Online Appendix to: “Unemployment and the Distribution of Liquidity"

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Appendix D. A simple linear model

We describe a simple version of our model that has linear preferences both in the last stage, $U(c_t, e_t) = c_t + (1 - e_t)\ell$, as in the MP model, and in the early stage, $v(y) = \bar{v}y$ with $\bar{v} > 1$.[1] In the presence of liquidity constraints, this linear specification does not make the distribution of asset holdings degenerate, but it renders distributional effects inoperative, thereby allowing us to focus on the interest rate and aggregate demand channels. We assume there is only one productivity type $z = 1$ and that all assets are equally acceptable, so that the two forms of public liquidity, government bonds and money, are perfect substitutes, $R^m = R^\iota \equiv R$. We focus on equilibria with bonds only and denote $a^g = A^g/n$ the supply of one-period real bonds per employed household. We set $\kappa(y) = y$, which means that the production $\bar{q} = \bar{y}$ can be stored across stages with no additional transformation cost to sell to early consumers. With no loss in generality (because of linear preferences and a balanced budget of the government), we set $\varpi_0 = \tau_0 = 0$.

Price of early consumption goods The price of early consumption must satisfy $p^y = 1$. Indeed, if $p^y < 1$ firms sell all their output to late consumers, which is inconsistent with market clearing for early consumption. If $p^y > 1$, then all the output is sold to early consumers and there is no output left to finance the entry costs of new firms.

The consumption/saving decision Let $V' \equiv V'(a)$ denote the expected discounted utility of one unit of asset at the beginning of a period. It solves

$$V' = \alpha\bar{v} + (1-\alpha)\beta R V' \Longrightarrow V' = \frac{\alpha\bar{v}}{1-(1-\alpha)\beta R}. \tag{1}$$

[1] Such linear specification is used in the context of New-Monetarist models in the example in Section 6.2 of Rocheteau et al. (2018) and in Herrenbrueck (2019). It is also used in the context of an over-the-counter market with liquidity constraints by Lagos and Zhang (2020).

With probability α the asset is traded for one unit of early consumption, which generates a utility $\bar{v}$. With complement probability, $1-\alpha$, the asset is saved for the following period (which is always weakly optimal by market clearing), which generates the expected discounted utility $\beta R V'$. The consumption/saving decision in the last stage is given by:

$$\max_{\hat{a}\geq 0}\left(-\frac{\hat{a}}{R}+\beta V'\hat{a}\right) \text{ s.t. } \hat{a}\leq R\left(a+\bar{w}_e+\tau_e\right).$$

The demand for assets is positive only if $\beta R V' \geq 1$, which can be reexpressed as:

$$R \geq \underline{R} \equiv \frac{1}{\beta\left(\alpha\bar{v}+1-\alpha\right)}. \tag{2}$$

The lower bound for the real interest rate is less than ρ and it decreases with the frequency, α, and value, $\bar{v}$, of early-consumption opportunities. If $R=\underline{R}$, then households are just indifferent between saving and consuming late. If $R>\underline{R}$, then households save their full income, $\hat{a}=R\left(a+\bar{w}_e+\tau_e\right)$.

The demand for private assets Let $\bar{\Omega}$ denote aggregate wealth at the beginning of the second stage if $R>\underline{R}$. It satisfies:

$$\bar{\Omega}_{t+1}=R\left[(1-\alpha)\bar{\Omega}_t+n_t(\bar{w}_1+\tau_1)\right].$$

Aggregate wealth in period $t+1$ is equal to the wealth of the $1-\alpha$ households who did not spend it on early consumption, plus total labor income and transfers, everything capitalized at rate R. From the budget constraint of the government, $\tau_1=(1-R)\,a^g/R$. The stationary solution is

$$\bar{\Omega}(R)=\frac{n\left[R\bar{w}_1+(1-R)\,a^g\right]}{1-R(1-\alpha)} \text{ if } R<(1-\alpha)^{-1}. \tag{3}$$

If $R(1-\alpha)>1$, then the dynamics of wealth accumulation are explosive, $\bar{\Omega}=+\infty$. We define by $\bar{\omega}(R)\equiv\left[\bar{\Omega}(R)-A^g\right]/n$ the maximum holdings of private assets per employed households. From (3):

$$\bar{\omega}(R)=\frac{R\left(\bar{w}_1-\alpha a^g\right)}{1-R(1-\alpha)} \text{ if } R<(1-\alpha)^{-1}. \tag{4}$$

Note that $\bar{w}_1>\alpha a^g$ is necessary for households to accumulate private assets. Under that condition, $\bar{\omega}(R)$ is increasing in R.

