger or older than the rest of the city. If the tax changes used to pay for UBI are more progressive, then high income people are especially likely to leave the city center, leading to something like urban blight.

2 Model

Our model is very similar to Favilukis et al. (2018). Here we explain the model's main features. The model is described in full detail in Favilukis et al. (2018).

We model a metropolitan area that consists of two zones, the central business district (zone 1) and the rest of the metropolitan area (zone 2).

Working-age households who live in zone 2 commute to zone 1 for work. Commuting entails both an opportunity cost of time and a financial cost. Finally, zones provide different levels of amenities. Zones have different sizes, captured by limits on the maximum amount of housing that can be built. Building becomes especially expensive as the city's housing stock gets close to the maximum limit.

The city is populated by overlapping generations of risk averse households who face idiosyncratic labor productivity risk and mortality risk. They make dynamic decisions on location, non-housing and housing consumption, labor supply, tenure status (own or rent), savings in bonds, primary housing, investment property, and mortgage debt. The rental stock is owned by local households, who rent it to other locals.

Since households cannot perfectly hedge labor income and longevity risk, markets are incomplete. This incompleteness opens up the possibility for redistribution policies to provide insurance. Progressive tax-and-transfer and social security systems capture important existing insurance mechanisms, with UBI going above and beyond these mechanisms. The model generates a rich cross-sectional distribution over age, labor income, tenure status, housing wealth, and financial wealth. This richness is paramount to understanding both the distributional and aggregate implications of housing affordability policies.

On the firm side, the city produces tradable goods and residential housing in each zone, subject to decreasing returns to scale. As a zone approaches its maximum buildable housing limit, construction becomes increasingly expensive, and the housing supply elasticity falls. Wages, house prices, and market rents are determined in the city's equilibrium, to clear the labor market, the housing supply (construction) and demand market, and the rental market, respectively. The interest rate is exogenous and comes from outside of the city. By Walrus' law, because the interest is exogenous, the consumption market does not clear. In other words, the city's net bond demand may be positive or negative, and the city may consume more, or less than it produces, the difference financed by the interest on the net bond position. In this sense, the city we model is analogous to a small, open economy in the international economics literature.

We extend the Favilukis et al. (2018) model by allowing for UBI. In particular, every household receives a fixed amount D per period. The total amount of UBI payments is funded by an increase in taxes. Following Heathcote et al. (2017), the income tax in our model is captured by two parameters, λ, which is related to the level of taxes, and τ, which is related to tax progressivity. We experiment with different combinations of λ and τ to fund the extra spending on UBI.

3 Results

3.1 Baseline model fit

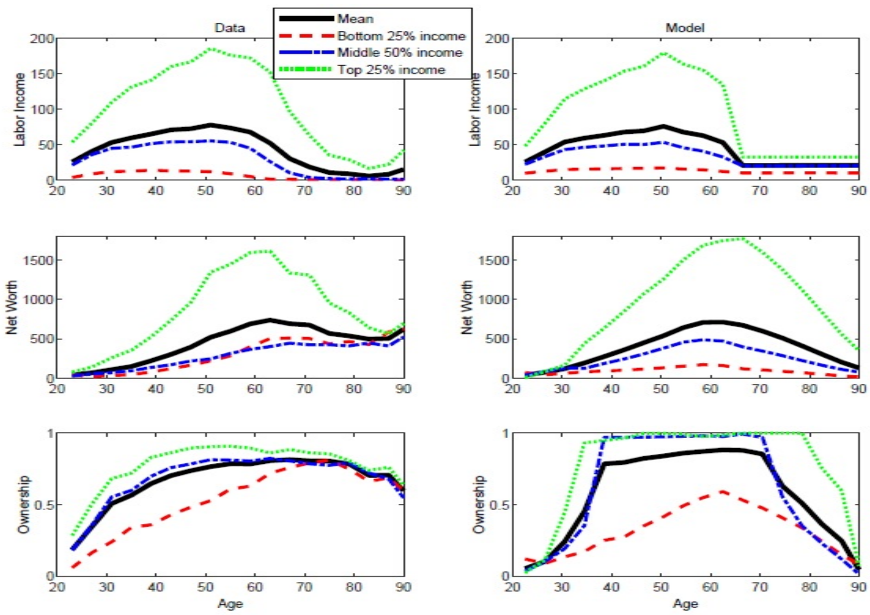
We calibrate the model to the New York metropolitan area, designating Manhattan as the urban core, or zone 1, and the rest of the metropolitan area (MSA) as zone 2. Our calibration targets key features of the data, including the relative size of Manhattan versus the rest of the MSA, the income distribution in the New York MSA, observed commuting times and costs, the housing supply elasticity, current zoning laws, the current size and scope of the affordable housing system, and the current federal, state, and local tax-and-transfer system. The baseline model generates realistic income, wealth, and home ownership patterns over the life-cycle for various percentiles of the income distribution. It matches both income and wealth inequality. The model also matches house price and rent levels for the MSA. It generates a large wedge between the prices and rents in the two zones. The details of the calibration are described in Favilukis et al. (2018).

