Universal Basic Income and the City*

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March 23, 2021

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). In the baseline calibration, about 38% of households see large welfare gains, but the remainder 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.
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 led to 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 cash ($5,000 per year in our baseline model) to every household. UBI is financed by income taxes which are, in their nature, distortionary. Distortionary income taxes typically 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 in our baseline model. 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 a society's desire for equality and redistribution (proxied by the risk aversion parameter in our model), and on the elasticity of labor supply, which measures how strongly labor supply responds to distortionary income taxes. As we reduce desire for equality (risk aversion), the benefit of UBI is weakened while the costs remain unchanged, leading to smaller welfare gains, and even a welfare loss if risk aversion is sufficiently low. Similarly, as we make labor supply more elastic, the distortionary cost of UBI rises while the benefit is unchanged, also leading to smaller welfare gains.

The most important results for the housing market are that the lower income for those at the top leads to lower rents and prices per square foot, and to 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. This alleviates concerns that UBI would lead to inflation of house prices and rents.

The way UBI is financed is crucial for both the welfare effects and the effects on the city. This is because different financing methods lead to different distortions. We explore two more progressive methods of financing UBI (a more progressive income tax and a wealth tax). Perhaps surprisingly, we find that they lead to less positive welfare effects than the baseline model because too much of the tax burden falls on the high productivity households, distorting their labor and saving decisions. On the other hand, a corporate tax leads to a more positive welfare effect, those this depends on the assumptions that corporate owners are outside of the city and do not change their behavior in response to the tax.

Finally, we study a case where UBI is funded exogenously, rather than by local income taxes. While this is not feasible globally, it is analogous to several recent experiments with UBI. For example, private donations funded a $500 per month UBI program for randomly selected lower income households in Stockton, CA, with similar programs starting in New Orleans, Gary, IN, and Durham, NC. We find that this leads to relatively small increases in rents and house prices across the city.

There are also interesting effects by neighborhood, but they depend on the progressivity of the tax system. The central core can become more or less dense, more or less wealthy, or younger or older relative to the rest of the city. The more progressive the tax changes used to pay for UBI, the higher the likelihood that higher income people leave the city center, making the core less wealthy and more dense as lower income people consume less housing per person.

It is important to note our model's limitations. First, our model is analogous to a small open economy where the interest rate is exogenous – this is reasonable when modeling a single city but is unlikely to be true if UBI is implemented nationally. Second, the population in our model is fixed and we do not allow in or out migration, other than to the suburbs. In the real world, UBI implemented in a single city may lead to in migration from other cities. Third, the model's assumptions about preference for equality (risk aversion) and the effect of distortions on labor supply (Frisch elasticity) are crucial. We discuss these in Section 3.4.

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, with the total amount of UBI payments 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. We also experiment with alternative ways to fund UBI, such as a wealth tax or a corporate tax, and we describe those below.

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, as well as house price and rent levels for the MSA. The model 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 2 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 1 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.

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

To finance UBI in our baseline case, while keeping τ fixed, we adjust λ such that total government spending is exactly equal to total government spending in the no-UBI model, plus the cost of UBI. This requires $\lambda = 0.7080$.

Figure 3 plots the marginal tax rate, as a function of household income, for the no-UBI model, the UBI model where taxes are raised (approximately) evenly across the board to pay for UBI (λ financing), and a model with more progressive taxation, discussed below. 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. Almost any welfare analysis of 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.

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, then the first channel would be quantitatively more important. In our model, preference for equality is controlled by the risk aversion coefficient. In our baseline calibration, the risk aversion is 5, somewhat higher than usually used in economics, but lower than many estimates from financial markets. On the other hand, if labor supply (and more generally effort and output) are very elastic, then the second channel would be quantitatively more important. 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.[1]

Table 2 presents the welfare changes caused by UBI. We present the

[1]There is disagreement among economists about 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.

overall welfare change, as well as the change by age, wealth, and income group. In our baseline model, 38% of the population is better off from UBI, while 62% 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. 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 1.09% better off in the model where the additional taxes are evenly distributed.

