Welfare Multipliers

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Transfers have become policymakers' preferred fiscal stabilization tool, far ahead of government purchases. We compare these two policies in a range of New Keynesian models with heterogeneous households. We uncover a fundamental tradeoff between purchases and uniform transfers. Purchases deliver a higher fiscal multiplier and are more effective at reducing unemployment. But transfers stimulate private spending — ie household consumption and business investment — much more. Part of the explanation is uniform transfers better target the poor, who respond most to fiscal stimulus. We show that welfare is systematically higher under the transfer policy as long as households value private goods more than public goods. Thus, welfare multipliers differ from fiscal multipliers. Theory appears to back what governments already do. (JEL E62, E63)

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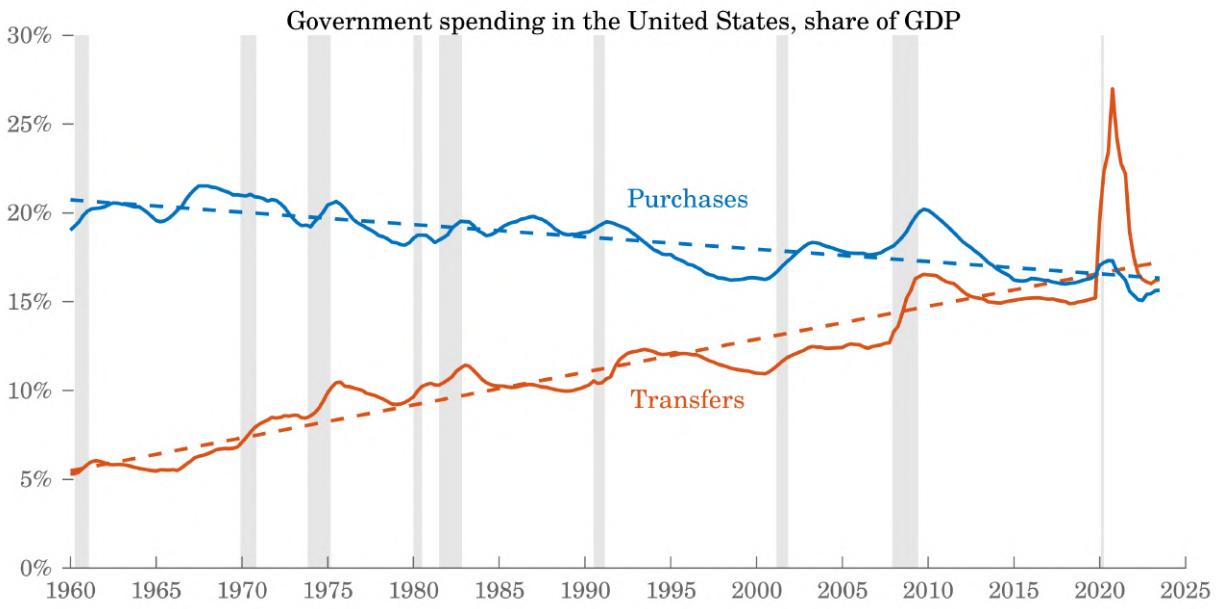

Figure 1: The Long Rise of Transfers

Note: Government spending excludes interest payments. Source: US Bureau of Economic Analysis.

1 Introduction

Recessions are periods when private consumption and investment expenditure sink. To revive spending, policymakers typically cut interest rates. When this is not enough, they resort to fiscal stimulus. There are two broad ways governments can increase expenditure. One is via *purchases* G, that is government consumption and investment. The other is through *transfers* $\mathcal{T}$, in the form of stimulus checks, unemployment insurance, or social security, for example. Historically, purchases have been dominant, which explains why they receive so much attention in the literature. Today, though, transfers make up the bulk of total government spending in advanced economies. Figure 1 illustrates this for the United States. Importantly, during recessions transfers account for the vast majority of the increase in government spending. Table 1 breaks down the change in public expenditure for recent economic downturns in the US and Europe. Transfers amount to two thirds of the total during the financial crisis and over 85 percent in the pandemic.

In this paper, we ask the question: what is the best way to increase government expenditure in a recession? We study purchase and transfer policies in a range of New Keynesian models with heterogeneous households (HANK). Such models are ideally suited because they feature nominal rigidity, allowing output to respond to aggregate demand policy, and non-Ricardian consumers, meaning lump-sum transfers have nontrivial effects. We consider both balanced-budget and deficit-financed policies, as well as associated monetary policy responses that either offset or accommodate the fiscal expansion.

We uncover a fundamental tradeoff between purchases and transfers. On the one hand,

Table 1: Increase in Government Spending During Recessions

Recession	Period	Change in total real spending	Share due to purchases	Share due to transfers
		United States		
Early 1990's recession	1990Q3–1991Q2	1.8%	85%	15%
Early 2000's recession	2000Q1–2001Q4	4.9%	55%	45%
Financial crisis	2007Q4–2009Q3	15.0%	34%	66%
Covid-19 pandemic	2020Q1–2021Q1	47.2%	3%	97%
		Euro area		
Financial crisis	2008Q2–2009Q2	5.4%	35%	65%
Sovereign debt crisis	2011Q4–2013Q1	0.8%	0%	100%
Covid-19 pandemic	2020Q1–2021Q1	9.6%	14%	86%

Note: Government spending excludes interest payments and is adjusted for inflation. Sources: US Bureau of Economic Analysis and European Central Bank.

purchases trigger a larger increase in output and employment than the equivalent amount in transfers. On the other hand, uniform transfers are better at lifting household consumption, business investment, and welfare. Thus, the policy that gives the most bang for the buck is not necessarily the one that most improves well-being. Welfare multipliers are different from fiscal multipliers.

Our argument proceeds in three stages. In the first stage, we lay down a simple one-asset HANK model with flexible prices, sticky wages, and a monetary policy that stabilizes the real interest rate. These assumptions enable us to derive analytical results using the intertemporal Keynesian cross logic developed by Auclert, Rognlie, and Straub (2023). We find that when public goods do not enter households' utility, any balanced-budget purchase policy financed by reducing *proportional* transfers expands output one-for-one (a fiscal multiplier of one) but decreases welfare. The reason is the policy increases pre-tax income and taxes by the same amount, leaving after-tax income — and thus consumption — unchanged for all agents. But it does require households to work more, hence reducing welfare. A deficit-financed purchase policy has a multiplier greater than one, but a transfer-only policy with the same deficit path does better in terms of welfare. Again, this is because proportional transfers deliver as much consumption as purchases but more leisure for all workers in the economy.

Of course, public goods should carry some weight in household utility. We adopt a flexible approach whereby public and private consumption can be either substitutes or complements. Let households care about effective consumption defined as $\tilde{c} = c + \xi G$, where c denotes private consumption. When $\xi = 1$, households value public and private goods equally, ie the goods are perfect substitutes. In this case, we establish an equivalence between purchases and *uniform* transfers (ie the same amount for everyone): the two policies imply the same fiscal multiplier and the same welfare.

In the second stage of our analysis, we relax the assumptions of flexible prices and con-

stant real rate and work with a textbook HANK. In particular, prices and wages are sticky and monetary policy follows a Taylor rule. We calibrate the model and simulate two temporary, deficit-financed expansionary purchase and uniform transfer policies. We find that purchases yield a higher output multiplier but transfers generate twice as much consumption. We compute welfare for different values of ξ and confirm that transfers dominate for any $\xi < 1$. When $\xi = 1$, the policies are equivalent. So as long as public and private goods are complements or imperfect substitutes, transfers are welfare-improving relative to purchases.

Two decompositions shed light on the channels at work. First, we break down the total consumption response into partial- and general-equilibrium effects. Transfers directly boost consumption via higher disposable income. By contrast, purchases affect consumption indirectly, through weaker, second-round forces, mainly higher income resulting from greater labor demand. Second, a cross-sectional decomposition reveals that uniform transfers are much more progressive than purchases, which turn out to be roughly proportional. Income of the bottom quintile of the wealth distribution increases about four times as much under the transfer policy. Since low-wealth households have a high marginal utility of consumption and a high marginal propensity to consume (MPC), this income surge translates into higher spending and higher welfare. Thus, transfers are a superior consumption-enhancing device because, unlike purchases, they directly target household wallets, especially those of the asset-poor.

Our one-asset HANK framework abstracts from investment in physical capital. The debate on multipliers in the literature often revolves around the response of investment to fiscal policy ("does government spending crowd in or crowd out investment?"). Another shortcoming of the model is the absence of the extensive margin of employment. In the data, most variation in labor demand comes from new hires, not hours per worker. This matters for welfare as it dampens the role of labor disutility, making employment a positive outcome, and also because unemployed workers often have high marginal utility of consumption.

To address these issues, the third stage of our paper develops a two-asset HANK model with search and matching frictions and unemployment risk. We add permanent skill heterogeneity to replicate the fact that low-skilled households are more likely to be unemployed. We calibrate the model to match three sets of moments in the US data: macroeconomic aggregates, labor market variables, and moments of the income and wealth distributions. We simulate the same set of policies, compute multipliers, and assess welfare.

Our first key finding is that output and employment increase more with purchases, but consumption *and* investment — ie private spending — rise more with transfers. Intuitively, transfers free up more resources for households than purchases do. High-MPC consumers spend the stimulus checks while low-MPC households save the proceeds. Part of these savings serve to finance productive capital. Hence the boom in investment. To be sure, government purchases do crowd in consumption and investment, but to a lesser extent.

Our second key finding is that transfers dominate in terms of welfare for any ξ below a

threshold that is slightly below one.[1] Although transfers dominate, the difference in welfare between the two policies shrinks in the extended model compared to the basic model. This is because government purchases now become progressive. By stimulating labor demand, purchases disproportionately favor the unemployed, who have a high marginal utility, and thus a large weight in the social welfare function. But unemployed workers represent only a fraction of the population, usually less than a tenth. Transfers are better at targeting the asset-poor, typically more numerous than the unemployed, and so in the model they remain the preferred policy at the society level.