Figure 1 shows household income, wealth accumulation, and home ownership over the life cycle. Households in the model look very much like the data for these quantities. When we break these quantities into low, middle, and high income households, the quantities also look like the data. Thus, the model is able to quantitatively capture a household's behavior throughout its life cycle, as well the high degree of inequality we see in the data. In particular, as in the data, all households begin with low income and little wealth. Households' income rises and peaks around age 50. Households accumulate wealth, with wealth peaking around age 65, just as households retire, at which point they deaccumulate wealth. At the peak, high income (top 25%) households have roughly 2.5 times as much wealth as the average household. Households also start off renting, but shift towards ownership through their 30s and 40s, reaching a peak ownership rate around 80% in their late middle ages. The ownership rate of low income (bottom 25%) of households is significantly below that of the average household.

Figure 2 shows the distribution of house sizes. The model (left panel) matches the data (right panel) quite well, even though these moments are not targeted by the calibration. The size distribution of owner-occupied housing is shifted to the right from the size distribution of renter-occupied housing units in both model and data.

Table 1 compares various real estate related statistics for the model and for New York City. Here too, the model fits the data well. The model matches the average price-to-rent ratio of 17.8 by construction. Households spend roughly 23% of their income on housing, although this ratio is much higher for renters. A significant fraction is rent burdened, that is, they spend more than 30% of their income on rent. 11% of the population lives in Zone 1 (Manhattan), these households tend to be younger, and have much higher incomes. Zone 1 is significantly denser than Zone 2, with smaller unit sizes, higher rents, higher prices, and a lower ownership rate.

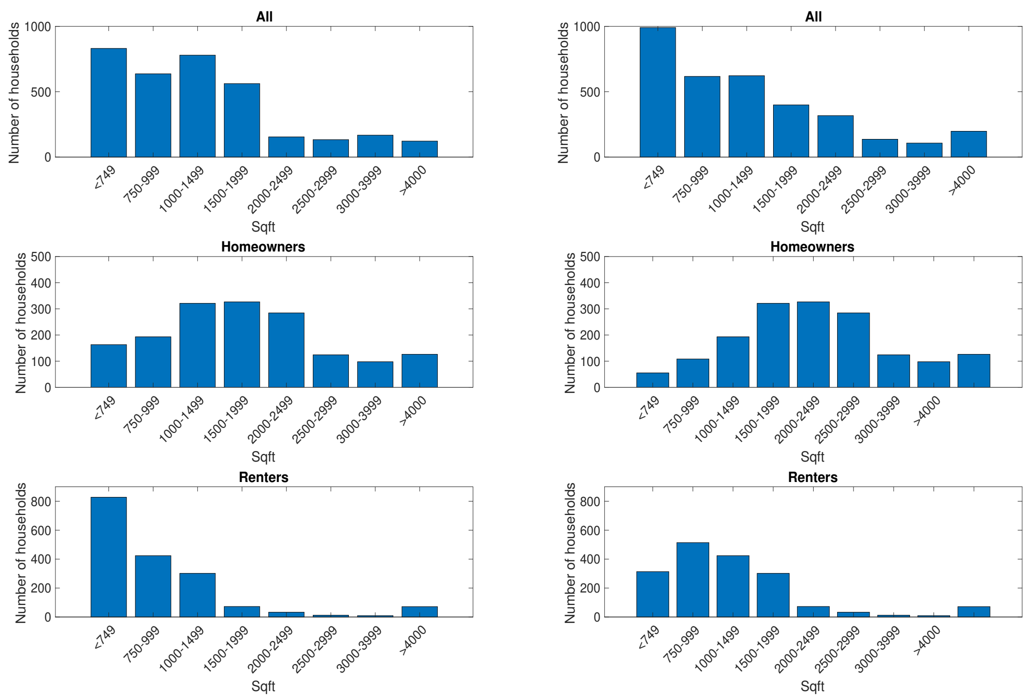
Figure 1: Life-cycle income, wealth, HO: Data (L) vs. Model (R)



