A. Online Appendix

A.1. Equilibrium and Solution Algorithm

In this appendix we describe the stationary equilibrium of the economy. For ease of notation and consistency with the computational method we describe a discrete state space. We use the notations $Pr(p'|p)$ as the transition probability of individual productivity, and $Pr(p)$ as the unconditional probability for individual productivity draws. A stationary equilibrium consists of:

1. A set of value functions $\{W(a,p), U(a,p), J(a,p), V^{NLF}, V\}$
2. Consumption $c^e(a,p)$ and $c^u(a,p)$ for employed and unemployed workers, respectively, as well as asset accumulation policy functions $g^e(a,p)$ and $g^u(a,p)$
3. A disutility cutoff Γ^*
4. Prices $\{r, w(a,p), \pi\}$
5. Vacancy level v and demand for capital per worker $k(p)$
6. Tightness ratio θ and implied probabilities λ^w and λ^f
7. A government policy consists of: tax on labor income $t_l(y_l)$ and a flat tax on financial income t_a; transfers b^{NLF} for individuals out of the labor force; lump sum transfers UBI; A government expenditure G; a UI policy of replacement rate h and a ceiling on benefits κ
8. Dividends d
9. Distributions over employment status (either e or u), assets a and individual productivity p, denoted by $\mu^e(a,p)$ and $\mu^u(a,p)$, as well as a measure of individuals outside the labor market μ^{NLF}

such that:

1. Given the job finding probability λ^w, the wage function, and prices $\{r,\pi\}$, the worker's choices of c and a' solve the optimization problem for each individual. This results in the value functions $W(a,p)$, and $U(a,p)$.
2. Given the value of staying outside of the labor force, and the value of entering the labor force U(0,$\underline{p}$), Γ^* is the threshold utility cost of joining the labor force.

3. Given the wage functions, prices, the distribution $\mu^e(a,p)$, and the workers asset accumulation decisions, each firm solves the optimal choice of $k(p)$. This results in $J(a,p)$.

4. Given the wage functions, prices, the distribution $\mu^u(a,p)$, the unemployed workers asset accumulation decisions, and the job filling probability λ^f, firms compute the value V. With free entry, $V = 0$.

5. The asset market clears, and the aggregate demand for capital equals supply.

6. The wage functions $w(a,p)$ are determined by Nash bargaining.

7. The government has a balanced budget.

$$\sum_a \sum_p [\mu^e(a,p)\,(w(a,p)t_l\,(w(a,p)) + at_a(1-q)) + \mu^u(a,p)\,(b(p)t_l\,(b(p)) + at_a(1-q))]$$
$$= \sum_a \sum_p [\mu^u(a,p)b(p)] + G + \mu^{NLF}\left[b^{NLF} + max(UBI - \overline{UBI}, 0)\right] + (1-\mu^{NLF})UBI \quad (7)$$

8. The dividend paid to equity owners every period is the sum of flow profits from all matches, net of the expenditure on vacancies.[22]

$$d = \sum_a \sum_p [(pf(k(p)) - rk(p) - w(a,p))\,\mu^e(a,p)] - \xi v \quad (8)$$

9. The distributions $\mu^e(a,p)$ and $\mu^u(a,p)$ are invariant and generated by $\{\lambda^w, s, \phi\}$, the law of motion for individual productivity and the asset accumulation policy functions as follows:

$$\begin{aligned}
\mu^e(a',p') &= (1-\phi)\{(1-s)\sum_a \sum_p \mu^e(a,p) \times Pr(p'|p) \times 1\{g^e(a,p) = a'\} \\
&\quad + \lambda^w \sum_a \sum_p \mu^u(a,p) \times Pr(p'|p) \times 1\{g^u(a,p) = a'\}\} \\
\mu^u(a',p') &= (1-\phi)\{s \sum_a \mu^e(a,p') \times 1\{g^e(a,p') = a'\} \\
&\quad + (1-\lambda^w)\sum_a \mu^u(a,p') \times 1\{g^u(a,p') = a'\}\} + \phi \times Pr(p) \times 1\{a' = 0\} \\
1 &= \sum_a \sum_p (\mu^e(a,p) + \mu^u(a,p)) + \mu^{NLF}
\end{aligned}$$

[22] As flow profits depend on asset holdings of individual workers, this distribution is taken into account.