In summary, our results suggest government purchases may be the preferred stabilization policy tool if the goal is to maximize employment or minimize the ratio of public debt to GDP. However, if policymakers wish to promote private spending and societal welfare, then transfers appear to be a more adequate instrument. Macroeconomic theory seems to back what governments around the world already do.

Related Literature.—This paper fits into the vast literature on fiscal multipliers. Most work focuses on government purchases.[2] Following the stimulus payments of 2001, 2008, and 2020-2021, many empirical studies estimate the impact of transfers on consumption, overall finding sizable effects.[3] Theoretically, transfers tend to have a lower multiplier than purchases (Oh and Reis 2012; Giambattista and Pennings 2017; Auclert, Rognlie, and Straub 2023), can redistribute from low- to high-MPC consumers (Bilbiie, Monacelli, and Perotti 2013; Boutros 2023; Bayer et al. 2023), can substitute for monetary policy (Kocherlakota 2022; Wolf 2024), and may be self-financing (Angeletos, Lian, and Wolf 2024; Bartal and Becard 2024). Our contribution is to reveal a stark tradeoff between purchase and transfer policies: purchases are best at raising total output while transfers more effectively stimulate *private* output, ie consumption and investment.

Our paper also connects to a normative literature on fiscal stabilization policy. In representative agent economies, countercyclical government spending is generally not desirable (Taylor 2000; Silva 2023; Bianchi-Vimercati, Eichenbaum, and Guerreiro 2024), except when monetary policy is constrained by the zero lower bound (Woodford 2011; Werning 2012; Sims and Wolff 2018; Bilbiie, Monacelli, and Perotti 2019; Bouakez, Guillard, and Roulleau-Pasdeloup 2020; Woodford and Xie 2022). These conclusions do not necessarily hold in heterogeneous agent economies. As far as we know, all existing work on optimal fis-

[1]The reason the cutoff is no longer 1 is that consumption is taxed at rate τ_c, so the cutoff is effectively $1/(1+\tau_c)$.

[2]Recent examples include Ramey and Zubairy (2018); Chodorow-Reich (2019); Hagedorn, Manovskii, and Mitman (2019); Ramey (2019); Roulleau-Pasdeloup (2021); Barnichon, Debortoli, and Matthes (2022); Faria-e-Castro (2022); Broer, Krusell, and Öberg (2023); Dupor et al. (2023); and Ferriere and Navarro (2024).

[3]See Johnson, Parker, and Souleles (2006); Shapiro and Slemrod (2009); Parker et al. (2013); Broda and Parker (2014); Coibion, Gorodnichenko, and Weber (2020); Armantier et al. (2021); Chen, Qian, and Wen (2021); Dunn et al. (2021); Karger and Rajan (2021); Andersen et al. (2022); Parker et al. (2022); Baker et al. (2023); and Chetty et al. (2024). Pennings (2021) estimates transfer multipliers at the state level and finds a value as high as 1.5 for permanent transfers.

cal (and monetary) policy in HANK takes government purchases as exogenous (Bhandari et al. 2021; McKay and Reis 2021; Le Grand, Martin-Baillon, and Ragot 2022; McKay and Wolf 2023). We contribute by showing that, in this environment, uniform cash payments (1) improve welfare regardless of the monetary policy stance, and (2) improve welfare more than purchases as long households value private goods above public goods.

Outline.—The paper proceeds as follows. Section 2 describes the basic model and presents our analytical results. Section 3 exposes the main quantitative findings from the calibrated version of the simple model. Section 4 details the extended model, the data and calibration strategy, and our results from that model. Section 5 concludes.

2 Fiscal vs Welfare Multipliers

This section presents our theoretical results. In a nutshell, transfers deliver a lower fiscal multiplier than purchases but a higher welfare multiplier.

2.1 A One-Asset HANK Model

We lay down a New Keynesian model with heterogeneous households. Relative to the textbook version, we have public goods in the utility function; sticky wages but flexible prices; and a constant real interest rate. These last two assumptions enable us to derive clean analytical results, as in Auclert, Rognlie, and Straub (2023). We relax them in Section 3.

Production.—Production is linear in effective labor L_t, $Y_t = L_t$. There is perfect competition in the goods market. The real wage $w_t = W_t/P_t$ is therefore constant and equal to one, and price inflation $\pi_t = P_t/P_{t-1}$ is equal to wage inflation π_t^w at all time.

Households.—A unit mass of households have preferences over effective consumption $\tilde{c}_{it}$ and labor ℓ_{it}

$$\mathbb{E}_0 \sum_{t=0}^{\infty} \beta^t \left\{ u(\tilde{c}_{it}) - v(\ell_{it}) \right\}, \tag{1}$$

where effective consumption consists of private goods c_{it} and public goods G_t (Bailey 1971)

$$\tilde{c}_{it} = c_{it} + \xi G_t. \tag{2}$$

Parameter ξ governs whether private and public goods are complements or substitutes. The standard case is $\xi = 0$. If $\xi > 0$, government purchases substitute for private consumption, with perfect substitution if $\xi = 1$. If $\xi < 0$, the goods are complements.

Households receive idiosyncratic productivity shocks e_{it} each period, which convert their work hours into effective labor $e_{it}\ell_{it}$. We normalize $\int e_{it} di = 1$ and, because of frictions in the labor market, assume all workers work the same number of hours, $\ell_{it} = L_t$. Financial markets are incomplete, so households self-insure by saving into a safe asset $a_{it} \geq \underline{a}$ whose

real return is r_t. The budget constraint reads

$$c_{it} + a_{it} = (1 + r_t)a_{it-1} + z_{it} + \mathcal{T}_t, \tag{3}$$

where $\mathcal{T}_t$ denotes uniform lump-sum government transfers (ie common to all households), and z_{it} represents after-tax income, defined as

$$z_{it} = \tau_t w_t e_{it} \ell_{it}. \tag{4}$$

Here, τ_t is a retention function (Heathcote, Storesletten, and Violante 2017). Let total taxes be $T_t = w_t L_t - \int z_{it} di$. Taxes are proportional to income. Using $Y_t = L_t = w_t L_t$ and the definition of aggregate after-tax income $Z_t = Y_t - T_t$, we can rewrite individual post-tax income as

$$z_{it} = (Y_t - T_t)\frac{e_{it}}{\int e_{it} di} = Z_t e_{it}. \tag{5}$$

We see that the only aggregate variable that matters for individual agent i's income — and therefore consumption — is aggregate after-tax income Z_t.

Policy.—The fiscal authority spends on purchases and uniform transfers. It collects proportional taxes and issues debt B_t. The government budget constraint is

$$G_t + \mathcal{T}_t + (1 + r_t)B_{t-1} = T_t + B_t. \tag{6}$$

Monetary policy sets the nominal interest rate i_t so as to keep a constant real interest rate

$$r_t = r. \tag{7}$$

The Fisher equation is $1 + r_t = (1 + i_t)/(1 + \pi_{t+1})$.

Unions.—A unit-mass of unions k select the wage on behalf of households by maximizing utility subject to a quadratic adjustment cost $\psi_t^w(W_{kt}, W_{kt-1}) = \frac{\mu}{\mu-1}\frac{1}{2\kappa}[\log(W_{kt}/W_{kt-1})]^2$. In the symmetric equilibrium, aggregate wage inflation $1 + \pi_t^w = W_t/W_{t-1}$ evolves according to a economy-wide Phillips curve

$$\log(1 + \pi_t^w) = \kappa L_t \int v'(\ell_{it}) - \frac{1}{\mu}\frac{\partial z_{it}}{\partial \ell_{it}} u'(c_{it})\, di + \beta \log(1 + \pi_{t+1}^w). \tag{8}$$

Intertemporal Keynesian Cross.—Following Auclert, Rognlie, and Straub (2023), we start from a steady-state distribution of agents and express aggregate consumption at date t as a function of aggregates only

$$C_t = \mathcal{C}_t(\{Z_s, G_s, \mathcal{T}_s\}_{s=0}^{\infty}), \tag{9}$$

where $\{Z_s\}_{s=0}^{\infty}$, $\{G_s\}_{s=0}^{\infty}$, and $\{\mathcal{T}_s\}_{s=0}^{\infty}$ are sequences of aggregate after-tax income, government purchases, and uniform transfers, respectively. Combining (9) with the goods market clearing condition and the definition of after-tax income, we obtain

$$Y_t = G_t + \mathcal{C}_t(\{Y_s - T_s, G_s, \mathcal{T}_s\}_{s=0}^{\infty}). \tag{10}$$

We study the first-order perturbation solution to equation (10) for bounded fiscal policies $\{dG_t, d\mathcal{T}_t, dT_t\}$. That is, any policy satisfies the intertemporal government budget constraint

$$\sum_{t=0}^{\infty} \frac{dG_t}{(1+r)^t} + \sum_{t=0}^{\infty} \frac{d\mathcal{T}_t}{(1+r)^t} = \sum_{t=0}^{\infty} \frac{dT_t}{(1+r)^t}. \tag{11}$$

Linearizing (10) as in Auclert, Rognlie, and Straub (2023, Proposition 1), we get the intertemporal Keynesian cross, giving the impulse response of output $d\boldsymbol{Y} = \{dY_t\}$ to a change in policy $d\boldsymbol{G} = \{dG_t\}$, $d\boldsymbol{\mathcal{T}} = \{d\mathcal{T}_t\}$, and $d\boldsymbol{T} = \{dT_t\}$

$$d\boldsymbol{Y} = d\boldsymbol{G} + \boldsymbol{M} \cdot d\boldsymbol{Y} - \boldsymbol{M} \cdot d\boldsymbol{T} + \boldsymbol{M}^G \cdot d\boldsymbol{G} + \boldsymbol{M}^{\mathcal{T}} \cdot d\boldsymbol{\mathcal{T}}. \tag{12}$$

$\boldsymbol{M}$ is an infinite matrix of intertemporal MPCs: each entry $M_{ts} \equiv \frac{\partial \mathcal{C}_t}{\partial Z_s}$ gives the response of aggregate consumption at time t to an anticipated increase in aggregate after-tax income at time s.[4] $\boldsymbol{M}^{\mathcal{T}}$ and $\boldsymbol{M}^G$ are the analog objects for uniform transfers, $M^{\mathcal{T}}_{ts} \equiv \frac{\partial \mathcal{C}_t}{\partial \mathcal{T}_s}$, and government purchases, $M^G_{ts} \equiv \frac{\partial \mathcal{C}_t}{\partial G_s}$, respectively. If public goods do not enter the utility function, ie $\xi = 0$, then government purchases have no direct effect on consumption, only indirect effects via post-tax income. In this case, $\boldsymbol{M}^G = \boldsymbol{0}$.