3.2 UBI

We focus on a UBI of \$5,000 per year given to every household. This quantity is financed by income taxes. We follow Heathcote et al. (2017) and choose an income tax schedule that captures the observed progressivity of the U.S. tax code in a parsimonious way. Net taxes are given by the function $T(\cdot)$: $T(y^{tot}) = y^{tot} - \lambda(y^{tot})^{1-\tau}$. The parameter τ governs the progressivity of the tax and transfer system, in the baseline model, we set $\tau = 0.17$ to match the average income-weighted marginal tax rate of 34% for the U.S. The parameter λ governs the level of the tax and transfer system, in the baseline model, we set $\lambda = 0.75$ to match state and local government spending to aggregate

Figure 2: House size distribution in Model (L) and Data (R)



Notes: Left panel: model. Right panel: data. Data source: American Housing Survey for the New York MSA, U.S. Census Bureau, 2015.

income in the NY metro area, equal to 15-20%.

We finance UBI in one of two ways. First, while keeping τ fixed, we adjust λ such that total government spending is exactly equal to total government spending in the baseline model, plus the cost of UBI. This requires $\lambda = 0.7080$. Second, we increase τ to 0.22, making the tax code more progressive, and we simultaneously adjust $\lambda = 0.6662$ such that again, total government spending is exactly equal to total government spending in the baseline model, plus the cost of UBI. Thus, in both models, UBI is fully financed by additional

Table 1: New York Metro Data Targets and Model Fit

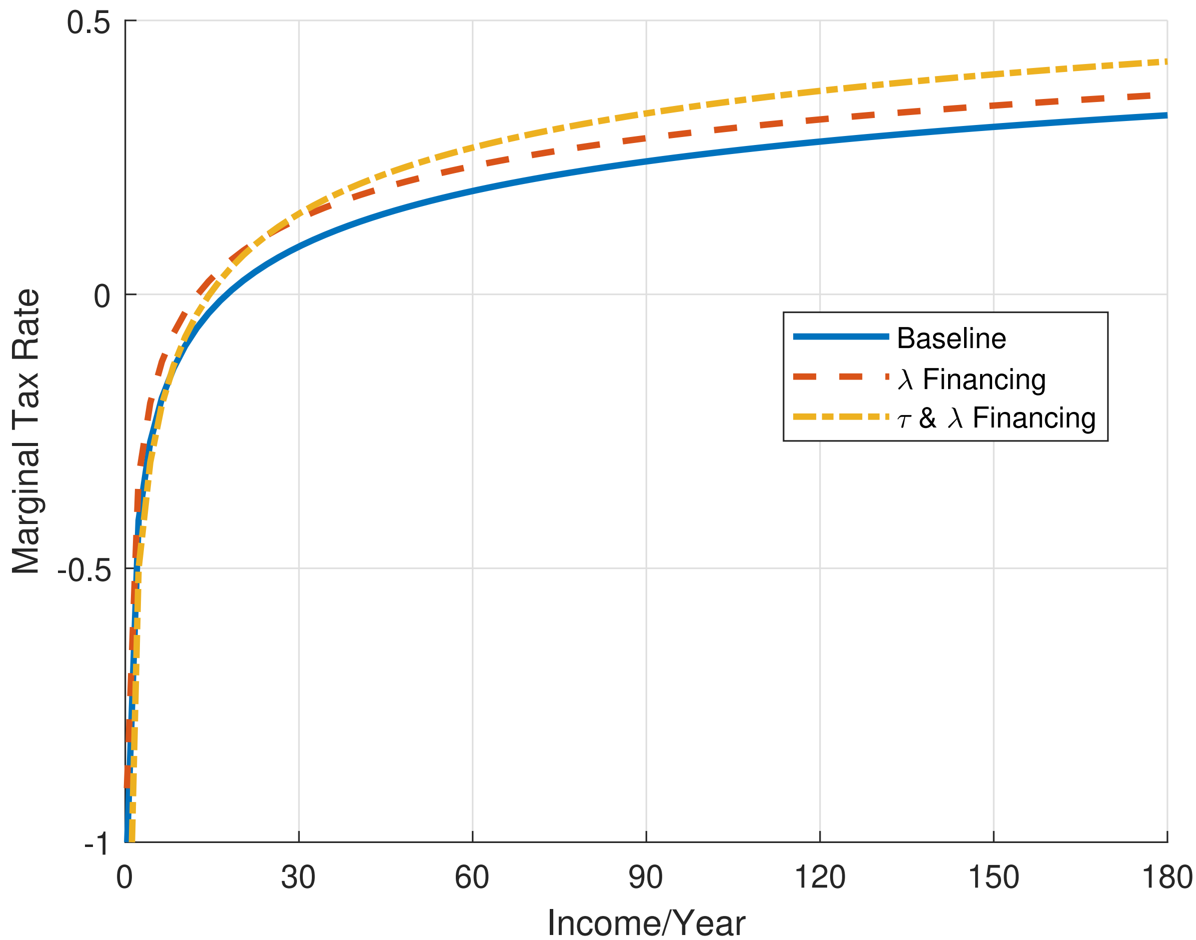
		Data		Model	
		metro	**ratio zone 1/zone 2**	**metro**	**ratio zone 1/zone 2**
1	Households (thousands)	7124.9	0.12	7124.9	0.12
2	Avg. hh age, cond. age > 20	47.6	0.95	47.4	0.87
3	People over 65 as % over 20	19.1	0.91	21.8	0.98
4	Avg. house size (sqft)	1445	0.59	1448	0.63
5	Avg. pre-tax lab income ($)	124091	1.66	124325	1.69
6	Home ownership rate (%)	51.5	0.42	57.4	0.79
7	Median mkt price per unit ($)	510051	3.11	506592	2.34
8	Median mkt price per sqft ($)	353	5.24	348	3.58
9	Median mkt rent per unit (monthly $)	2390	1.65	2432	1.82
10	Median mkt rent per sqft (monthly $)	1.65	2.78	1.67	2.78
11	Median mkt price/median mkt rent (annual)	17.79	1.89	17.36	1.29
12	Mkt price/avg. income (annual)	3.99	1.71	4.08	1.38
13	Avg. rent/avg. income (%)	23.0	1.00	23.5	1.07
14	Avg. rent/income ratio for renters (%)	42.1	0.81	28.8	0.91
15	Rent burdened (%)	53.9	0.79	45.5	0.49
16	% Rent regulated of all housing units	5.57	2.77	5.25	2.87