A.2. Wealth Moments

The table below presents the share of aggregate wealth owned by quintiles of the wealth distribution both for the data (data source: Table 1 of Krueger, Mitman and Perri (2017)) and our model economy. Further more, it reports the Gini coefficient of the wealth distribution.

Table A1: Wealth moments

	Data	Model
% share owned by		
Q1	-0.2	<0.05
Q2	1.2	1.7
Q3	4.6	7.3
Q4	11.9	21.5
Q5	82.5	69.6
Gini	0.78	0.68

A.3. Detailed Welfare Measure

In what follows we provide a detailed definition of our utilitarian welfare measure applied when comparing welfare across steady states. For each policy experiment we follow the protocol below:

1. Calculate the expectation of the discounted value from consumption over the entire (discretized) state-space.

2. Compute the stock of disutility due to the participation cost.

3. Add (1) and (2).

4. Derive the consumption equivalence measure.

In each of the calculations in (1) and (2), we appropriately account for discounted values of both consumption and participation costs of future (unborn) generations.

Finally, we compare the consumption equivalent measures across steady states, and report them in terms of percent change compared to the benchmark model.

A.4. Transition Dynamics

When calculating transition dynamics in Section 4.2.4, we make a few simplifying assumptions, namely, shifting to annual frequency, and assuming one wage per productivity level. These assumptions reduce dramatically the computational burden, making the calculation of transition dynamics feasible.

We verify that these assumptions do not change our steady state results, by comparing the impact of UBI for the specification for which we calculate transitions (UBI equals 5.3%) with and without imposing these assumptions. In particular, the change in steady states values of GDP per capita is 2.0% using the benchmark economy assumptions and 2.1% when applying the simplifying assumptions. Similarly, consumption equivalent welfare changes by 12.3% in the benchmark and 12.0% in the alternative economy.

A.5. Financing UBI with progressive taxation - a detailed discussion

The results from Section 4 and specifically the Alaska experiment, highlight the importance of distortionary taxation and labor force participation. The analysis in Section 4.2, demonstrates that partially replacing existing social assistance payments with UBI can mitigate the adverse effect of distortionary taxation. Here, we study another approach to potentially mitigate this effect – considering changes in the progressivity of the tax schedule while keeping the government budget balanced.

The effect of increased progressivity on the economy is qualitatively ambiguous. On the one hand, a more progressive tax schedule could raise incentives to participate in the labor force and thereby limit the negative distortionary effect of the UBI financing burden. On the other hand, because increased progressivity reduces incentives to self insure, it lowers the demand for capital in the economy. This latter channel could further depress the demand for capital already induced by the insurance effect of UBI.

In the spirit of Holter, Krueger and Stepanchuk (2019) for the tax function that we use, changing τ_l is akin to changing the progressivity of the tax function. Figure A5 depicts the results for the baseline $\tau_l = 0.15$, along with a more progressive tax scheme ($\tau_l = 0.25$) and a less progressive one ($\tau_l = 0.05$).[23]

As the upper left plot of Figure A5 shows, as in the baseline case, UBI reduces GDP for all progressivity levels. However, for a given amount of UBI, GDP increases with progressivity.

Moreover, consider the case of a rise in progressivity over the benchmark value (from $\tau_l = 0.15$ to 0.25). Figure A5 suggests that, in this case, the higher the UBI level is, the larger the impact of progressivity on

[23] To keep the budget balanced, whenever we change τ_l, we adjust λ_l (the tax on average income). Note that increasing τ_l would mechanically increase the EITC level. To avoid very large EITC driving our results, we bound its value at the maximum level obtained in the baseline calibration with $\tau_l = 0.15$.

output is. To understand these patterns, we need to consider separately the effect of progressivity on capital and labor.

A.5.1. The impact on labor force

As the second and third plots in the first row of Appendix Figure A5 suggest, the effect of progressivity on output is mostly through labor force participation and not through capital. To understand this recall that, in the model, entry into the labor market occurs at low-productivity jobs. Therefore, workers put extra weight on wages in these entry-level jobs when making the decision whether to take them.

The increase in progressivity boosts after-tax wages in entry jobs, an effect illustrated in the left plot in the second row of Appendix Figure A5. This panel shows large gains in after-tax wages at entry. Moreover, for most UBI levels, after-tax wages are higher even for the average-productivity person.