To highlight the importance of preference for equality and labor supply elasticity, Table 2 also presents results for models with a lower preference for equality ($\gamma = 4$ and $\gamma = 2$), and a model with a more elastic labor supply (Frisch Elasticity of 2.0). The patterns by age, wealth, and income are qualitatively similar in all models. However, as preference for equality is reduced, the average welfare effect falls and becomes slightly negative when $\gamma = 2$. Note that as γ falls, there is little change in the welfare cost to high productivity households because the distortionary effects are not changing. However, the welfare benefit to low productivity households is reduced, leading to a lower average welfare effect. On the other hand, when labor becomes more elastic, all income groups see a shift down in their welfare change, since distortionary taxes affect everyone.

Although average utility rises in the baseline model, the distortions from higher taxes are quite strong. As a result, households consume too much leisure and too few goods relative to what they would prefer. As shown in Table 4, hours fall by 4.1% in the baseline 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. This fall in hours is significantly larger in the model with more elastic labor supply. The fall in labor supply results in higher per-hour wages (though not higher total incomes) as businesses face labor shortages, resulting in a 1.5% fall in average income.

Since the tax is on total income, not just on labor income, higher taxes also disincentivize saving. Wealth falls by 15%, significantly more than income, leading to a 14% fall in the wealth-to-income ratio. As we explain in the discussion, part of this large fall can be attributed to the open economy style model, which assumes that the interest rate is set exogenously to the city. This is a reasonable assumption when focusing on a single city, as we do here, but not when studying the full general equilibrium effects of UBI, as one would want to do if implementing it at a national level. Wealth falls for two reasons: for low income households a safe universal basic income stream makes precautionary saving far less, while 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 5.0%. Housing consumption (dwelling size) falls by 3.3%. Lower demand for housing leads to lower rents, which fall by

3.0%, and lower house prices, which fall by 3.1%. 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 16.2% drop in ownership. Thus, within this model, concerns that UBI would lead to soaring house prices are misplaced. Distortionary taxation makes the city poorer overall, leading to lower demand for housing and lower housing costs.

Income and consumption inequality fall. The Gini coefficient for after-transfer income falls from 0.475 in the baseline model to 0.460; the Gini coefficient for consumption falls from 0.387 to 0.369. Wealth inequality actually rises with UBI because low income households expect a safe source of income and engage in less precautionary savings.

Interesting changes also occur in the spatial dimension. In the baseline model the population of the city center (Zone 1) falls while the population of the suburbs rises. This is because the financial costs of commuting are no longer as onerous for lower income households, who prefer to move out to the suburbs and consume larger dwellings where the price per square foot is much smaller. We conjecture that subsidizing commuting or building better public transport would have a similar effect. These households are replaced by relatively more productive and wealthier households. Due to this composition effect, the average dwelling size and ownership rate in the city center actually rise, while they fall elsewhere.

We also solve a model where the UBI is doubled to $10,000. This model looks qualitatively similar, but with stronger effects than the baseline model. For example, hours, income, and house prices all fall by about twice as much. The welfare increase is more than double that of the baseline model.

3.3 Alternative ways of paying for UBI

In the baseline model, UBI is financed by increasing the income tax, with the increase being (approximately) even, that is, there is no change to the progressivity of the tax code. In this section we investigate alternative ways of financing UBI. The welfare results are presented in Table 3 and changes to other moments are in the bottom panel of Table 4.

In the first experiment, we pay for UBI by making the tax code more progressive by increasing τ to 0.22. We simultaneously adjust $\lambda = 0.6662$ such that, as before, total government spending is exactly equal to total government spending in the baseline model, plus the cost of UBI. In the second experiment, we raise the entirety of the cost of UBI through a wealth tax. In the third experiment, we raise half that of the required revenue through a wealth tax, and the other half through a corporate tax. In the fourth experiment, the UBI is financed by some exogenous organization and requires no increase in local taxes. While this case is clearly not feasible on a large scale (general equilibrium), we include it because it is analogous to several experiments carried out in the real world. In all cases, we keep all other parameters, including risk aversion, labor supply elasticity, and the size of the UBI exactly as in the baseline model. The only difference is the financing method.

The welfare change in the progressive model is positive but about half that in the baseline model. This is somewhat surprising, since UBI itself adds progressivity to government transfers, and UBI is welfare improving. The reason is that with a more progressive tax, the bulk of the extra expense falls on the most productive households, which significantly raises their marginal tax rates. The fall in hours is twice as large as in the baseline model, but the fall in effective (productivity adjusted) hours is more than three times as large because the high productivity households drastically cut hours. As a result, the welfare loss of the high productivity group is 12.46%, compared to 4.62% in the baseline model. House prices and rents fall by almost twice as much as in the baseline model.