Notes: Columns 2-3 report the values for the data of the variables listed in the first column. Column 3 reports the ratio of the zone 1 value to the zone 2 value in the data. Column 5 reports the same ratio in the model.

taxes. Figure 3 plots the marginal tax rate, as a function of household income, for the baseline model, the UBI model where taxes are raised (approximately) evenly across the board to pay for UBI (λ financing) and the UBI model where the tax increase is progressive (λ & τ financing). The tax increase required to pay for a $5,000 per household UBI is significant, with a family earning $180,000 seeing its tax rate rise from 33% to 43%.

While our focus is on the real estate effects of UBI, it is useful to first consider its effects in general. In almost any welfare analysis of UBI, UBI will produce two key forces, which will work against each other. A redistributionary force which raises average welfare, and a distortionary incentive force which lowers average welfare.

Figure 3: Marginal tax rates



First, UBI leads to redistribution of after-transfer income towards low income households. While all households receive $5,000, in dollar terms, low income households see only a small increase in taxes, while high income households see large increases. If low income households also have the highest marginal utility, as is the case in many economic models, then they will also see large gains in welfare. High income households, with lower marginal utility, will see smaller losses in welfare. In simpler terms, low income households need an extra $5,000 much more than high income households do. Thus, this first force typically leads to welfare gains if welfare is computed using an equal weighted social welfare function (as it is computed here), and even larger gains under a Rawlsian social welfare function. Of course, UBI is not Pareto optimal because high income households lose.

Second, UBI must be paid for by taxation, and most real world taxes are distortionary. In our model, UBI is paid for by distortionary taxes on total income. This distorts the labor supply decision, causing households to work fewer hours than they otherwise would, leading to lower aggregate income output, income, and consumption in the city. Since total income includes capital income, this also distorts the saving decision. Households save a lower fraction of their income, leading to lower aggregate investment and wealth. Thus, this second force typically leads to welfare losses.

Whether the net effect on welfare is positive or negative depends on the relative strengths of these two forces. For example, if society puts a high value on equality, in our model through the risk aversion coefficient, then the first channel would be quantitatively more important. In our baseline calibration, the risk aversion is 5, somewhat higher than usually used in economics, but lower than many estimates from financial markets. The Frisch elasticity of labor supply in our model is around 1.1, which is above estimates from micro data, but below estimates from macro data.