Job creations and the supply of private assets From the job creation condition (equation 18 in main paper), assuming the labor market is active, θ solves

$$\frac{\theta k}{\lambda(\theta)}=\frac{\bar{q}-\bar{w}_1}{r+\delta}, \tag{5}$$

where $r=R-1$. Using that $\lim_{\theta\to 0}\lambda(\theta)/\theta=\lambda'(0)=1$, $\theta>0$ if $R<\bar{R}\equiv\left[\bar{q}-\bar{w}_1+(1-\delta)k\right]/k$. Hence, for an active equilibrium to exist, $[\underline{R},\bar{R})$ must be nonempty, i.e.,

$$\underline{R}<\bar{R}\Leftrightarrow\frac{\left[\rho+\delta-\alpha(\bar{v}-1)(1-\delta)\right]}{\alpha\bar{v}+1-\alpha}k<\bar{q}-\bar{w}_1. \tag{6}$$

We assume in the following that (6) holds, i.e., entry costs are sufficiently low to generate firm entry. The supply of private assets per employed worker is $a^p(R) \equiv \phi^f(R)$ where, from $\phi^f(z) = zq(p^y) - z\bar{w}_1 + (1-\delta)\frac{\phi^f(z)}{R^\iota}$, we can derive

$$a^p(R) = \frac{R\left(\bar{q} - \bar{w}_1\right)}{R - (1-\delta)}, \; \forall R \in \left(1-\delta, \bar{R}\right). \tag{7}$$

It is decreasing in R with $\lim_{R \searrow 1-\delta} a^p(R) = +\infty$.

Determination of the real interest rate The asset market clearing condition can be expressed as

$$\bar{\omega}(R) \geq a^p(R), \quad " = " \text{ if } R > \underline{R}. \tag{8}$$

If $\bar{\omega}$ is larger than the supply of private assets – a savings glut – then households do not save their full income, which requires $R = \underline{R}$.[2] An equilibrium is a list (n, θ, R) that solves $n = \frac{m(1,\theta)}{\delta + m(1,\theta)}$, (5), and (8). The equilibrium condition (8) is represented graphically in Figure 1. The following proposition characterizes equilibria in closed form.

Proposition 1 ***(Linear model.)*** *Suppose $U(c,e) = c$, $v(y) = \bar{v}y$ with $\bar{v} > 1$, and (6) holds. Assume $\bar{w}_1 > \alpha a^g$. There are two regimes with an active labor market ($\theta > 0$).*

(i) Savings glut. *If the following conditions hold,*

$$\begin{aligned} \bar{w}_1 - \alpha a^g \quad &\geq \quad \frac{\left[\alpha\bar{v} - \rho(1-\alpha)\right]}{\rho + \delta - (1-\delta)\alpha\left(\bar{v} - 1\right)}\left(\bar{q} - \bar{w}_1\right) && (9) \\ \rho + \delta \quad &> \quad (1-\delta)\alpha(\bar{v} - 1), && (10) \end{aligned}$$

then r and θ are independent of a^g and solve:

$$\begin{aligned} r \quad &= \quad \frac{\rho - \alpha\left(\bar{v} - 1\right)}{1 + \alpha\left(\bar{v} - 1\right)} && (11) \\ \frac{\theta k}{\lambda(\theta)} \quad &= \quad \frac{\left[1 + \alpha\left(\bar{v} - 1\right)\right]\left(\bar{q} - \bar{w}_1\right)}{\rho + \delta - (1-\delta)\alpha\left(\bar{v} - 1\right)}. && (12) \end{aligned}$$

(ii) Abundant asset supply. *If (9)-(10) do not hold and*

$$a^g < \frac{\alpha\bar{w}_1 + (1-\alpha)\bar{q} - \left[\alpha + \delta(1-\alpha)\right]k}{\alpha}, \tag{13}$$

then r and θ solve:

$$\begin{aligned} r \quad &= \quad \frac{\alpha\left(\bar{q} - \bar{w}_1\right) - \delta\left(\bar{w}_1 - \alpha a^g\right)}{\left(\bar{w}_1 - \alpha a^g\right) + (1-\alpha)\left(\bar{q} - \bar{w}_1\right)} && (14) \\ \frac{\theta k}{\lambda(\theta)} \quad &= \quad \frac{\alpha\left(\bar{w}_1 - a^g\right) + (1-\alpha)\bar{q}}{\alpha + \delta(1-\alpha)}. && (15) \end{aligned}$$

Moreover, $\partial r/\partial a^g > 0$, $\partial\theta/\partial a^g < 0$, $\partial r/\partial\bar{w}_1 < 0$, $\partial\theta/\partial\bar{w}_1 > 0$, and $\partial n/\partial\bar{w}_1 > 0$.