Multipliers.—It is standard in the literature to describe the effect of fiscal policy on output using multipliers. The cumulative multipliers of purchases and transfers are respectively

$$\sum_{t=0}^{\infty} \frac{dY_t}{(1+r)^t} \Big/ \sum_{t=0}^{\infty} \frac{dG_t}{(1+r)^t} \quad \text{and} \quad \sum_{t=0}^{\infty} \frac{dY_t}{(1+r)^t} \Big/ \sum_{t=0}^{\infty} \frac{d\mathcal{T}_t}{(1+r)^t}. \tag{13}$$

Roadmap.—The remainder of this section focuses on two polar cases. The first case is when public goods do not enter the utility function, $\xi = 0$, a common premise in the literature. We show that welfare is always higher under a *proportional* transfer policy than under the cost-equivalent purchase policy (Section 2.2). The second case is when public goods perfectly substitute for private goods, $\xi = 1$. We establish that a *uniform* transfer policy is equivalent to a purchase policy, both in terms of fiscal multiplier and welfare (Section 2.3).

2.2 Fiscal Policy and Welfare With No Public Goods in Utility

Consider the standard case when public goods do no enter the utility function, $\xi = 0$. Suppose there are no lump-sum transfers for now, $\mathcal{T}_t = 0$. The government engages in expansionary fiscal policy. It may increase purchases G_t or it may increase proportional transfers, that is reduce taxes T_t. It can fund these policies by balancing the budget or by deficit spending. We analyze the two in turn.

Balanced-Budget Fiscal Policy.—Under a balanced-budget policy, the government raises purchases and taxes one-for-one to balance the budget each period, $d\boldsymbol{G} = d\boldsymbol{T}$. Auclert, Rognlie, and Straub (2023, Proposition 3) show, in this exact same environment, that the

[4] Every column of $\boldsymbol{M}$ sums to one in present value, $\sum_{t=0}^{\infty} \frac{M_{ts}}{(1+r)^{t-s}} = 1$ for all s.

fiscal multiplier is 1 at every date, $d\boldsymbol{Y} = d\boldsymbol{G}$. That is, aggregate consumption is constant at all time, $d\boldsymbol{C} = \mathbf{0}$. Our first result provides the welfare implications of such policy.

Proposition 1: *Assume no public goods in utility, $\xi = 0$. Consider an expansionary purchase policy with balanced budget, $d\boldsymbol{G} = d\boldsymbol{T}$. Then output increases but welfare decreases.*

The intuition is as follows. Output Y_t and taxes T_t have the same incidence across all households. So any policy that raises output and taxes by the same amount leaves individual agents' after-tax income unchanged, $d\boldsymbol{z}_i = \mathbf{0}$. Therefore, all individual consumption paths are unchanged, $d\boldsymbol{c}_i = \mathbf{0}$. However, output increases by exactly the shock to purchases, $d\boldsymbol{Y} = d\boldsymbol{G}$, and so do hours, $d\boldsymbol{L} = d\boldsymbol{Y}$. It follows that all consumers work more even though none of them consumes more. As long as households do not value public goods, a balanced-budget fiscal policy unambiguously worsens welfare.

The critical assumption for Proposition 1 is the proportionality of taxes, which ensures that income and taxes have the same incidence for all households. If, instead, income and taxes have different incidence, an additional redistribution channel between income-earners and taxpayers changes the multiplier and the welfare result (Auclert, Rognlie, and Straub 2023). In Appendix A.1, we show using simulations that when taxes are raised lump-sum at the margin, the fiscal multiplier is less than one. This is because taxpayers have higher MPCs than income-earners. In that case, we find welfare declines even more, relative to the proportional transfer case, as it is precisely the high-MPC, high marginal-utility consumers who experience a drop in consumption.

Deficit-Financed Fiscal Policy.—Governments typically fund expansionary policy with deficit spending, ie they issue debt now and repay later. Our second result compares welfare under two separate deficit-financed policies: (1) a purchase policy financed with proportional taxes $\{d\boldsymbol{G}, d\boldsymbol{T}\}$ and (2) a transfer-only policy $d\boldsymbol{T}'$ which consists in lowering proportional taxes in early periods and raising them later on.

Proposition 2: *Assume $\xi = 0$. Consider two deficit-financed policies: a purchase policy $\{d\boldsymbol{G}, d\boldsymbol{T}\}$ and a transfer-only policy $d\boldsymbol{T}'$. Both induce the same deficit, $d\boldsymbol{G} - d\boldsymbol{T} = d\boldsymbol{T}'$. Then output is higher under the purchase policy but welfare is higher under the transfer policy.*

With deficit financing, individual and aggregate consumption paths are no longer constant but instead depend on the path of primary deficit $d\boldsymbol{G} - d\boldsymbol{T}$. Typically, consumption increases and the fiscal multiplier is greater than 1. The key insight, though, is that the consumption paths are strictly the same under the two policies. Again, this is because the path of after-tax income is the same for all agents. But because G_t directly adds to output Y_t, the fiscal multiplier of purchases is greater than the fiscal multiplier of transfers. This implies households must work more under the purchase policy. Since they dislike working, they are better off under the transfer policy.

Just like in the balanced-budget case, if lump-sum transfers are used in place of proportional transfers, the result is magnified, meaning the welfare difference between purchases

and transfers widens. This is because low-wealth households have higher short-term MPCs than wealthy households and thus respond more to a lump-sum transfer policy. We confirm this finding in our quantitative simulations in Section 3.

Taken together, Propositions 1 and 2 convey one of the central messages of the paper: government purchases boost output more than transfers, but do worse in terms of welfare. The chief reason is purchases lead to a lower ratio of consumption to effort (ie labor) than transfers do, which is what households care about.

2.3 Fiscal Policy and Welfare With Perfect Public-Private Substitution

Propositions 1 and 2 hold for proportional transfers when households do not value public goods in their utility function. We now switch gear and consider another extreme case, in which public goods and private goods are perfect substitutes. Our next proposition establishes an equivalence between purchases and *uniform* transfers, both in terms of fiscal multiplier and welfare.

Proposition 3: *Assume $\xi = 1$, ie perfect substitution between public and private goods. Consider two policies financed with proportional taxes: a purchase policy $\{d\boldsymbol{G}, d\boldsymbol{T}\}$ and a uniform transfer policy $\{d\boldsymbol{\mathcal{T}}, d\boldsymbol{T}\}$. Let $d\boldsymbol{G} = d\boldsymbol{\mathcal{T}}$. Then the two policies are equivalent: they yield the same fiscal multiplier and the same welfare.*

The intuition is straightforward. If $\xi = 1$, households value public goods as much as private goods. So when the government raises purchases and increases the provision of public services, households are happy to reduce their private consumption accordingly and save the proceeds for future spending. This turns out to be equivalent to receiving the same dollar amount in the form of stimulus checks, which can also be saved for future spending. With perfect substitute goods, then, the rise in purchases combined with the fall in private consumption due to substitution exactly equals the rise in consumption triggered by the uniform transfer policy. Thus, aggregate aggregate output and hours increase by the same magnitude under the two policies. We also show that individual effective consumption paths, $\tilde{\boldsymbol{c}}_i$, are identical. It follows that the welfare of each agent, and thus aggregate welfare, is the same under the two policies.

Proposition 3 offers a sharp characterization of the welfare effects of our two fiscal policies when public goods perfectly substitute for private goods. Regardless of the financing scheme, the same welfare outcome is attained. In practice, it is likely that $\xi < 1$. Anecdotal evidence suggests public goods substitute for private consumption to some extent (eg schooling, health insurance, security), although there is evidence that public and private goods might sometimes be complements (Jalles and Karras 2022). In any case, most people would tend to place more weight on private consumption in their utility. A simple rationale is that it is hard for the government to identify, let alone provide, the particular goods that households desire. In the rest of the paper, we study the case when $\xi < 1$. Our general

finding is that for all model specifications and calibrations considered, welfare is greater under the transfer policy.

3 Quantitative Results

The analytical results of Section 2 derive from a particular version of HANK, one that assumes flexible prices and a constant real interest rate. In this section, we relax these assumptions and work with a textbook version, featuring sticky prices and wages and an active Taylor rule. Our goal is to calibrate the model, quantify how government purchase and transfer policies fare in this standard environment, and dissect the various economic mechanisms at play.

3.1 Model Details

We specify a standard power utility function for households

$$\mathbb{E}_0 \sum_{t=0}^{\infty} \beta^t \left\{ \frac{(c_{it} + \xi G_t)^{1-1/\gamma} - 1}{1 - 1/\gamma} - \nu \frac{L_t^{1+1/\varphi}}{1 + 1/\varphi} \right\}. \tag{14}$$

Here, γ is the elasticity of intertemporal substitution and φ is the Frisch elasticity of labor supply. Let idiosyncratic shocks e_{it} have standard deviation σ and persistence ρ. On top of labor income, bond income, and government transfers, households now receive dividends d_{it} from firms, which we assume are proportional to income z_{it}.