A.5.2. The impact on capital

The rise in labor force participation due to progressivity (conditional on UBI level) would suggest a similar increase occurring in capital due to complementarity. Yet, as seen in the figure, the relation between capital and progressivity conditional on UBI level is not monotonic, and overall, capital seems less sensitive to progressivity. This is explained by the presence of a counteracting force, where high progressivity reduces the demand for savings and, thus, capital due to the public insurance provided by this high progressivity.

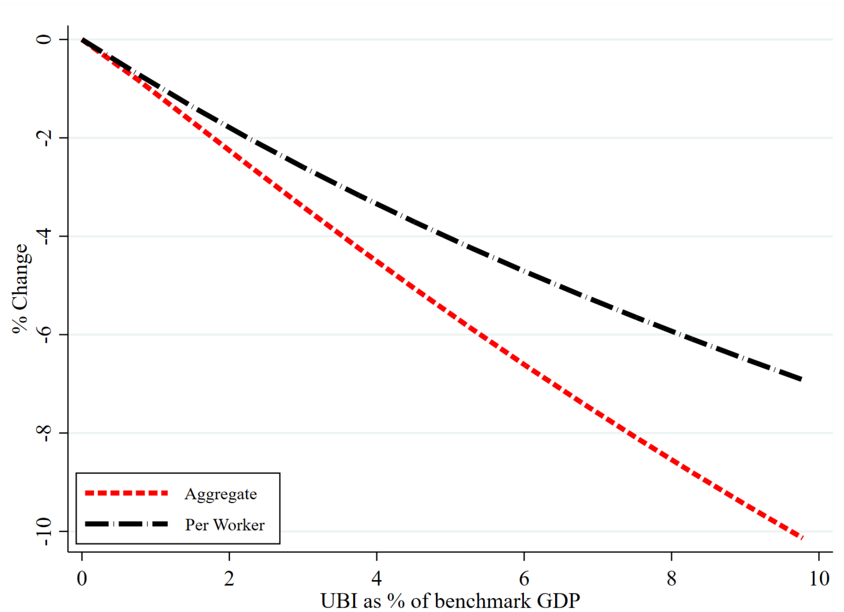
Following our strategy from Section 4.1, we turn to look at the change in capital per worker to isolate this demand for savings channel. As Appendix Figure A6 shows, for low levels of UBI, progressivity depresses the demand for savings, reducing capital per worker. But as UBI increases, the marginal value for progressive taxation as an insurance mechanism falls, as reflected in the shrinking difference between capital per worker for low and high progressivity schemes. This decline in the importance of the insurance channel for higher UBI levels, along with the relatively constant effect of progressivity on labor force participation, explain the non-monotonic relation between aggregate capital and progressivity over different UBI levels.

A.5.3. Welfare

Finally, in terms of welfare, as is clear from Panel B of Figure A5, progressivity reduces consumption inequality (left plot) and increases welfare (middle plot) for each level of UBI. Moreover, the optimal UBI level (the one that maximizes welfare) varies with progressivity. Intuitively, with less progressivity, UBI plays a more important role, by providing insurance. The rightmost plot of Panel B shows an index of consumption-equivalent welfare, with each line normalized to 1 for the case of zero UBI.

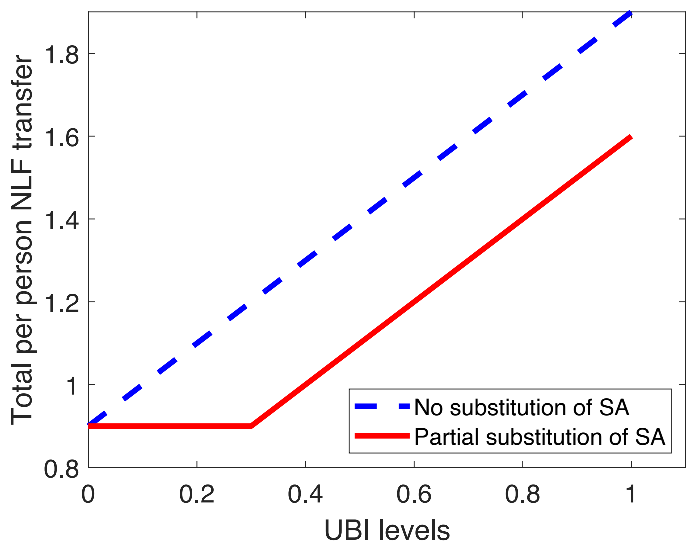
A.6. Appendix Figures

Figure A1: Aggregate Capital vs Capital per Worker - the Demand for Savings Channel