[2] By Walras's Law the clearing condition of the asset market, (8), and the clearing condition of the goods market are redundant. Hence, in the following we focus on the former.

Proof. (i) The savings glut regime is defined by $R = \underline{R}$. From (2) and (5) r and θ solve (11) and (12). A necessary condition for (8) to hold at $R = \bar{R}$ is $\bar{R} > 1 - \delta$, i.e., $\rho + \delta > (1-\delta)\alpha(\bar{v} - 1)$. A sufficient condition for (8) to hold at $R = \bar{R}$ is

$$\alpha\bar{v} - (1-\alpha)\rho \leq 0, \tag{16}$$

in which case $\bar{\omega}(\bar{R}) = +\infty$. If $\rho < \alpha\bar{v}/(1-\alpha)$, then $\bar{\omega}(\bar{R}) \geq a^p(\bar{R})$ can be reexpressed as

$$\bar{w}_1 - \alpha a^g \geq \frac{[\alpha\bar{v} - \rho(1-\alpha)]}{\rho + \delta - (1-\delta)\alpha(\bar{v} - 1)} (\bar{q} - \bar{w}_1). \tag{17}$$

Given $\bar{w}_1 - \alpha a^g > 0$, (16) implies (17). (ii) The second regime is such that $R \in (\underline{R}, \bar{R})$. The endogenous variables, r and θ, solve (14) and (15). It is easy to check that $R > \underline{R}$ is equivalent to (9) does not hold. Let's consider the comparative statics with respect to w_1. From (14),

$$\frac{\partial r}{\partial \bar{w}_1} = \frac{-(\alpha R + \delta)}{D}$$

where

$$D \equiv \bar{w}_1 - \alpha a^g + (1-\alpha)(\bar{q} - \bar{w}_1).$$

From (15), $\theta > 0$ implies $D > 0$. Hence, $\partial r/\partial \bar{w}_1 < 0$ since $R > 0$. The result $\partial\theta/\partial\bar{w}_1 > 0$ follows directly from (15). Let's consider next comparative statics with respect to a^g. From (14),

$$\frac{\partial r}{\partial a^g} = \frac{\alpha(\delta + r)}{D}.$$

From (5), $r > -\delta$. Hence, $\partial r/\partial a^g > 0$. The result $\partial\theta/\partial a^g < 0$ follows directly from (15). ■

In the first regime, the supply of assets is scarce relative to the potential wealth that households can accumulate, which drives the (gross) real interest to its lower bounds, $\underline{R}$. In Figure 1 we indicate such an equilibrium where $\bar{\omega}(\underline{R}) > a^p(\underline{R})$ by the marker "0". The supply of public liquidity, a^g, has no effect on R, and θ. Indeed, if a^g increases, then households ramp up their asset holdings without asking for a higher interest rate. The fact that households raise their early consumption has not effect on firms' profits since early consumption and late consumption are sold at the same price. The condition for a savings glut, (9), holds if a^g is small, if $\bar{w}_1$ is large, or if α is small.

In the second regime the supply of assets is sufficiently abundant to drive the real interest rate above its lower bound. In Figure 1 we indicate such an equilibrium where $\bar{\omega}(R) = a^p(R)$ by the marker "1". Households save their full income in order to spend their wealth on early consumption opportunities. When a^g increases, the supply of assets becomes larger than the maximum wealth households can accumulate given their income. As a result, r increases, which reduces the supply of private assets, $\partial r/\partial a^g > 0$, $\partial\theta/\partial a^g < 0$, and $\partial n/\partial a^g < 0$. This effect is the interest channel of public liquidity.