The wealth tax experiment also has a positive welfare change, but smaller than the baseline model. There are fewer distortionary effects on hours worked, as a result hours fall by less than the baseline model, and effective hours actually rise. However, wealth accumulation falls by twice as much as in the baseline model, as households would prefer to consume too early over paying additional wealth taxes. Households in the top wealth decile see a welfare loss of 23.9%, compared to 8.2% in the baseline model. House prices and rents fall by about the same amount as in the baseline model.

The welfare increase is significantly larger in a model where a mix of wealth and corporate taxes funds UBI. However, caution must be taken here. First, the businesses in our model are owned by corporations outside of the city, thus, while additional corporate taxes may lead these businesses to hire less locally, leading to lower welfare – indeed, hours fall relative to the wealth only model – the reduction in welfare of the owners of these businesses is not part of our welfare calculation. Second, capital is fixed in our model and it is usually optimal to tax whichever factor cannot get out of the way. In the real world, businesses might invest less or relocate to another city.

In our final experiment, UBI is financed outside of the city, requiring no local tax increase. This is analogous to several UBI experiments implemented in the real world, such as the €560 monthly payment to some unemployed Finns and the $500 monthly payment to low income residents of Stockton, CA. Not surprisingly, since this imposes no costs on the locals, this case has the largest welfare benefits, about 7% in consumption equivalent units. The benefit to the lowest income workers is comparable in magnitude to the other cases because these workers did not see much of an increase in taxes. However, middle and even high income workers now see small benefits as well, since they do not experience any tax increases. In total, only 3% of the population is worse off, because unlike the other cases, UBI leads to a rent and house price increase of approximately 1%, which hurts some households. UBI also leads to a decrease in working hours and wealth accumulation. This increase is smaller than in the baseline case because there are no longer distortionary effects of tax increase. Rather, this happens because households are generally wealthier and choose to consume more leisure.

These different types of taxes also have different effects on the spatial dimension. For example, when the tax is targeted at the most wealthy (the progressive and wealth tax experiments) then high productivity and high wealth households tend to leave the city center for the suburbs. For example, with a progressive tax, the average productivity of those living in the city center falls by 9.4%, and the average income falls by 25.8%; with a wealth tax the average productivity falls by 5% but the average wealth by 15%. Despite this, the population of the city center actually grows because they are replaced by lower income and lower wealth households who consume less real estate per household, leading to more density. This is in contrast to the baseline model, where lower income households move to the suburbs, leading to city center density falling, and wealth and productivity rising. On the other hand, when the tax burden is spread more evenly (the corporate tax and exogenous funding experiments), the spatial effects are more similar to the baseline model.

3.4 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, 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.

In our model, the city's population is fixed. If a single U.S. city implements UBI, low income households may migrate in. If the city also finances this UBI through taxes, then whoever bears the burden of the tax – whether that be businesses, high income, or high wealth individuals – may move out. This may lead to an unsustainable spiral where more and more of the tax base moves out, replaced by needy individuals. Any real world UBI implementation at a city level would have to consider this. This may be less of an issue if UBI is implemented in a large country like the U.S. since both in- and out-migration are more difficult.

Above, we experimented with labor supply elasticity. 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 the risk-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. The tax code likely affects these choices in different ways that cannot all be captured even if we match the Frisch labor supply elasticity.

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, the 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 an extra $5,000 for this entrepreneur may be higher than that of a low income household.

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.