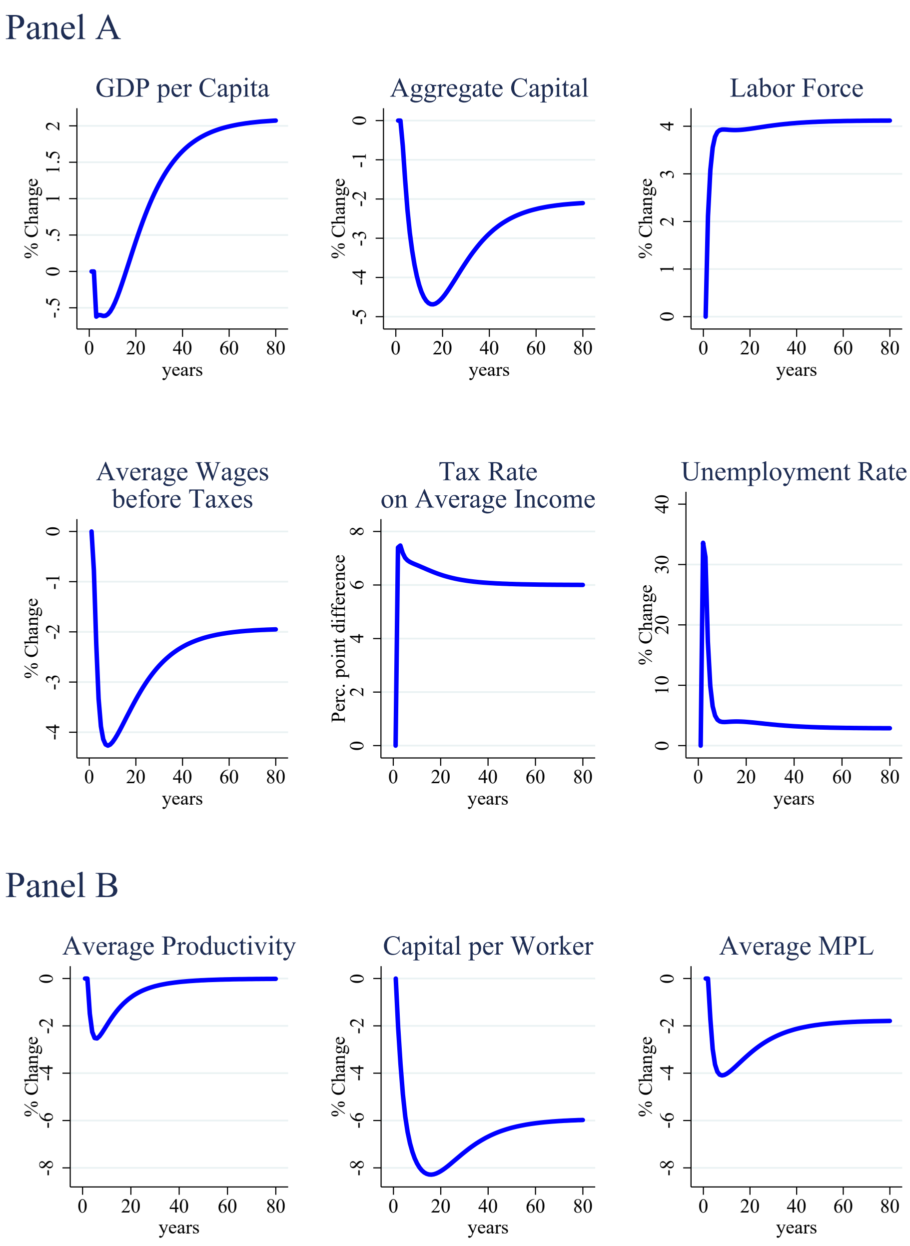
Notes: Steady state responses of aggregate capital (dashed red) and of capital per-worker (dash-dot black) to changes in UBI in the Alaska experiment. UBI is expressed as % of benchmark GDP. Capital is expressed in % difference from its benchmark steady state level.