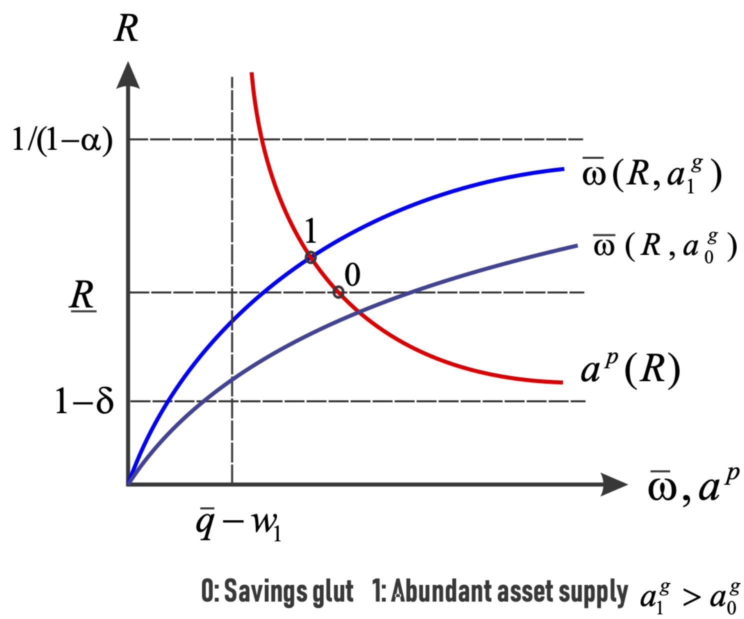

Figure 1: Equilibrium in simple linear model.

Adding a markup

In order to allow the composition of sales to early and late consumers to matter for firms' profits, suppose now that early consumption is sold at a markup $\mu > 1$ over the opportunity cost of selling late. We treat this markup as exogenous in this simple version of the model but it arises endogenously in the general version when $\kappa'' > 0$. Analogous to the assumption of random matching in search models, the demand for early consumption is divided evenly among the n active firms in the market for early consumption.

Households' marginal value of assets solves (1) where $\bar{v}$ is replaced with $\bar{v}/\mu$. The lower bound for the real interest rate is $\underline{R} \equiv (1+\rho) / [\alpha(\bar{v}/\mu) + 1 - \alpha]$. The average sales of a firm in terms of the numeraire are now

$$q = \bar{q} + \alpha \frac{\mu - 1}{\mu} \left(a^g + \phi^f \right). \tag{18}$$

The second term on the right side of (18) corresponds to the additional profits received by a firm from selling to early consumers. Each unit of asset spent on early consumption generates a profit equal to $(1/\mu) - 1$ in terms of the numeraire, and the demand per firm is αa where, by market clearing, $a = a^g + \phi^f$. This second term creates a link between firms' average revenue and households' wealth. From the free-entry condition, $-\frac{\theta k}{\lambda(\theta)} + \frac{q - \varpi_1}{r' + \delta} \leq 0,\ \text{"} = \text{"}$ if $\theta > 0$, market tightness solves

$$\frac{\theta k}{\lambda(\theta)} = \frac{\mu(\bar{q} - \bar{\varpi}_1) + \alpha(\mu - 1) a^g}{\delta\mu + [\alpha + (1-\alpha)\mu] r - \alpha(\mu - 1)}. \tag{19}$$

The provision of public liquidity has now a direct effect on market tightness. For given r, $\partial\theta/\partial a^g > 0$ if $\mu > 1$ because firms raise their profits by selling to early consumers. The upper bound for R above which the labor market shuts down is

$$\bar{R} \equiv \frac{\mu\left(\bar{q}-\bar{w}_1\right)+\alpha\left(\mu-1\right)a^g+(1-\delta)\mu k}{\left[\alpha+(1-\alpha)\mu\right]k}.$$

We impose $\underline{R} < \bar{R}$. The supply of private assets per employed worker as a function of the gross real interest rate as

$$a^p(R)=\frac{R\left[\bar{q}-\bar{w}_1+\alpha(1-\mu^{-1})a^g\right]}{R-(1-\delta)-\alpha\left(1-\mu^{-1}\right)},\ \forall R\in\left(1-\delta+\alpha\left(1-\mu^{-1}\right),\bar{R}\right). \tag{20}$$

The maximum wealth per employed worker, $\bar{\omega}(R)$, is still given by (4) and the market-clearing condition is given by (8). The outcome of the asset market is represented graphically in Figure 2. A key difference is that the curve $a^p(R)$ is now parameterized by a^g.

Proposition 2 ***(Linear model with markup.)*** *Suppose $U(c,e)=c$ and $v(y)=\bar{v}y$ with $\bar{v}>1$. Moreover, early consumption is sold at a markup $\mu>1$. Assume $\bar{w}_1>\alpha a^g$. There are two regimes with an active labor market ($\theta>0$).*