We present the welfare results, by various household characteristics, in Table 3. In our model, approximately 50% of the population is better off from UBI, while 50% is worse off. Those better off are the poorest and least productive households; they also tend to be either young or old, as opposed to middle-aged. Income and consumption inequality fall. The Gini coefficient for after-transfer income falls from 0.475 in the baseline model to 0.461 and 0.439 in the even taxation and progressive taxation models, respectively; the Gini coefficient for consumption falls from 0.386 to 0.365 and 0.335. Wealth inequality actually rises with UBI because low income households expect a safe source of income and engage in less precautionary savings.

Because the marginal utility of those who are better off is very high, the average welfare effect is positive. In consumption equivalent units, the average household is 1.20% better off in the model where the additional taxes are evenly distributed, and 0.47% better off in the model where the additional tax is more progressive.

Although average utility rises the distortions from higher taxes are quite strong. As a result, household consume too much leisure, and too little goods relative to what they would prefer. As shown in Table 2, hours fall by 4.1% in the evenly distributed model, and by 9.5% in the progressive model. In the evenly distributed model, effective hours (hours weighted by productivity) falls by far less, 1.7%, suggesting that the fall in hours is greater among the unproductive households, which is, to a degree, efficient. This happens because many low productivity households do not feel the need to work much after receiving the $5,000 UBI. In the progressive model, effective hours fall by 7.0%, nearly as much as actual hours, because more progressive taxes discourage high productivity households from working. The fall in labor supply results in higher per-hour wages (though not higher total incomes) as businesses face labor shortages.

Since the tax is on total income, not just labor income, higher taxes also disincentivize saving. Wealth falls by even more than income. Relative to the baseline model, in the evenly distributed and progressive models, respectively, wealth by 18% and 33%, and the wealth-to-income ratio falls by 17% and 30%. Wealth falls for two reasons. For low income households a safe universal basic income stream makes precautionary saving far less important. On the other hand, for high income households, holding wealth becomes less attractive because of higher taxes on capital income.

Of course, lower income and lower wealth result in lower consumption. Non-durable consumption falls by 5.5% and 12.9% in the even and progressive models. Housing consumption (dwelling size) falls by 2.8% and 6.8%. Lower demand for housing leads to lower rents, which fall by 3.8% and 9.0%, and lower house prices, which fall by 1.6% and 3.5%. The ratio of housing expenditures to income also falls, implying that housing becomes more affordable. This is because of the non-linearity in the cost of housing construction. Since the aggregate housing demand is lower, the city no longer needs to flatten mountains, fill in lakes, or build extra tall skyscrapers, reducing the average cost of construction. Despite more affordable housing, there is a sharp drop in ownership, 16% in the even model, and 20.5% in the progressive model.

Interesting changes also occur in the spatial dimension. In the evenly distributed model the population of the city center (Zone 1) falls and of the suburbs rises. This is because the financial costs of commuting are no longer as onerous for lower income households who move out to the suburbs and consume larger dwellings than they would had they stayed in the city center. These households are replaced by relatively more productive and wealthier households. The average dwelling size and ownership rate in the city center actually rise, due to this composition effect.

When the tax increase is more progressive, things look very different. Wealthy and high income households leave the center, with the average wealth, income, and ownership of the center falling by more than 20%. The population of the center rises, as wealthier households are replaced by poorer households who consume far less housing per person. This looks very much like urban blight.

3.3 Discussion

In this section we discuss what may be missing from the model and other loose ends.

In our model, interest rates are fixed and exogenous to the model. This is a natural assumption when considering an individual city. However, if UBI is instituted at a wider scale, then a model where interest rates are endogenous,

Table 2: UBI change in quantities

	Even tax increase			**Progressive tax increase**		
	Z1	Z2	All	Z1	Z2	All
Fraction of population	-1.16	0.13	0.00	10.51	-1.22	0.00
Average age	-0.53	0.02	0.00	-13.00	1.58	0.00
Productivity	1.89	-0.28	0.00	-12.05	1.83	0.00
Hours	-5.40	-3.94	-4.14	-9.07	-9.87	-9.52
Effective Hours			-1.68			-7.03
Wage			0.47			2.32
Income	-7.54	0.19	-1.12	-26.73	-0.41	-4.41
Wealth	2.71	-20.59	-17.92	-21.05	-34.95	-33.09
Consumption	-0.29	-6.15	-5.49	-16.82	-12.48	-12.88
Dwelling size	1.11	-3.10	-2.76	-9.92	-6.10	-6.77
Ownership	6.77	-17.90	-15.94	-20.18	-20.27	-20.50
Rent	-3.60	-4.22	-3.83	-8.44	-9.91	-8.98
Price	-1.43	-2.10	-1.56	-3.27	-4.83	-3.52

and where there is a link between aggregate consumption and production is perhaps more appropriate. In such a model, the reduction in saving due to higher taxes would lead to higher interest rates as capital becomes scarce. This, in turn, would attenuate some of the reduction in saving and the effect on wealth.