Firms.—A unit-mass of firms j act in monopolistic competition and set prices subject to a quadratic adjustment cost $\psi_t(p_{jt}, p_{jt-1}) = \frac{\mu}{\mu-1} \frac{1}{2\kappa} [\log(p_{jt}/p_{jt-1})]^2 Y_t$. The symmetric equilibrium yields a standard price Phillips curve

$$\log(1 + \pi_t) = \kappa \left(mc_t - \frac{1}{\mu} \right) + \frac{1}{1 + r_{t+1}} \frac{Y_{t+1}}{Y_t} \log(1 + \pi_{t+1}), \tag{15}$$

where the marginal cost is $mc_t = w_t$. Aggregate dividends are given by $D_t = Y_t - w_t L_t - \psi_t$.

Policy.—To ensure debt does not explode, the fiscal authority adopts a fiscal rule whereby taxes eventually adjust to budget imbalances

$$T_t = T + \phi_b (B_{t-s} - B), \quad s > 0. \tag{16}$$

The monetary authority sets the nominal interest rate in response to inflation

$$i_t = r + \phi_\pi \pi_t. \tag{17}$$

Table 2: Calibration of the Basic Model

Param.	ξ	β	γ	φ	ν	σ	ρ	μ	κ	G	T	B	ϕ_b	ϕ_π
Value	0	0.97	0.6	0.5	0.92	0.8	0.97	1.1	0.01	0.18	0.3	3.6	0.03	1.25

Calibration.—Table 2 reports the calibration of the model. All parameters are set to standard values.[5] We provide more details about the data and choice of parameters in Section 4 when we calibrate our extended model. Note that we set the weight of public goods in utility ξ to 0, for now, but consider different values in the welfare exercise.

3.2 The Output-Consumption Tradeoff

We run the following experiment. The economy is in steady state. The government expands fiscal policy temporarily in two different ways. It raises government purchases by one percent of output for four consecutive quarters, then stops. Alternatively, it raises uniform transfers by one percent of output for four consecutive quarters, then stops. In both cases, taxes are held constant during 24 quarters before gradually increasing to keep debt in check. Figure 2 plots the response of the main aggregate variables to this experiment.

The key takeaway is that output increases more with purchases but consumption increases more with transfers. Start with the purchase policy. Output jumps by over one percent during the initial four quarters and then remains above steady state for some time even though the stimulus is over. Consumption also increases, by about 0.15 percent of output on impact. The mechanism is a standard Keynesian channel. Government purchases raise aggregate demand, which stimulates production thanks to the imperfect adjustment of prices and wages. Higher income, in turn, boosts consumption. The cumulative fiscal multiplier is 1.47, meaning the consumption multiplier is 0.47. The basic HANK model thus implies substantial crowding-in and a multiplier well above 1. This is due to the economy's large average MPC coming from the sizable share of zero-wealth households (20% in this calibration). Note monetary policy responds to the surge in inflation by raising the nominal interest rate more than one-for-one, offsetting part of the boom.

Consider now the transfer policy. All of the increase in output comes from the surge in private consumption. Households spend the stimulus checks, raising aggregate demand through the same Keynesian channel just described. In fact, the labor income feedback is amplified because wages increase much more under transfers. This is due to a classic

[5]The model is calibrated at quarterly frequency. The discount factor β is set to 0.97 to target a real rate r of 1 percent. The elasticities of intertemporal substitution γ and labor supply φ equal 0.6 and 0.5, respectively. We normalize hours in steady state $L = Y = 1$ using a labor disutility coefficient ν of 0.92. The idiosyncratic shock parameters, σ and ρ, are set to 0.8 and 0.97, respectively, to hit a share of zero-asset households of 20 percent in steady state. On the production side, the markup μ and Phillips curve slope κ, which are both common to firms and labor unions, are fixed at 1.1 and 0.01, respectively. Steady-state government purchases G, taxes $\mathcal{T}$, and debt B are 0.18, 0.3, and 3.6, in line with US data, as we discuss in Section 4. The fiscal rule coefficient ϕ_b is set 0.03 to minimize the contractionary effects of tax hikes. Finally, the Taylor rule coefficient ϕ_π is 1.25.

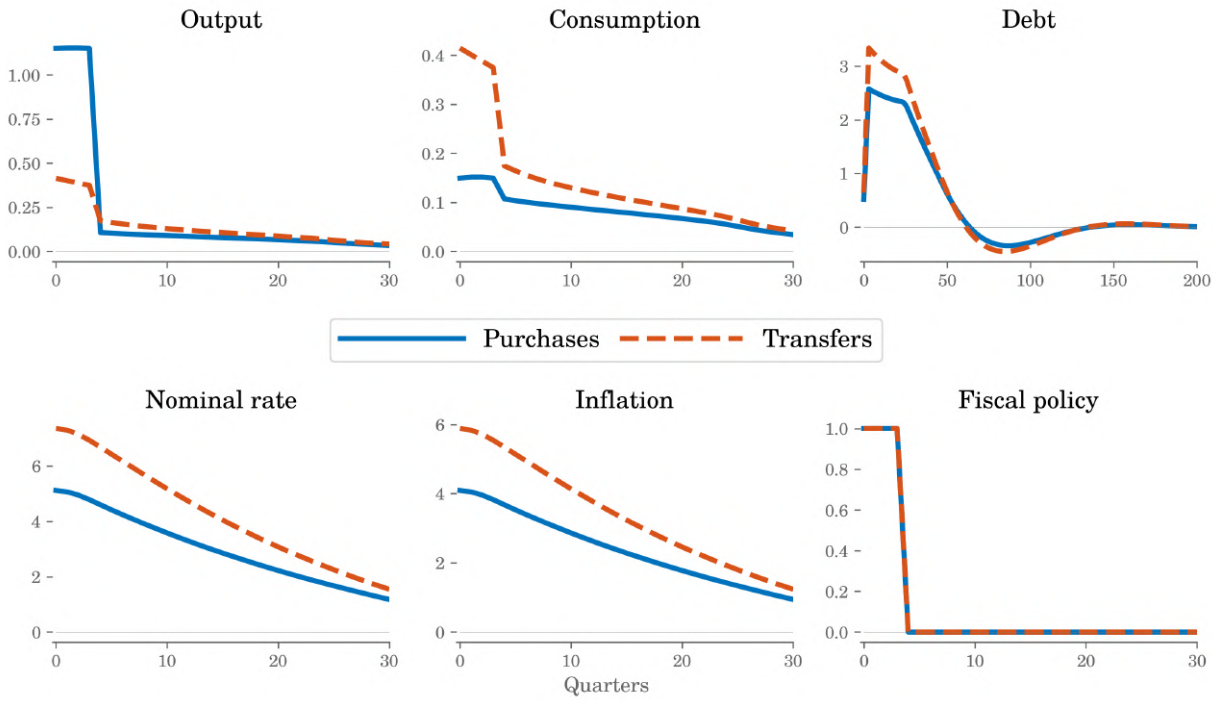

Figure 2: Government Purchases vs Transfers in the Basic Model

income effect on the labor supply, whereby households feeling richer demand higher compensation to work extra hours, causing the transfer policy to be more inflationary. But not every consumer splashes out. Some have large asset holdings and rather behave like permanent-income consumers. They save the proceeds for future use, only consuming a fraction of the sum, as we explain in Section 3.4. Consequently, the fiscal multiplier of transfers is 0.85, well below that of purchases. But the consumption multiplier is also 0.85, almost twice that of purchases. This exercise thus highlights the fundamental tradeoff between purchase and transfer policies. Transfers raise total output less than purchases but private spending more.

3.3 Welfare

Which policy is best? A way to answer this question is to conduct a welfare analysis. We compute welfare by considering a utilitarian planner who attaches equal weight to each household. The planner's objective is

$$\mathbb{E}_0 \sum_{t=0}^{\infty} \beta^t \int \{u(c_{it} + \xi G_t) - v(L_t)\}\, di. \tag{18}$$

Figure 3 reports the welfare difference between the transfer policy and the purchase policy for different values of ξ (solid line). Recall that public and private goods are perfect complements if $\xi = -1$ and perfect substitutes if $\xi = 1$. We also plot the welfare difference when the planner ignores labor disutility, ie $\mathbb{E}_0 \sum_{t=0}^{\infty} \beta^t \int \{u(c_{it} + \xi G_t)\}\, di$ (dashed line). Values