(i) Savings glut. *If the following condition holds,*

$$\bar{w}_1-\alpha a^g \geq \frac{\left[\alpha\bar{v}\mu^{-1}-\rho(1-\alpha)\right]\left[\bar{q}-\bar{w}_1+\alpha(1-\mu^{-1})a^g\right]}{1+\rho-\left[\alpha\left(\bar{v}\mu^{-1}-1\right)+1\right]\left[1-\delta+\alpha\left(1-\mu^{-1}\right)\right]} \tag{21}$$

$$1+\rho > \left[\alpha(\bar{v}\mu^{-1}-1)+1\right]\left[1-\delta+\alpha\left(1-\mu^{-1}\right)\right] \tag{22}$$

then the real interest rate and market tightness are given by:

$$r = \frac{\rho-\alpha\left(\bar{v}/\mu-1\right)}{\alpha\bar{v}/\mu+1-\alpha} \tag{23}$$

$$\frac{\theta k}{\lambda(\theta)} = \frac{\left[1+\alpha\left(\frac{\bar{v}}{\mu}-1\right)\right]\left[\mu\left(\bar{q}-\bar{w}_1\right)+\alpha\left(\mu-1\right)a^g\right]}{\mu\left(\delta+\rho\right)-\alpha(1+\rho)\left(\mu-1\right)-(1-\delta)\mu\alpha\left(\frac{\bar{v}}{\mu}-1\right)}. \tag{24}$$

Moreover, $\partial r/\partial a^g=0$ and $\partial\theta/\partial a^g>0$.

(ii) Abundant asset supply. *If (21) and (22) do not hold and*

$$a^g < \frac{\alpha(\bar{w}_1-k)+(1-\alpha)\mu\left(\bar{q}-\delta k\right)}{\alpha}, \tag{25}$$

then the real interest rate and market tightness are given by

$$r = \frac{\alpha\left(\mu\bar{q}-\bar{w}_1\right)-\delta\mu\left(\bar{w}_1-\alpha a^g\right)}{\alpha(\bar{w}_1-a^g)+(1-\alpha)\mu\bar{q}} \tag{26}$$

$$\frac{\theta k}{\lambda(\theta)} = \frac{\alpha(\bar{w}_1-a^g)+(1-\alpha)\mu\bar{q}}{\alpha+\mu(1-\alpha)\delta}. \tag{27}$$

Moreover, $\partial r/\partial a^g>0$ and $\partial\theta/\partial a^g<0$.

In a savings glut, an increase in a^g does not affect the real interest rate but it raises firms' profits, market tightness, and employment. By raising the amount of wealth that households can accumulate, an increase in

a^g raises the consumption of early consumers which is sold at a markup. This effect is the aggregate demand channel of public liquidity. Graphically, in Figure 2, a small increase in a^g shifts the curve $\bar{\omega}$ upward but its intersection with the curve a^p, which also shifts upward, is still located below $\underline{R}$. In the case of abundant asset supply, the increase in a^g crowds out private assets by raising r – the interest rate channel of public liquidity. In that case, market tightness decreases and employment decreases.

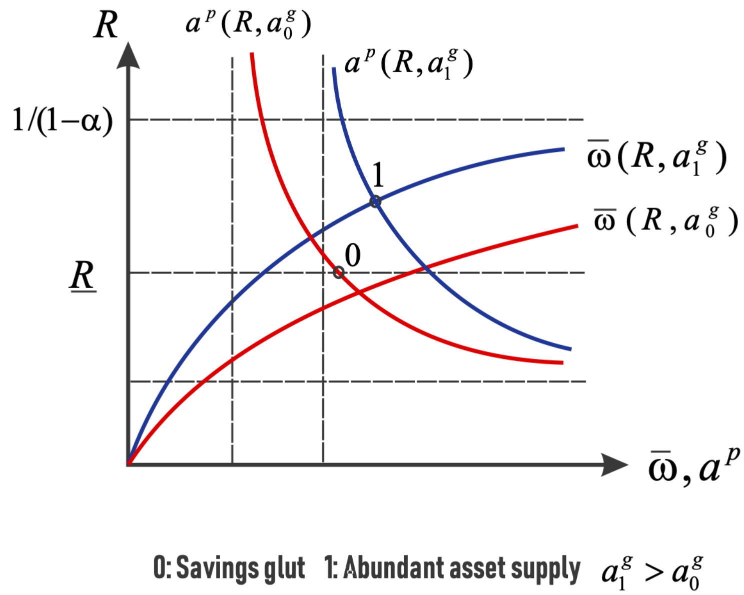

Figure 2: Equilibrium in simple linear model with a markup.

Appendix E. Additional numerical results

In this section, we report additional numerical results for i) a version of the when idiosyncratic labor productivity, z, is stochastic and ii) our baseline model under counter-factual changes in asset liquidity and money transfers schemes.