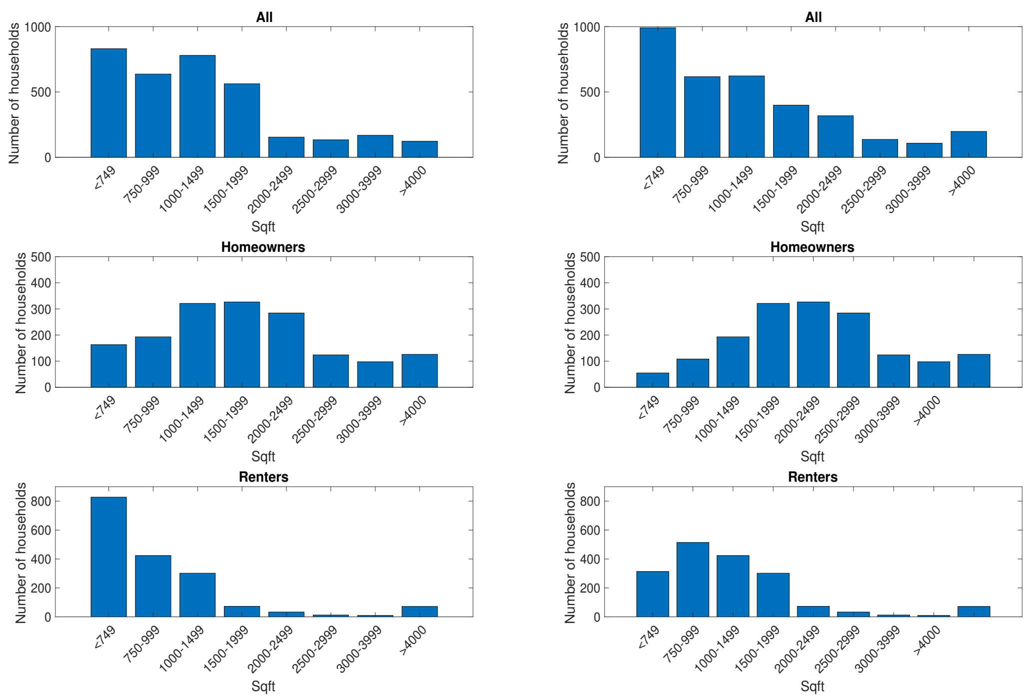
References

Favilukis, Jack, Pierre Mabille, and Stijn Van Nieuwerburgh, 2018, Out-of-town investors and city welfare, Working Paper Columbia GSB and UBC Sauder.

Heathcote, Jonathan, Kjetil Storesletten, and Giovanni L. Violante, 2017, Optimal tax progressivity: An analytical framework, *Quarterly Journal of Economics* 132, 1693–1754.

Keane, Michael, and Richard Rogerson, 2012, Micro and macro labor supply elasticities: A reassessment of conventional wisdom, *Journal of Economic Literature* 50.

Figure 1: 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.

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.

Figure 2: Life-cycle income, wealth, HO: Data (L) vs. Model (R)