Risk aversion is crucial for the welfare calculation. In our calibration, we use a risk aversion 5. While this number appears low relative to the equity risk premium and is on the low end of numbers used by financial economists, it is much higher than those used by macro and micro economists. Experimental evidence, though itself not free of problems, suggests risk aversion around 1.0.

Table 3: UBI change in welfare

By Age

Age	Uniform	Progressive
22	6.62	10.18
26	2.23	3.44
30	1.35	1.88
34	0.63	0.62
38	0.03	-0.30
42	-0.36	-1.09
46	-0.69	-1.75
50	-0.86	-2.21
54	-1.04	-2.71
58	-0.96	-2.94
62	-0.26	-2.54
66	1.62	-0.95
70	1.68	-0.82
74	2.15	-0.24
78	3.21	1.05
82	5.25	3.42
86	8.56	7.10
90	10.97	9.73
94	11.61	10.50
98	11.64	10.60
All	1.20	0.47

By Skill

Skill	Uniform	Progressive
1	17.64	25.60
2	2.79	4.37
3	-1.85	-2.95
4	-4.05	-9.41
All	1.20	0.47

By Wealth

Wealth	Uniform	Progressive
1	10.58	14.32
2	10.14	13.08
3	8.41	13.03
4	3.51	5.16
5	1.32	2.32
6	-0.13	0.01
7	-2.19	-3.09
8	-4.76	-9.61
9	-5.64	-12.25
10	-8.61	-18.66
All	1.20	0.47

Similarly, the elasticity of labor supply is crucial for the welfare calculation. Our parameters imply a Frisch elasticity of around 1.0. However, there is much disagreement among economist as to this number, see Keane and Rogerson (2012). Estimates from microeconomic data suggest these elasticities are small, between 0 and 0.5. On the other hand, estimates from macroeconomic data suggest that they are large, between 1 and 2. These differences may be due to adjustments at the intensive versus the extensive margins, or to human capital accumulation.

Closely related to the labor supply elasticity is the issue of entrepreneurship and creation of new technologies. In our model, workers are endowed with productivity, and they choose hours, which converts productivity into output. While this is an adequate description of the real world production process for many workers, there are other choices that real world workers make. For example, they may choose effort, or may choose the risk versus return trade-off of the project they work on. They may also choose to work on producing output today, as workers choose in our model, or producing knowledge, which may improve output tomorrow, which is outside of our model. All of these choices are likely affected by the tax code, and may be affected by the tax code in different ways.

Similarly, since our model has no entrepreneurship, our model also cannot speak to borrowing constraints that entrepreneurs face. These may be important for marginal utility. In our model, the marginal utility is very closely associated with income and wealth. That is, poorest households are most in need of an extra $5,000. However, consider for example, an entrepreneur who is relatively wealthy, but who has a great idea that requires significant financing. If this idea has a very high expected return on capital, then the marginal benefit of handing an extra $5,000 to this entrepreneur may be higher than that of handing it to a low income household.

Finally, it is useful to compare our model's results to UBI experiments that have been carried out in the data, such as the €560 monthly payment to some unemployed Finns, and the $500 monthly payment to low income residents of Stockton, CA. We conjecture that our model's prediction of lower rents and house prices is quite different from these experiments. In our model, UBI is fully financed by local taxes. This directly makes many high income locals worse off, which affects their economic decisions. In the UBI experiments, the additional money comes from outside of the city, making low income residents better off, but having no direct effect on the high income residents.

4 Conclusion

We study the effect of universal basic income (UBI), financed by distortionary income taxes, with a particular focus on real estate and the effects on the urban environment. For our chosen parameters, UBI is a net positive for local welfare using the average social welfare measure, although it negatively affects approximately 50% of the population. Because of distortions to the labor and investment decisions, the city is poorer on the net, which leads to lower rents and house prices. Additionally, if the tax used to finance UBI is very progressive, then wealthier households leave the city center for the outer suburbs, leading to urban blight.

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