Lump-sum money creation with idiosyncratic labor-productivity risk

In our baseline environment, households face limited labor earnings risk through occasional unemployment spells. In this section, we introduce additional earnings risk through idiosyncratic shocks to labor productivity, z. We assume that households are ex-ante identical and face an labor productivity process $ln(z_{i,t+1}) = \rho_z ln(z_{i,t}) + \sigma_z \epsilon_{i,t}$, with $\epsilon_{i,t} \sim \mathcal{N}(0,1)$. We follow Auclert et al. (2021) and set ρ_z and σ_z such that the autocorrelation of earnings, $w_1(z)$, is 0.966 and the cross-sectional standard deviation of log earnings is 0.92. We discretize this process using the Rouwenhorst method using $\mathcal{Z} = \{z_\ell, z_m, z_h\}$. For simplicity, we assume that all households and firms interact in a common labor market with a common recruiting cost k. The free-entry condition now becomes

$$-k + \frac{\lambda(\theta)}{\theta} \frac{\mathbb{E}_z \phi^f(z)}{R^\iota} \leq 0, \text{ ``='' if } \theta > 0, \tag{28}$$

where the expectations operator is taken over the distribution of labor productivities of the unemployed (since there is no endogenous job destruction, this coincides with $\varpi(z)$). We also assume unemployed households also face risk in their non-employment income such that $w_0(z)/w_1(z)$ is fixed. Hence, a worker that loses their job with $z = z_h$ receives $w_0(z_h)$ but may get a negative productivity shock in unemployment such that $w_0(z) < w_0(z_h)$ for $z = \{z_\ell, z_m\}$. All other equilibrium conditions remain the same if expectations over employment states $\mathbb{E}_e$ are replaced with expectations over both employment and labor productivity $\mathbb{E}_{e,z}$.

To calibrate the model, we maintain the same strategy as outlined in Section 4 in the main paper, however since our goal with this version of the model is to match cross-sectional features of both the liquid and total wealth distributions, we replace the target for the distribution of the share of liquid wealth to income with the wealth to income distribution. The parameters set independently, $(R^m, \bar{w}_0/\bar{w}_1, \mu, \delta, \nu)$, are identical to those in Table 1 in the main paper. Table 1 reports the jointly calibrated parameters and how they compare to the model with ex-ante heterogeneous, constant z and lump-sum money transfers. The parameter with the largest difference to the environment with fixed z is supply of government bonds, A^g. The demand for precautionary savings in illiquid wealth is significantly larger when z is stochastic. In order to match returns while keeping average labor productivity set at 1, the bond supply must be larger.

Figure 3 illustrates the fit of the model with respect to the liquid and total wealth-to-income distributions. The model has a slightly more concentrated liquid wealth to income distribution compared to the data, however the fit of the total wealth distribution is good. Introducing idiosyncratic labor-productivity risk into the model allow it to match the wealth heterogeneity observed in the data. We now show that the main

Parameter	**Lump-sum** *(fixed z)*	**Lump-sum** *(stoch. z)*	**Moment**	**Data**	**Model**
Parameters Calibrated Jointly - outer loop					
bond supply, A^g	2.565	20.65	bond share of wealth	13%	63%
entry cost, k	6.573	7.576	monthly job finding rate	30%	30%
production cost curvature, a	0.780	0.783	average retail markup	30%	31%
acceptability of illiquid, α_1/α	0.360	0.422	liquidity premium	6.2%	6.2%
Parameters Calibrated Jointly - inner loop					
discount rate, β^{12}	0.952	0.954			
early consumption - curvature, ψ	0.200	0.204	see Figure 3		
early consumption - level, Ψ	2.182	1.806			
expenditure shock, α	0.110	0.223			

Table 1: Lump-sum money creation with labor-productivity risk: jointly calibrated parameters

qualitative implications from our experiments remain unchanged.