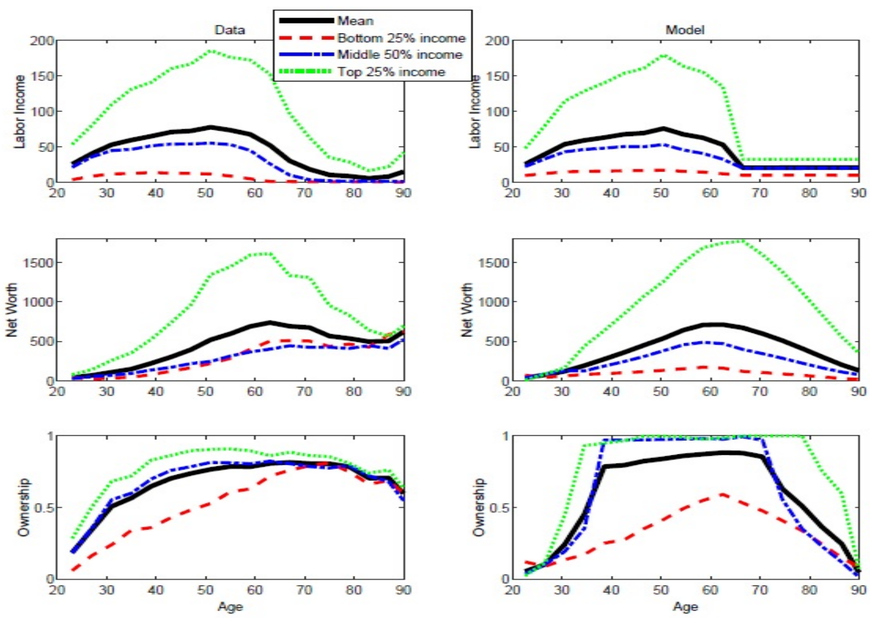


Figure 3: Marginal tax rates

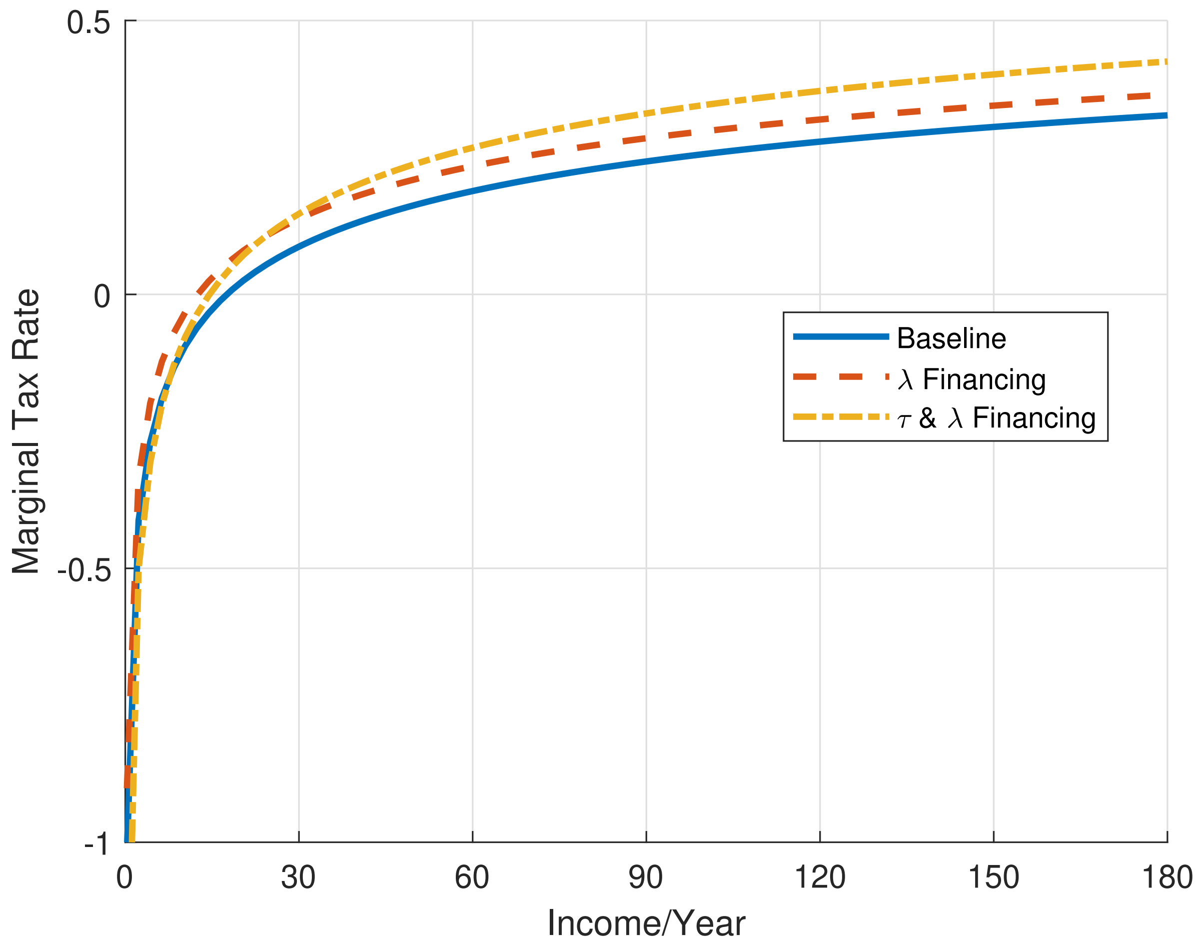


Table 2: UBI change in welfare: Alternative utility functions

This table presents the changes in welfare associated with an introduction of UBI across models with different utility functions. For each utility case, the baseline model is calibrated to NYC, and then $5,000 UBI is introduced. The "base" case is the baseline calibration in the text, where risk aversion $\gamma = 5$. We also present two cases with lower risk aversion ($\gamma = 4$ and $\gamma = 2$) and a case with a higher Frisch elasticity of labor supply. We present welfare by age, wealth, and productivity group.