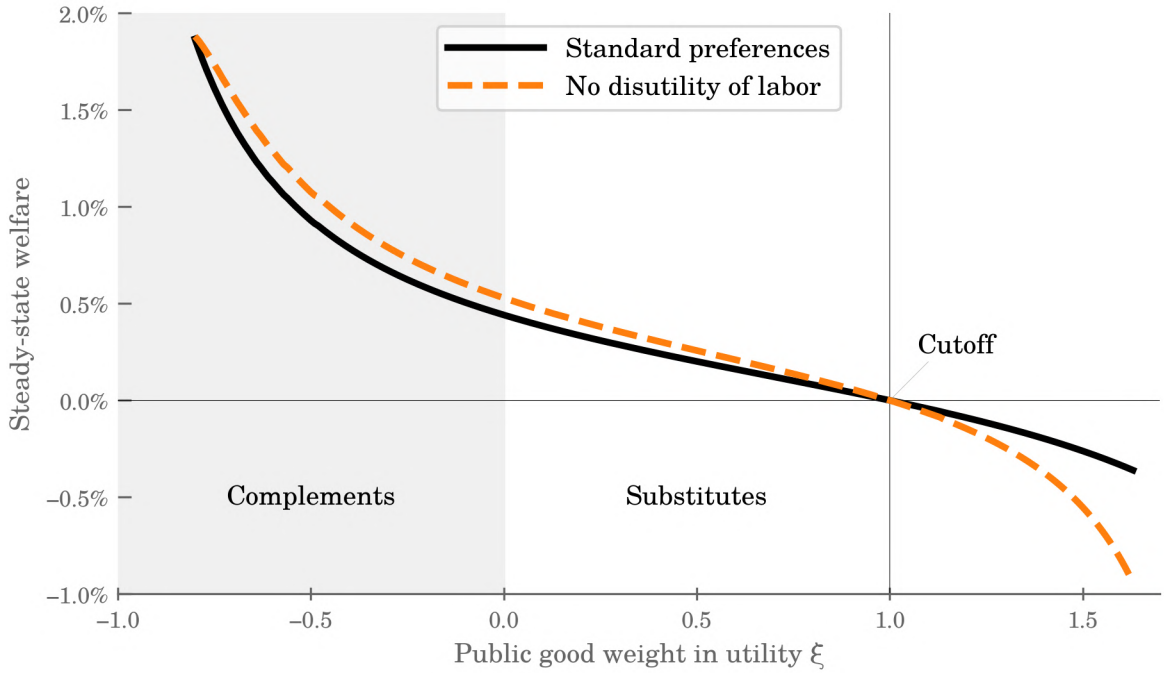

Figure 3: Welfare Difference, Transfers Minus Purchases

are expressed as percentage of one-period steady-state welfare.

Our main finding is as follows. In the basic HANK model, transfers augment welfare more than purchases for any $\xi < 1$. The intuition is straightforward. Transfers raise private consumption more, especially for the poor, and at the same increase hours worked less. They win on the two margins. So as long as public goods do not perfectly substitute for private goods, households are better off with transfers. In the case of complements, $\xi < 0$, purchases do provide a strong boost in consumption, but the policy reduces welfare because G_t enters with a negative sign in the utility function. To sum up, when public and private goods are either complements or imperfect substitutes, transfers are welfare-improving relative to purchases.

In the case of perfect substitution, $\xi = 1$, we find the two policies generate the same welfare, and for that matter, the same fiscal multiplier (see Appendix B.1). This is line with Proposition 3. We deduce that the assumptions of flexible prices and constant real interest rate, which we need in Section 2 for our proof but relax here in the simulations, are not key to the result. Irrespective of prices and interest rates, when households value public goods as much as private goods, receiving an extra dollar of purchases is equivalent to receiving an extra dollar of transfers.

These findings do not depend on the degree of labor disutility. As the dashed line in Figure 3 makes clear, welfare is higher with transfers for all $\xi < 1$, and equal when $\xi = 1$, even when the planner disregards the utility loss from work. So what matters here quantitatively is effective consumption, ie the bundle of private and public goods consumption.

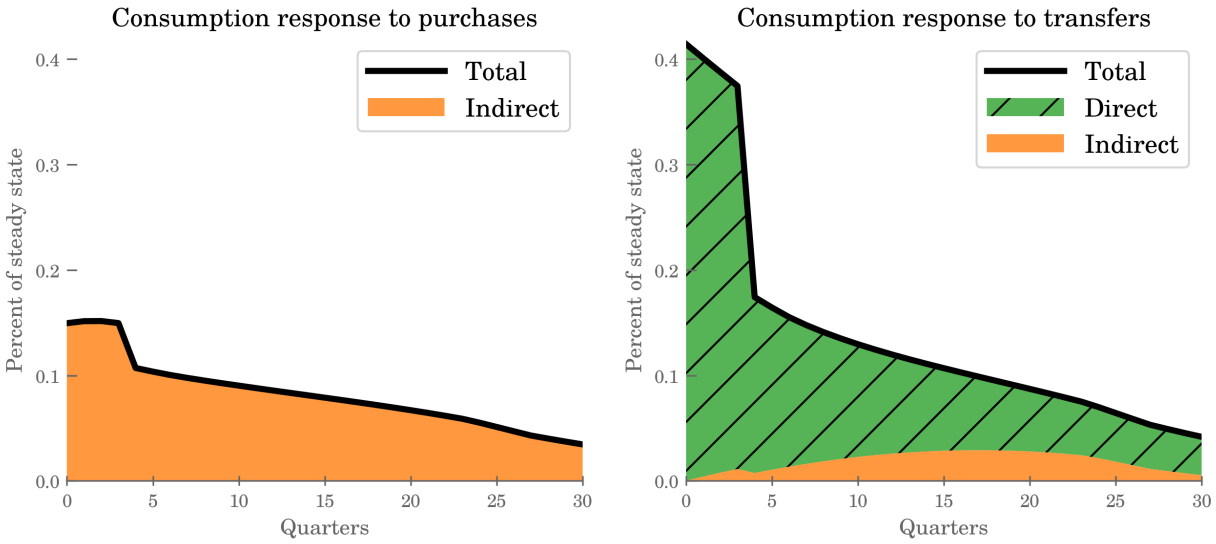

Figure 4: Decomposing the Consumption Response

Note: Direct effects correspond to the direct impact of transfers on household budget. Indirect effects include general-equilibrium changes in wages, hours worked, asset returns, dividends, and taxes.

3.4 Understanding the Mechanisms

Why do consumption and welfare increase more with transfers? We conduct two decompositions to further understand the mechanisms at play.

Direct vs Indirect Effects.—Figure 4 decomposes the impulse response of aggregate consumption into direct and indirect effects. The direct effect is defined as the first-round, partial-equilibrium effect of the policy on household income. Indirect effects correspond to any general equilibrium feedback, including changes in wages, hours worked, real interest rates, dividends, and taxes.

Purchases only raise consumption indirectly. The mechanism is the one described above. Higher demand for goods from the public sector boosts household labor income through higher wages and more hours worked. In turn, higher income enables households to spend more. Capital income, it turns out, contributes negatively to total income. This is because the surprise inflation arising from the boom lowers the real return on bonds. In addition, higher wages lower markups and cause dividends to fall. That said, capital income changes have relatively little influence on aggregate spending, because they disproportionately affect the asset-rich, low-MPC consumers who respond the least to fiscal policy.

Transfers boost consumption directly and indirectly. The direct channel dominates: transfers raise disposable income and thus instantly stimulate household consumption via a standard income effect, evident in the budget constraint (3). As aggregate demand expands, the same general equilibrium feedback occurs, increasing labor income, and further feeding aggregate spending. But this indirect effect is considerably smaller than the direct one. In sum, transfers raise private consumption more than purchases because they directly target

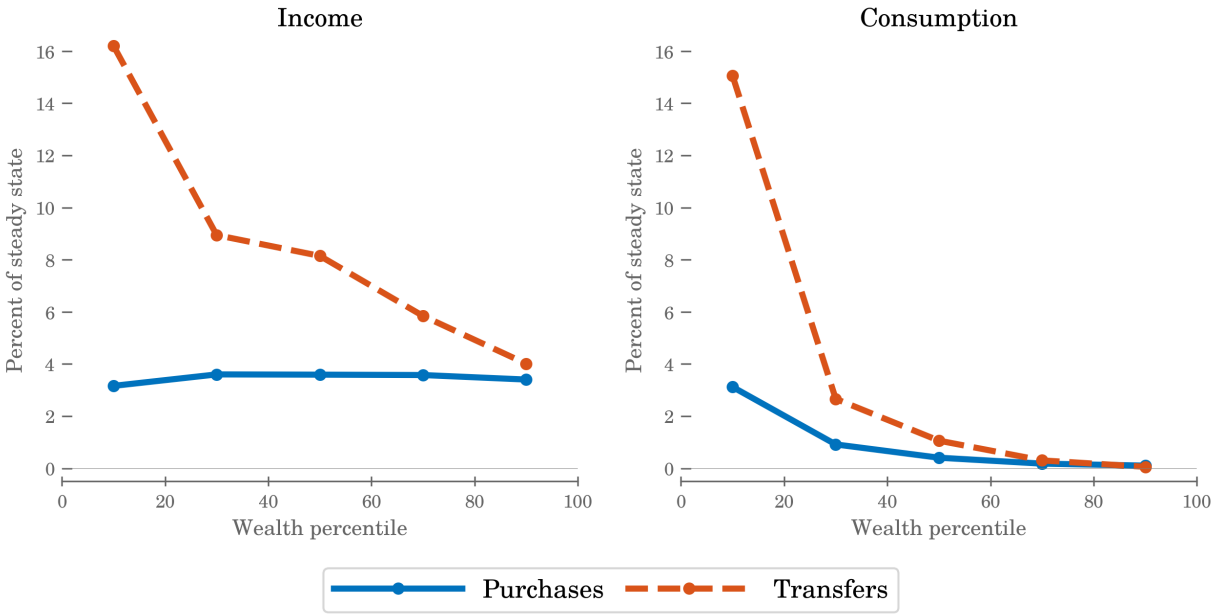

Figure 5: First-Year Cumulative Income and Consumption Response by Wealth Quintile

household purses. Government purchases, on the other hand, only affect consumption via second-round, general-equilibrium effects.

Distributional Effects.—Households are not affected equally by the two policies. Figure 5 plots the first four-quarter cumulative response of income and consumption response by wealth quintile, expressed in deviation of average quintile steady state.

Purchases raise income roughly proportionally. In fact, the poor experience a smaller increase than the middle class because they hold very little assets and thus do not benefit from the eventual surge in bond returns. Despite that, purchases trigger a higher consumption response from the bottom two quintiles. This is because low-wealth households are more likely to be constrained, so they have a higher MPC and respond more to the expansionary policy.