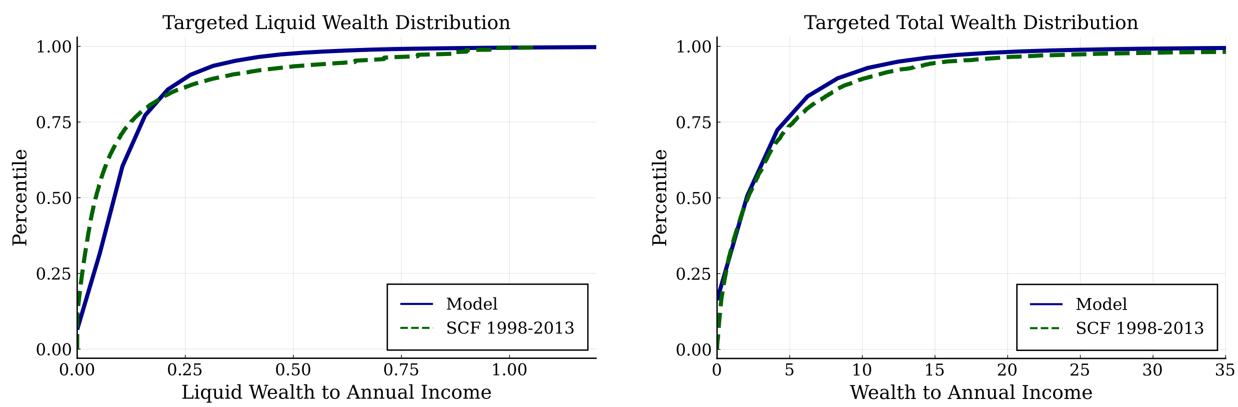

Figure 3: Lump-sum money creation with labor-productivity risk: the distribution of liquid wealth to income (left) and the distribution of the total wealth to income (right), in model versus data.

Figure 4 illustrates the long-run Phillips curve and the interest-rate and aggregate-demand channels, as discussed in Section 6. The Phillips curve is still upward-sloping. The aggregate-demand and interest-rate channels are weaker compared to the version of the model with fixed permanent heterogeneity in labor productivity (and lump-sum transfers of money creation). Inflation reduces the financial discount rate, increases asset prices, and reduces firms' expected revenue.

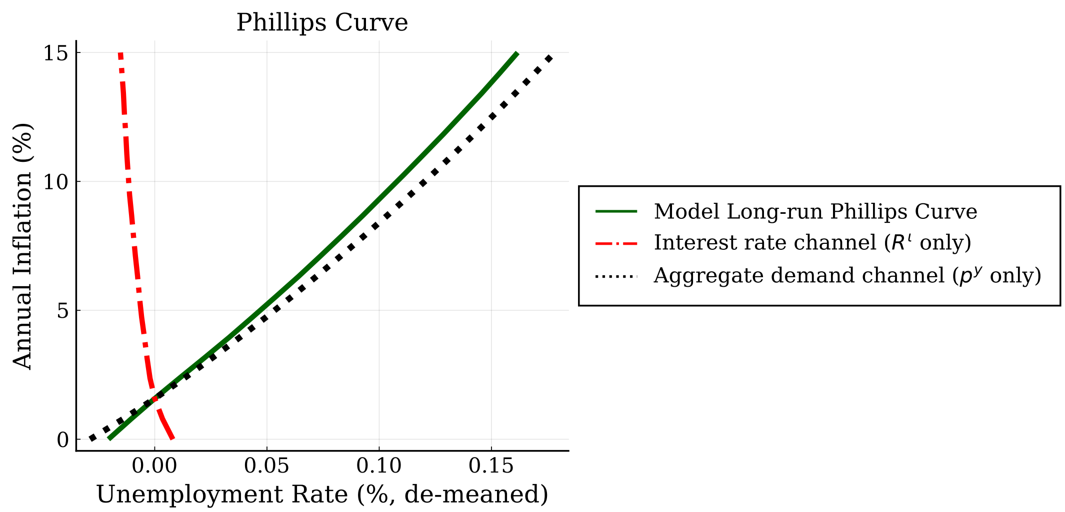

Figure 4: Lump-sum money creation with labor-productivity risk: aggregate demand and interest channels of the long-run Phillips curve.

More on the slope of the long-run Phillips curve

For our calibration, the long-run Phillips curve is almost vertical, i.e., the unemployment rate is largely unresponsive to a change in anticipated inflation. We now show that changes in fundamentals or policy can alter the strengths of the aggregate demand and interest rates channels, with quantitative implications for the long-run trade-off between inflation and unemployment.

Liquidity of financial assets and the long-run Phillips curve In the benchmark calibration, conditional on an expenditure shock, financial wealth can be liquidated 6% of the time. Suppose now that innovations in the finance and banking industry makes it easier to liquidate and transfer financial wealth in order to allow households to finance unexpected expenditures. We capture this idea by assuming that financial wealth is more liquid than in the baseline, while keeping the same rate of expenditure shocks $\alpha = 0.075$. We set $\alpha_1/\alpha = 0.5$. Figure 5 illustrates how the long-run Phillips curve, and the strength of the aggregate demand and interest rate channels, change under these assumptions.