Welfare change by age

	All	24	32	40	48	56	64	72	80	88	96
base	1.08	4.11	0.86	-0.25	-0.79	-0.96	0.55	1.72	3.80	9.00	11.31
$\gamma = 4$	0.80	3.31	0.65	-0.34	-0.89	-1.07	0.13	1.21	3.74	9.51	11.63
$\gamma = 2$	-0.15	1.66	0.06	-0.78	-1.52	-2.03	-1.77	-0.62	3.86	11.14	13.92
Fr.El.=2	0.13	2.97	0.60	-0.58	-1.16	-1.48	-0.65	-0.15	0.98	3.63	4.78

Welfare change by wealth decile

	All	1	2	3	4	5	6	7	8	9	10
base	1.08	8.82	9.29	10.52	3.43	0.66	0.15	-3.00	-5.10	-5.74	-8.21
$\gamma = 4$	0.80	7.80	8.39	10.66	3.39	0.41	-0.12	-3.28	-5.22	-5.85	-8.15
$\gamma = 2$	-0.15	5.56	7.20	8.92	3.24	-0.04	-1.31	-4.32	-6.03	-6.37	-8.41
Fr.El.=2	0.13	5.66	5.73	8.84	3.16	1.31	0.03	-2.81	-4.72	-6.34	-9.57

Welfare change by skill group

	All	1	2	3	4
base	1.08	17.05	2.14	-2.76	-5.62
$\gamma = 4$	0.80	16.45	1.70	-2.91	-5.67
$\gamma = 2$	-0.15	13.96	0.55	-3.35	-6.09
Fr.El.=2	0.13	12.03	2.02	-2.63	-6.53

Table 3: UBI change in welfare

This table presents the changes in welfare associated with an introduction of UBI across models with alternative ways of paying for UBI. In each case, the baseline model is calibrated to NYC, and then $5,000 UBI is introduced. In the baseline case, UBI is financed by an across the board increase in tax rates (λ). In the progressive case, UBI is financed by an increase in tax progressivity (τ) with the remainder by across the board increase (λ). In the wealth case, UBI is financed by a wealth tax. In the "wealth+corp" case, UBI is financed by a mix of wealth and corporate taxes. In the "exogenous" case, UBI is financed by a benefactor outside the city, and costs locals nothing. The "UBI×2" is identical to the baseline case, but the size of UBI is doubled. We present welfare by age, wealth, and productivity group.

Welfare change by age											
	All	24	32	40	48	56	64	72	80	88	96
base	1.08	4.11	0.86	-0.25	-0.79	-0.96	0.55	1.72	3.80	9.00	11.31
progr.	0.46	7.12	1.58	-0.46	-1.85	-2.77	-2.14	-1.17	1.16	6.67	9.15
wealth	0.60	7.32	2.34	-0.22	-2.13	-3.29	-1.84	-0.88	1.28	7.14	9.40
wealth+corp	3.91	9.29	4.98	3.17	1.94	1.14	1.93	2.57	4.37	9.34	11.46
exogenous	7.01	10.91	7.31	6.23	5.58	5.18	5.73	6.24	7.84	11.94	13.99
UBI×2	2.94	8.16	2.05	0.30	-0.60	-0.64	2.74	5.05	8.38	15.44	18.38

Welfare change by wealth decile											
	All	1	2	3	4	5	6	7	8	9	10
base	1.08	8.82	9.29	10.52	3.43	0.66	0.15	-3.00	-5.10	-5.74	-8.21
progr.	0.46	13.82	13.31	13.21	4.80	1.11	0.26	-4.08	-8.54	-11.90	-17.36
wealth	0.60	13.67	14.67	14.54	6.83	2.32	1.39	-3.12	-8.27	-12.11	-23.87
wealth+corp	3.91	14.50	14.62	14.34	6.89	4.03	3.11	-0.19	-2.81	-4.58	-10.77
exogenous	7.01	15.16	14.73	14.42	7.51	5.95	4.98	2.81	1.84	1.57	1.17
UBI×2	2.94	16.44	16.56	19.25	8.82	3.25	2.06	-3.24	-8.12	-10.37	-15.22

Welfare change by skill group					
	All	1	2	3	4
base	1.08	17.05	2.14	-2.76	-5.62
progr.	0.46	24.84	3.20	-4.68	-12.46
wealth	0.60	21.63	3.83	-3.52	-12.19
wealth+corp	3.91	22.31	5.29	-0.11	-4.68
exogenous	7.01	23.43	6.94	3.14	1.56
UBI×2	2.94	32.77	5.31	-4.04	-10.44

Table 4: UBI change in quantities

This table presents changes in various quantities from an introduction in UBI for each of the models we solve. We separate the changes into Zone 1, Zone 2, and All.