Transfers, contrastingly, are uniform, meaning each household receives the same cash amount. This means that in percentage terms transfers raise the income of the poor considerably more. The upshot is that consumption of the bottom quintile increases about a 100 times more than consumption of the top quintile, relative to steady state. This ratio is 15 for purchases. Since the poor have the highest marginal utility, they weigh a lot in the utilitarian planner's objective. So it is the progressive nature of transfers that explains why household income, consumption, and welfare increase more with transfers than with purchases.

3.5 Limitations and Roadmap

The simple one-asset HANK framework presents some limitations. First, the model abstracts from investment in physical capital. The literature devotes a great deal of attention to the response of investment to fiscal policy: is there crowding in or crowding out? This has implications for the fiscal multiplier. Second, the extensive margin of employment is absent from the model. In practice, increasing labor demand often means hiring new workers rather than having existing workers toil more. This matters for welfare because it can potentially weaken the labor disutility channel, and also because unemployed workers are often those with low skills, low income, and high marginal utility of consumption.

To address these issues, we now extend the basic model to include capital together with investment adjustment costs, as is now standard in the HANK literature. On top of that, we add search and matching frictions and unemployment risk with an added layer of heterogeneity in skills. As we show below, these ingredients give rise to new propagation channels through which fiscal policy influences the economy.

4 Adding Investment and Unemployment

This section adds investment and equilibrium unemployment to the basic HANK model. Two key results emerge. One, transfers trigger a larger increase in consumption *and* investment relative to purchases, even though purchases still have a bigger effect on total output. Two, welfare continues to be higher under transfers, although the difference is smaller than in the basic model.

4.1 Model Details

Households.—In addition to receiving stochastic productivity shocks e_{it}, households differ along two new dimensions. First, they belong permanently to either one of two types: low-skilled L with mass λ and high-skilled H with mass $1-\lambda$. Each type has a specific discount factor, with $\beta_L < \beta_H$, and specific job market characteristics, detailed below. This permanent heterogeneity allows us to capture the substantial wealth inequality present in the data as well as the fact that low-skilled households are more likely to be unemployed.

Second, households face unemployment risk. Each period, employed workers lose their job with probability s_g, where $g = \{L, H\}$, while unemployed workers find a job with probability f_{gt}. Employed workers supply work hours n_t and earn labor income $(1-\tau_{\ell t})w_t e_{it} n_t$, where $\tau_{\ell t}$ is a flat-rate labor tax. Unemployed workers receive unemployment benefit $(1-\tau_{\ell t})bw_t e_{it}$, with $b<1$. The utility function is

$$\mathbb{E}_0 \sum_{t=0}^{\infty} \beta^t \left\{ \frac{(c_{it}+\xi G_t)^{1-1/\gamma}-1}{1-1/\gamma} - \nu \frac{n_t^{1+1/\varphi}}{1+1/\varphi} - \chi 1_{it}^U \right\}, \tag{19}$$

where 1_{it}^U is an indicator function for unemployed households. Parameter χ captures the

non-pecuniary cost of being unemployed. The budget constraint is the same as in (3) except households now pay a tax on consumption, $(1+\tau_c)c_{it}$.

Labor Market.—Total hours worked L_t are the product of employed workers E_t and hours per worker n_t

$$L_t = E_t \cdot n_t. \tag{20}$$

The population of unemployed workers in each group is $U_{gt} = 1 - E_{gt}$, where $g \in \{L, H\}$. Employment evolves according to $E_{gt} = (1-s_g)E_{gt-1} + f_{gt}U_{gt-1}$. To capture the extent to which employment and hours per worker account for changes in total hours, we specify the following labor demand equation, following Fernandes and Rigato (2023)

$$d\log E_t = \eta \cdot d\log L_t \quad \text{and} \quad d\log n_t = (1-\eta)\cdot d\log L_t. \tag{21}$$

Parameter η represents the elasticity of the extensive margin to total hours, which is around 0.8 in US data (Fernandes and Rigato 2023) but 0 in standard models. Finally, changes in employment itself can be tilted towards low-skilled workers according to

$$d\log E_{Lt} = \zeta \cdot d\log E_t. \tag{22}$$

Parameter ζ governs how much variation in total employment is accounted for by the low-skilled workers, which can be greater than their share λ of the population.

Financial Intermediaries.—A competitive financial intermediary takes the aggregate deposits of households A_t and invests them into government bonds B_t and firm equity p_t. No arbitrage requires that the economy's ex ante return $\mathbb{E}_t[1+r_{t+1}]$ equal the expected returns on bonds and equity

$$\mathbb{E}_t[1+r_{t+1}] = \mathbb{E}_t[1+r^b_{t+1}] = \frac{\mathbb{E}_t[D_{t+1}+p_{t+1}]}{p_t}, \tag{23}$$

where recall D_t denotes aggregate dividends paid by firms.

Goods Producers.—Firms have a Cobb-Douglas production function with two inputs

$$y_{jt} = \Theta k_{jt}^{\alpha}\ell_{jt}^{1-\alpha}, \tag{24}$$

where Θ denotes total factor productivity. The Phillips curve is the same as in (15) but with marginal cost $mc_t = w_t/(Y_t/L_t)$. Dividends are given by $D_t = (1-\tau_k)(Y_t - w_tL_t - I_t - \psi_t)$ where I_t denotes aggregate investment and τ_k is a corporate income tax.

Capital Producers.—A representative capital producer builds the capital stock and rents it out to goods producers at rate r^k_t. The capital producer solves

$$\max_{K_t, I_t} \sum_{t=0}^{\infty} M_t \left[r^k_t K_t - I_t \right] \quad \text{subject to} \quad K_{t+1} = (1-\delta)K_t + \left[1 - S\left(\frac{I_t}{I_{t-1}}\right)\right] I_t. \tag{25}$$

Here, $S(\cdot)$ is a convex function that satisfies $S(1) = S'(1) = 0$. Defining Tobin's Q as the marginal value of capital, we get the following optimality conditions

$$Q_t = \frac{E_t r^k_{t+1} + (1-\delta)E_t Q_{t+1}}{1 + r_{t+1}} \tag{26}$$

$$1 = Q_t \left[1 - S\left(\frac{I_t}{I_{t-1}}\right) - \left(\frac{I_t}{I_{t-1}}\right) S'\left(\frac{I_t}{I_{t-1}}\right)\right] + E_t \left[\frac{Q_{t+1}}{1+r_{t+1}} \left(\frac{I_{t+1}}{I_t}\right)^2 S'\left(\frac{I_{t+1}}{I_t}\right)\right]. \tag{27}$$

Labor Unions.—A continuum of unions k choose wage W_{kt} to maximize the average utility of employed workers they represent

$$\mathbb{E}_0 \sum_{t=0}^{\infty} (1+r)^{-t} \left(\frac{1}{E_t} \int [u(\tilde{c}_{it}) - v(n_{kt})] 1^E_{it} di - \psi_{wt}(W_{kt}, W_{kt-1})\right) \tag{28}$$

subject to labor demand $n_{kt} = (\frac{W_{kt}}{W_t})^{-\frac{\mu}{\mu-1}} n_t$ and cost $\psi_{wt}(W_{kt}, W_{kt-1}) = \frac{\mu}{\mu-1}\frac{1}{2\kappa_w}[\log(\frac{W_{kt}}{W_{kt-1}})]^2$. The indicator 1^E_{it} equals one if the worker is employed, zero otherwise. The symmetric equilibrium yields a slightly modified wage Phillips curve

$$\log(1+\pi^w_t) = \kappa_w \left(\nu n_t^{1+\frac{1}{\varphi}} - \frac{(1-\tau_\ell) w_t n_t}{(1+\tau_{ct})\mu E_t} \int e_{it} \tilde{c}_{it}^{-\frac{1}{\gamma}} 1^E_{it} di\right) + \beta \log(1+\pi^w_{t+1}). \tag{29}$$

Policy.—The government budget constraint is now

$$G_t + \mathcal{T}_t + (1+r_t)B_{t-1} = \tau_c C_t + \tau_{\ell t}(w_t L_t + b U_t) + \tau_k D_t + B_t. \tag{30}$$

The fiscal rule consists in adjusting the labor income tax, ie $\tau_{\ell t} = \tau_\ell + \phi_b(B_{t-s} - B)$.

4.2 Data and Calibration

We calibrate the model at quarterly frequency to match three sets of moments: macroeconomic aggregates, labor market variables, and distributional variables.

Data.—Our sample period is 2004Q1–2024Q1. Macroeconomic aggregates include the shares of consumption; investment; capital; government purchases; and transfers in GDP. The data come from the Bureau of Economic Analysis' national account tables, except the capital stock estimates which are from Penn World Table. Labor market moments include the job finding rate, defined as the inverse of unemployment duration; the share of low-skilled workers, defined as anyone who has not been to college (the remaining high-skilled workers have at least some college education); the average unemployment rate; the unemployment rates of low- and high-skilled workers; and the skill premium, defined as the ratio of high- to low-skilled after-tax income. The data is from the Bureau of Labor Statistics. Finally, regarding distributional variables we are interested primarily in matching the fraction of households with zero liquid wealth, which Kaplan (2024) estimates using the Survey of Consumer Finances. In addition, we compute the income and wealth shares of the bottom 50%, middle 40%, and top 10% households. The data is from the Federal Reserve's Distributional Financial Accounts. Table 3 lists all the data moments we target for the calibration of the model.