Figure A2: UBI substitutes for welfare: Consumption outside the labor force



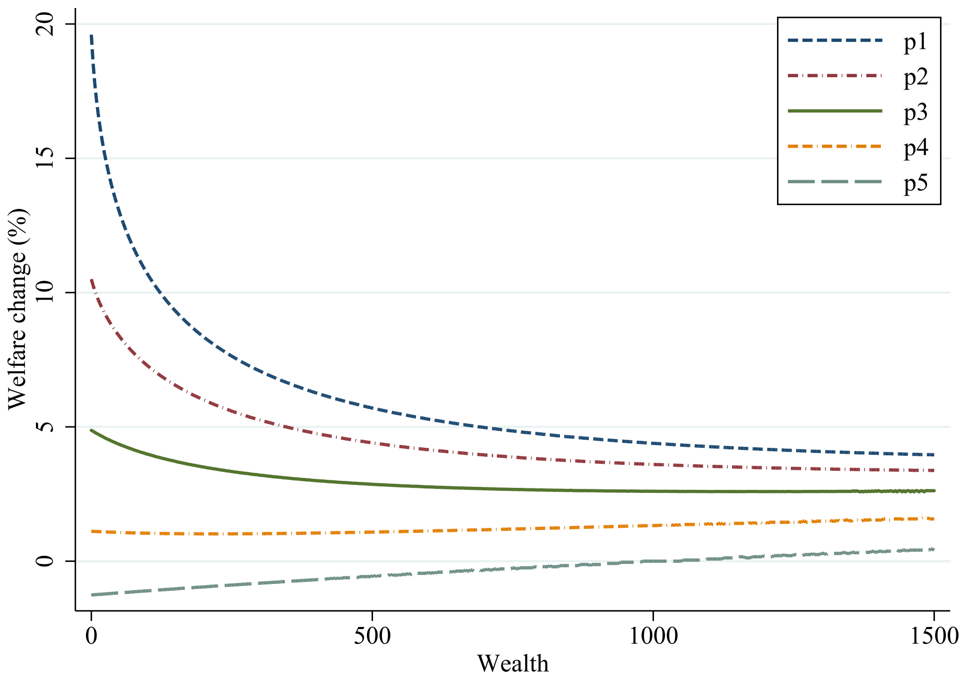
Notes: Consumption outside the labor force implied by the policy whereby UBI substitutes for welfare payments up to a threshold.

Figure A3: UBI substitutes for welfare: Transition Dynamics



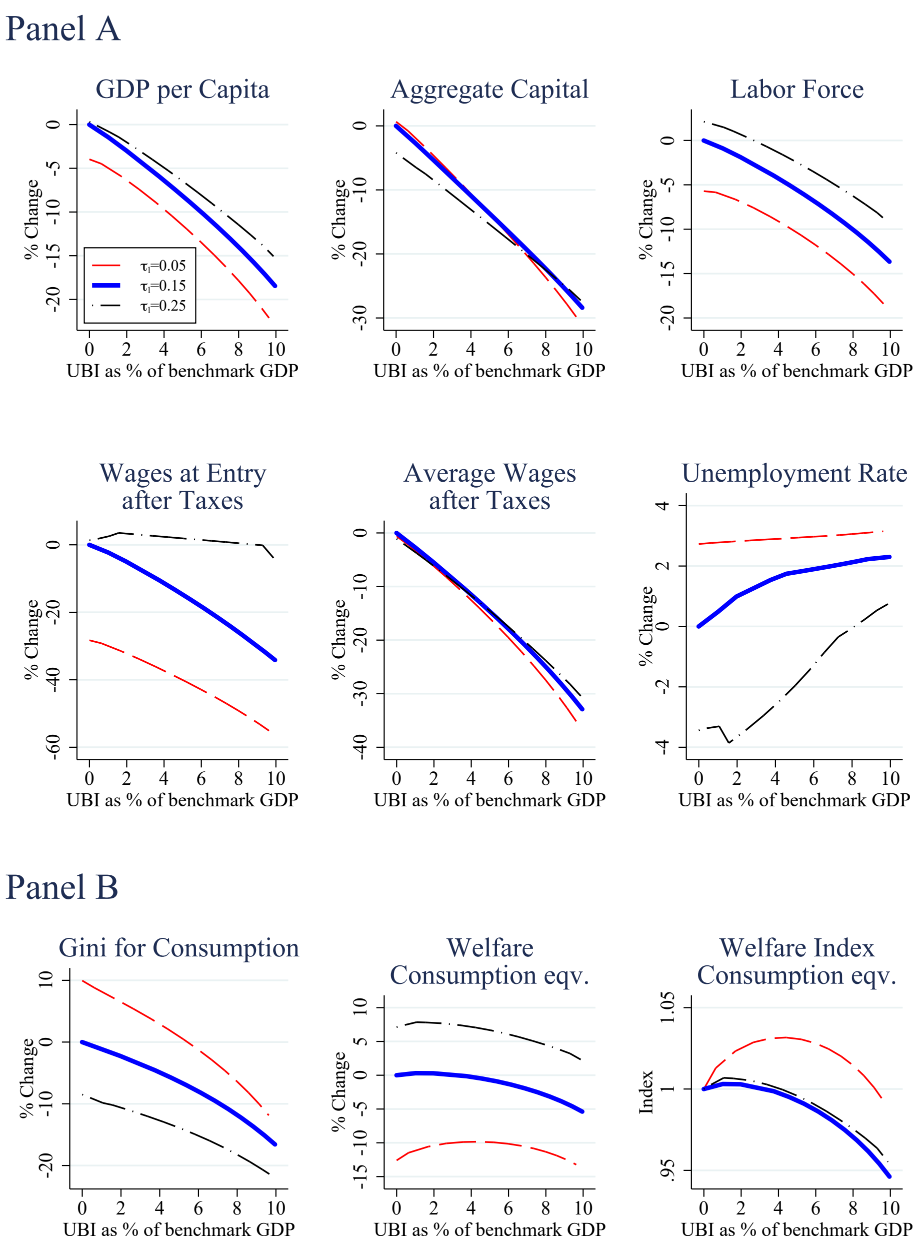
Notes: Transition dynamics of macro aggregates to changes in UBI. The end-point is the steady state with UBI level of 5.3% of baseline GDP per capita. All measures are expressed in % deviations from their initial steady-state level other than Tax Rate on Average Income (p.p difference).