	Base			$\gamma = 4$			$\gamma = 2$			Frisch Elast. = 2		
	Z1	Z2	All	Z1	Z2	All	Z1	Z2	All	Z1	Z2	All
Pop. Frac	-2.75	0.32	0.00	-4.78	0.57	0.00	-1.71	0.20	0.00	3.27	-0.38	0.00
Avg Age	1.63	-0.22	0.00	9.22	-0.91	0.00	5.31	-0.51	0.00	-5.93	0.74	0.00
Prod.	2.25	-0.21	0.00	5.02	-0.57	0.00	2.54	-0.37	0.00	1.66	-0.51	0.00
Hours	-6.43	-4.06	-4.43	-9.36	-3.69	-4.53	-4.91	-4.66	-4.74	1.22	-7.32	-6.21
Eff. Hours	–	–	-2.39	–	–	-2.46	–	–	-2.57	–	–	-4.32
Wage	–	–	0.61	–	–	0.62	–	–	0.64	–	–	1.30
Income	-8.39	-0.03	-1.50	-7.13	-0.19	-1.55	-0.83	-1.61	-1.62	4.80	-4.61	-2.85
Wealth	5.94	-18.03	-15.29	13.51	-19.14	-15.73	-0.40	-18.21	-16.15	-15.93	-17.13	-16.62
Cons.	-5.25	-4.96	-4.95	-5.19	-4.97	-5.01	-5.40	-5.35	-5.39	-7.35	-6.34	-6.43
Unit Size	2.52	-3.82	-3.28	4.80	-4.09	-3.32	1.60	-3.91	-3.48	-3.53	-4.77	-4.75
Ownership	7.94	-17.31	-15.24	11.41	-18.71	-16.21	3.62	-19.42	-16.83	-12.37	-13.05	-12.95
Rent	-2.30	-2.60	-2.95	-2.33	-2.65	-3.31	-2.44	-3.04	-3.15	-2.06	-3.35	-2.53
Price	-2.29	-2.62	-3.10	-2.34	-2.69	-3.59	-2.41	-2.97	-3.16	-2.06	-3.36	-2.30
	Progressive Tax			Wealth Tax			Wealth and Corp. Tax			Exogenous Funding		
	Z1	Z2	All	Z1	Z2	All	Z1	Z2	All	Z1	Z2	All
Pop. Frac	2.84	-0.34	0.00	0.28	-0.03	0.00	-4.27	0.50	0.00	-5.59	0.66	0.00
Avg Age	-8.13	0.85	0.00	1.22	-0.10	0.00	3.76	-0.44	0.00	7.17	-0.76	0.00
Prod.	-9.40	1.78	0.00	-4.99	1.03	0.00	2.75	-0.17	0.00	4.11	-0.30	0.00
Hours	-11.30	-9.95	-10.05	1.28	-3.34	-2.77	-4.66	-3.90	-4.09	-7.74	-4.49	-4.96
Eff. Hours	–	–	-8.12	–	–	0.46	–	–	-1.42	–	–	-2.76
Wage	–	–	2.62	–	–	-0.68	–	–	0.27	–	–	0.99
Income	-25.84	-1.69	-5.51	2.57	0.38	0.73	0.50	-0.50	-0.62	-1.59	-1.06	-1.47
Wealth	-2.90	-29.80	-26.50	-15.33	-33.10	-30.97	2.49	-18.54	-16.19	14.64	-4.80	-2.70
Cons.	-12.49	-11.47	-11.59	-6.74	-5.22	-5.34	-1.75	-1.29	-1.34	2.69	2.54	2.59
Unit Size	-3.51	-8.17	-7.95	-0.57	-3.30	-3.13	4.22	-1.70	-1.14	5.72	0.13	0.72
Ownership	-12.24	-18.46	-18.00	-9.40	-27.76	-26.26	0.24	-19.01	-17.40	4.86	-12.65	-11.16
Rent	-5.29	-5.97	-5.38	-2.61	-3.16	-2.98	-0.38	-0.28	-0.97	2.00	2.74	1.66
Price	-5.30	-6.03	-5.24	-2.58	-3.16	-2.93	-0.37	-0.33	-1.25	1.69	2.34	0.94