Table 3: Target Moments

Variable		Model	Data
Macroeconomic aggregates			
Output, normalized	Y	1.00	1.00
Consumption	C	0.65	0.65
Investment	I	0.17	0.17
Government purchases	G	0.18	0.18
Government transfers	$\mathcal{T}$	0.14	0.14
Government debt	B	3.62	3.62
Capital	K	11.54	11.50
Labor market variables			
Share of low skilled	λ	0.38	0.38
Job finding rate	f	0.51	0.51
Unemployment rate	U	0.06	0.06
Low-skill unemployment rate	U_L	0.09	0.09
High-skill unemployment rate	U_H	0.04	0.04
Skill premium	Z_H/Z_L	1.46	1.62
Distributional variables			
Hand-to-mouth share		0.29	0.29
Bottom 50% income share		0.18	0.15
Bottom 50% wealth share		0.01	0.02
Middle 40% income share		0.49	0.39
Middle 40% wealth share		0.50	0.31
Top 10% income share		0.33	0.46
Top 10% wealth share		0.49	0.68

Calibration.—We provide a complete discussion of the calibration in Appendix C and report the parameterization in **??**. As Table 3 makes clear, the model matches the data moments very well. The only exception is the top 10% wealth share, which is lower in the model than in the data. It is well-known that heterogeneous agent models have trouble matching the thick right tail of the wealth distribution. See Benhabib, Bisin, and Luo (2019) for an exploration of the potential driving forces explaining the discrepancy.

4.3 The Output-Private Spending Tradeoff

We repeat the exercise of Section 3.2. The government separately raises purchases and transfers by one percent of output for four consecutive quarters, then stops. Labor taxes remain constant during 24 quarters then go up to keep public debt in check. Figure 6 plots the response of the extended model's key variables to this experiment.

The chief observation is that output increases more with purchases but consumption *and* investment — ie private spending — grow faster with transfers. The logic behind the higher consumption response is the same as in the basic model. Transfers raise household income more than purchases do, especially for the asset-poor. These constrained households have high MPCs and so spend the checks, providing a strong boost in aggregate consumption. The reason investment jumps more with transfers is more subtle, and we defer the discussion to

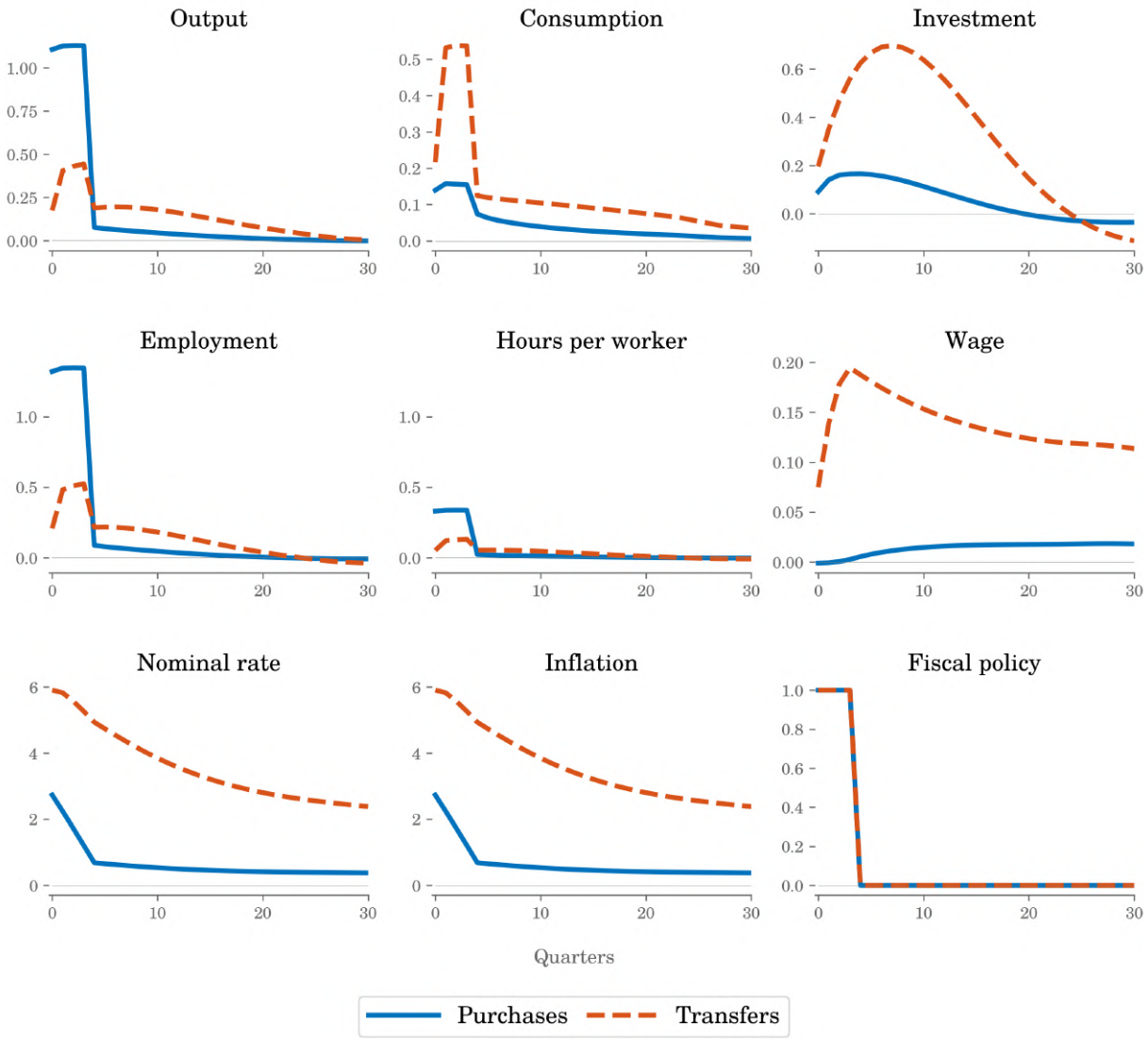

Figure 6: Government Purchases vs Transfers in the Extended Model

the next subsection. For now, note that households endowed with higher disposable income simply have more available resources to invest in productive assets such as physical capital (as well as in non-productive government debt). This supply-side perspective is one way to understand the higher investment boom induced by transfers.

In the labor market, employment shoots up significantly more with purchases. That is, a greater number of out-of-work households find a job. Hours per worker are relatively muted, in line with the empirical evidence. The employment surge is short-lived, though. When the purchase policy stops, aggregate demand falls abruptly and employment quickly returns to its steady-state value. By contrast, under the transfer policy employment and output remain elevated for at least 20 quarters. This is because stimulus payments trigger a sustained consumption spree. A large fraction of the population has nonzero asset holdings. These agents save the checks and spend them over multiple periods, thus prolonging the

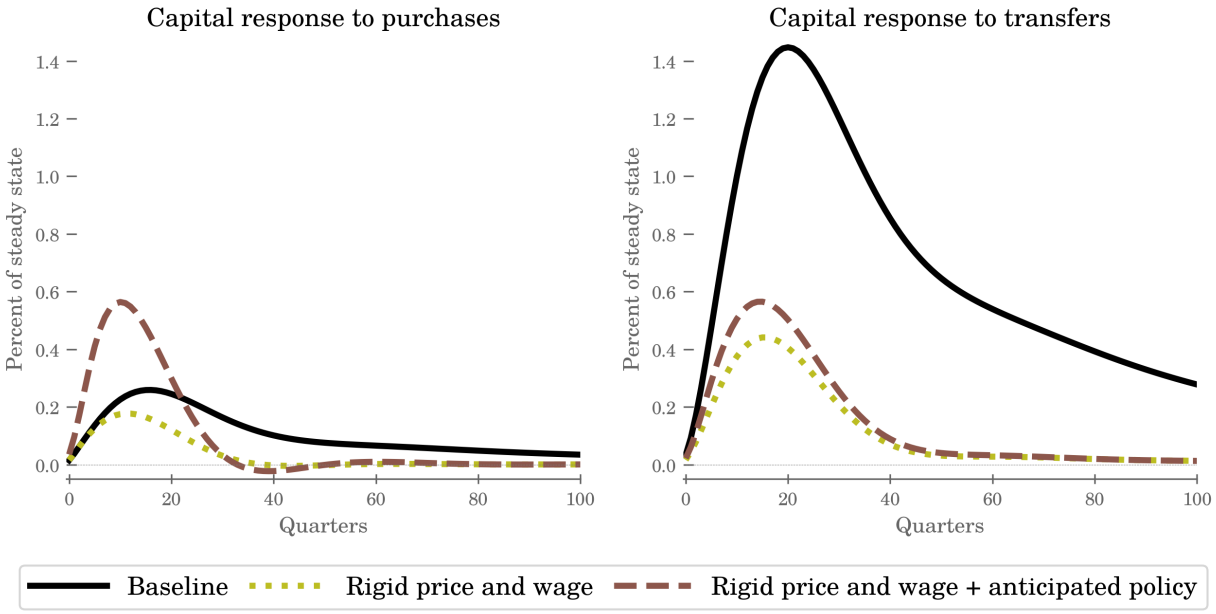

Figure 7: Dissecting the Capital Response

Note: Rigid price and wage means perfectly flat Phillips curves, $\kappa_p = \kappa_w = 0$. Anticipated policy means each policy is announced in period 0, starts in period 4, and lasts until period 8.

expansionary impact of the policy well into the future.

All in all, the extended model pinpoints a more general tradeoff than the basic version. Government purchases are more efficient at lifting output and lowering unemployment. Meanwhile, uniform transfers are more powerful when it comes to increasing private spending, that is consumption and investment. Before turning to the welfare analysis, we zoom in on the dynamics of investment and capital.

4.4 Understanding the Investment Response

Our findings suggest the policy that most stimulates aggregate demand is not the one that leads to the strongest investment reaction. How come? There are two main explanations. First, wages increase considerably more with transfers, as Figure 6 makes clear. This is due to a wealth effect on the labor supply: transfers raise consumption a lot, prompting households to desire more leisure. To incentivize work, firms must hike up salaries. But this increases the marginal cost of production, so firms respond by substituting away from labor towards capital — a relatively cheaper input. Indeed, the cumulative capital-to-labor ratio increases about four times as much under the transfer policy. To get a sense of how strong this channel is, we impose fully rigid wages and prices by setting the slopes of the Phillips curves κ_w and κ_p to zero. We rerun the experiment and look at the response of capital to each policy. Figure 7 plots the results. As the dotted green line in the right panel shows, the increase in capital under the transfer policy is now only a third of the increase in the baseline case. Intuitively, there is no need for businesses to become that capital

intensive now that labor remains cheap throughout the experiment.