Figure A4: UBI substitutes for welfare: Winners and Losers



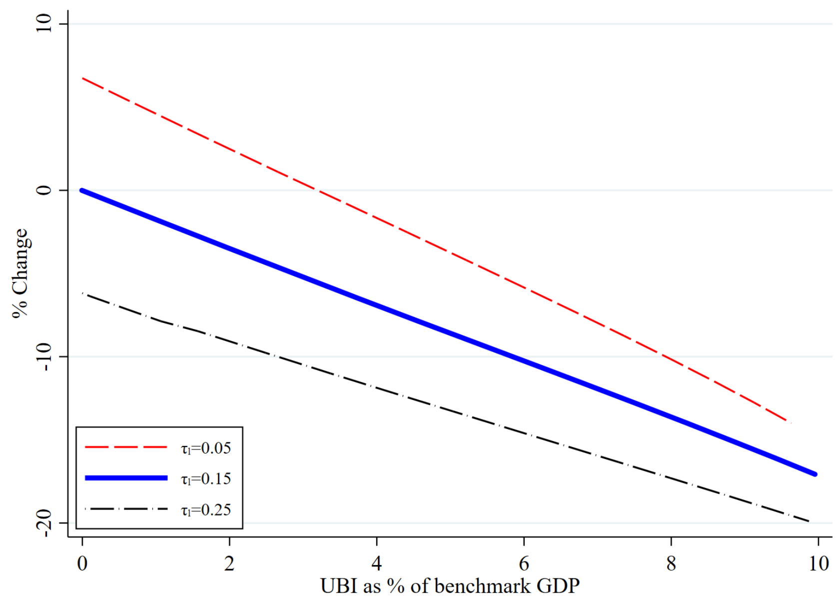
Notes: Welfare gains (consumption equivalent) of employed by wealth over the five levels of productivity. Calculated in the first period of the transition relative to the pre-UBI steady state. We show the results up to wealth level of 1,500 which includes over 98% of employed in the model.

Figure A5: Tax progressivity and the impact of UBI



Notes: Steady state responses of macro aggregates to changes in UBI. UBI expressed as % of benchmark GDP. All measures are expressed in % deviations from their benchmark steady state level other than Welfare Index Consumption equivalent (Indexed to 1 for the no UBI case for each level of progressivity). Blue solid lines represent responses in the baseline model (medium progressivity); High (low) progressivity is represented by the dash-dot black (dashed red) lines.

Figure A6: Capital per Worker - different levels of progressivity



Notes: Steady state responses of capital per-worker to changes in UBI in the baseline model (blue), high (dash-dot black), and low (dash red) progressivity. UBI is expressed as % of benchmark GDP. Capital is expressed in % difference from its benchmark steady state level.