Increasing the liquidity of wealth leads to a negatively-sloped long-run Phillips curve, illustrated with the solid-green line in Figure 5. Quantitatively, an increase in the inflation rate from 0 to 10% reduces unemployment by about 0.5 percent. When the liquidity of financial wealth increases, stocks and bonds become more substitutable with money. As a result, the portfolio substitution effect strengthens and inflation reduces the real return on financial wealth. This effect reduces unemployment as firms' values are boosted, illustrated with a dashed-red line. Further, the increase in the liquidity of financial wealth implies that inflation up to 10% has minimal effects on aggregate demand and the price of early consumption, shown as

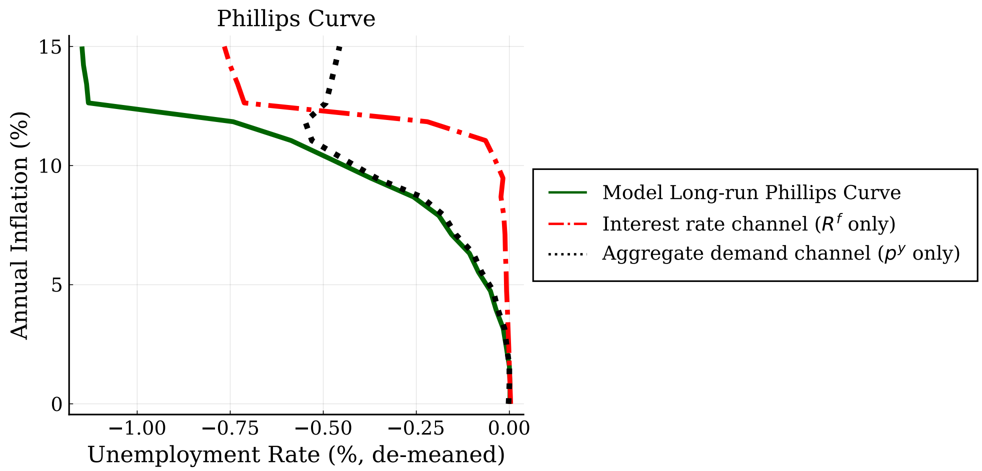

Figure 5: Long-run Phillips curve when asset liquidity is higher, $\alpha_1/\alpha = 0.5$.

the dash-dotted red line. For inflation rates larger than 10%, we find these effects reverse; asset prices fall and the price of early consumption rises.

Targeted 'helicopter drops' We now consider a change in policy according to which 'helicopter' drops of money target the unemployed, i.e., money creation is distributed lump sum to unemployed households only. Formally, the transfers conditional on employment status are equal to $\tau_0 = \pi\phi_t M_t/(1-n) + (1/R^g - 1)A^g$ and $\tau_{1=}(1/R^g - 1)A^g$. It means that taxes required to service government debt affect all households, but the revenue generated from money creation is only distributed to the unemployed. This transfer scheme captures the possibility of income-progressivity in monetary transfers.

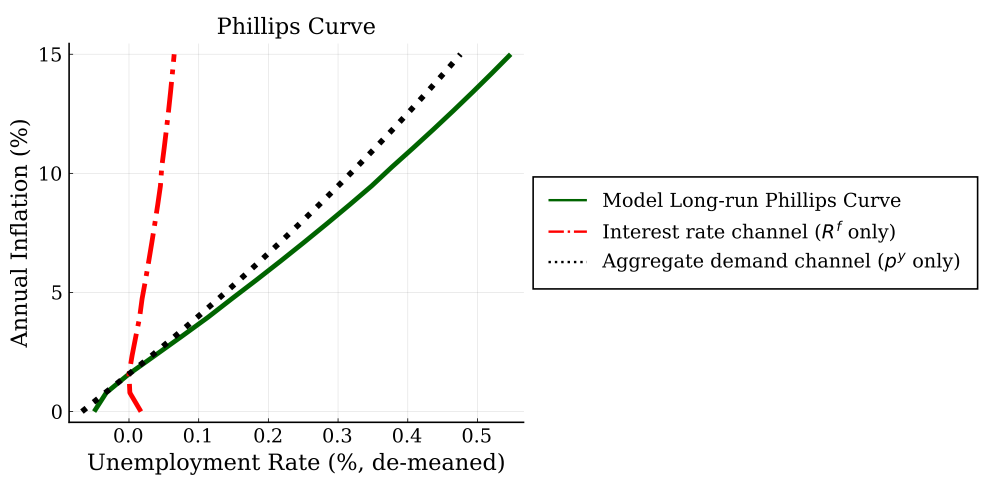

Figure 6: Long-run Phillips curve when money creation is distributed lump-sum to unemployed households.

When money creation is used to finance unemployment benefits, the slope of the long-run Phillips curve flattens relative to the baseline, as illustrated in the solid-green line in Figure 6. An increase of the inflation rate from 0 to 10 percent raises equilibrium unemployment by about 0.36 percent. The insurance provided by targeted transfers reduces households' precautionary demand for higher-return, less-liquid wealth. Inflation has a stronger, positive, effect on the return on illiquid wealth, relative to the baseline.

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