The second explanation has to do with timing. Capital takes time to build, and adjustment costs make large investment spikes expensive. When at time 0 the purchase policy is announced and implemented, the capital stock is suddenly too low relative to the higher output and employment levels, indicating a need for fresh new investment (a high Tobin's Q and high marginal product of capital). But the policy is short-lived, as discussed already, and in period 5 output will experience a large drop. Capital producers realize this and refrain from investing, relative to a situation in which the purchase policy would last longer. On the contrary, the temporary transfer policy leads to an enduring boom in consumption and employment. This makes investment today more profitable because the benefits of a higher capital stock will be reaped over a much longer horizon. To see this channel at work, we assume each policy is announced in period 0 but implemented after one year, in period 4, and we maintain the assumption of rigid prices and wage. The dashed brown line in Figure 7 displays the result. The dynamics of capital under the two policies are now essentially the same. In particular, the capital response to purchases is greater than in the baseline case. Anticipating higher employment and thus a higher return to capital in the future, capital producers start investing now.[6]

To summarize, investment is higher with transfers because (1) increased labor costs make capital relatively cheap; and (2) the protracted expansion in consumer spending induced by transfers makes capital attractive for a longer period of time.

4.5 Welfare

Several features of the extended model may affect the welfare comparison between the two policies. To begin with, investment serves to build capital, which enables more production, in turn affecting household income and welfare. Next, the extensive margin of employment turns the labor disutility margin less relevant, as the bulk of extra labor hours comes from the pool of unemployed workers, not the already-employed ones. Finally, unemployed workers are for the most part low-skilled households with high marginal utility, so any policy that raises employment should favor them and ultimately raise welfare.

Section 4.5 reports fiscal and welfare multipliers for each policy across three model specifications. The first column (labeled HA2) corresponds to the extended model; the second column (HA1) indicates the basic model; and the third column (RA) is for the benchmark New Keynesian model. In the top panel, we consider the standard case $\xi = 0$, while in the bottom panel we allow ξ to be positive and set it to 1/2.

Our main finding is that welfare is higher with transfers across all specifications. Not surprisingly, the welfare difference between transfers and purchases is highest in the basic

[6]There is a third channel, which we switch off on purpose. The large increase in wages means transfers are more inflationary than purchases. Under inflation-targeting monetary policy, the surprise first-period real interest rate should be lower with transfers, further stimulating investment. This channel is absent here because we assume the central bank implements a constant real interest rate.

Table 4: Purchase vs Transfer Multipliers

	HA2		HA1		RA	
Variable	G	$\mathcal{T}$	G	$\mathcal{T}$	G	$\mathcal{T}$
No public goods in utility, $\xi = 0$						
Output	1.28	1.04	1.49	0.87	1.00	0.00
Consumption	0.22	0.69	0.49	0.87	0.00	0.00
Investment	0.05	0.35	–	–	–	–
Welfare	0.00	0.11	−0.03	0.42	−0.02	0.00
Public goods in utility, $\xi = 1/2$						
Output	1.18	0.98	1.29	1.02	0.50	0.00
Consumption	0.02	0.75	0.29	1.02	−0.50	0.00
Investment	0.15	0.23	–	–	–	–
Welfare	0.05	0.09	0.18	0.38	−0.01	0.00

Note: HA2 correspond to the extended model, HA1 indicates the basic model, and RA denotes the benchmark New Keynesian model.

HA1 model. There, when public goods do no enter utility ($\xi = 0$), purchases actually reduce welfare. This means that the consumption gain resulting from the economic expansion, but accruing mostly to the upper classes, is not enough to compensate for the extra hours worked, which are borne by everyone. Transfers, on the other hand, raise welfare sharply. This is because they increase consumption more — especially for the asset-poor — but hours less than purchases, an improvement on both margins of the utility function.

In the extended HA2 model, purchases are welfare neutral for $\xi = 0$. The policy is more progressive, relative to the basic model, as Figure xx in the appendix shows. But the welfare gain is not huge, and transfers remain overwhelmingly dominant. Our reading of this result is as follows. Only a fraction of the workforce is unemployed at a given point in time (in our data sample 6% of the total and 9% of the low-skilled). So even though the purchase policy is effective at putting people back to work, it benefits only a minority group. Zero-wealth households, on the other hand, represent a much bigger contingent (around 30% of the population). Thus, a transfer policy that better targets these households clearly dominates in terms of welfare.

The case with public goods in utility is not so clearcut. The higher ξ, the lower the welfare difference. Still, for values close to 1, we find transfers still dominate. The cutoff occurs exactly when $\xi = (1 + \tau_c)^{-1} = 0.91$. Intuitively, consumption is taxed at rate τ_c. So welfare and fiscal multipliers coincide when the pubic good weight in utility is equal to the marginal utility from consumption.

To conclude, we find that incorporating unemployment to the model raises the welfare benefits of the purchase policy. Despite that, we find transfers remain the most welfare improving policy of the two.

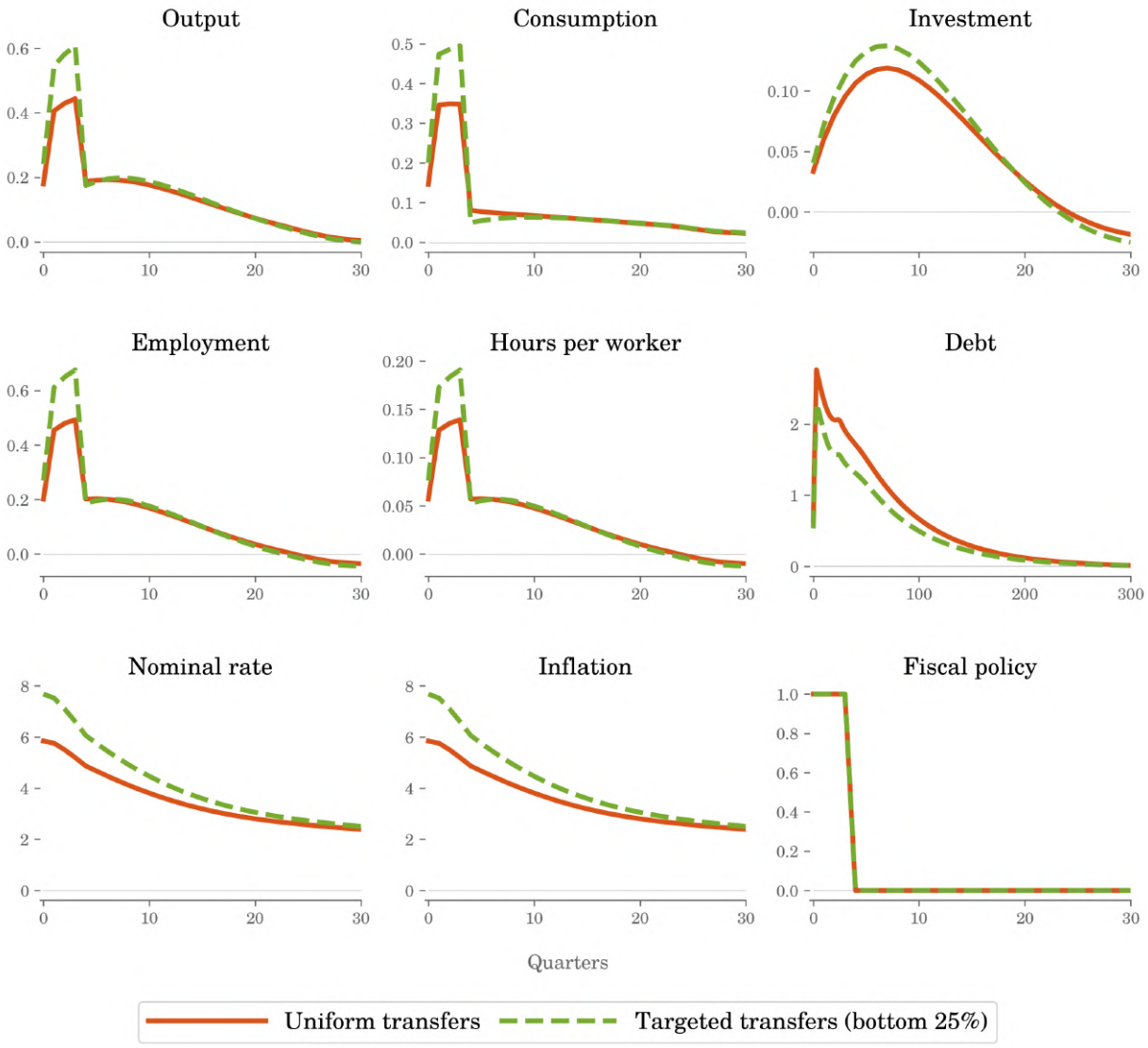

Figure 8: Uniform vs Targeted Transfers

4.6 Going Further: Targeted Transfers

Our simulations so far only contemplate uniform transfers. Since low-asset, high-MPC households are those that respond the most to the transfer policy, one may wonder how much additional oomph one could obtain by sending stimulus checks only to these agents. Figure 8 plots the response of the economy to a targeted transfer policy in which only the bottom quarter of the wealth distribution receives a cash payment. The policy still consists in disbursing one percent of output during four consecutive periods, then stops.

The bottom line is that output and consumption are about 20 percent larger in cumulative terms, while welfare is over three times as large. Government debt is 12 percent smaller. So relative to the uniform transfer policy, the targeted transfer policy leads to more production, more employment, more consumption, about the same level of investment, higher welfare, and is cheaper, after factoring in tax revenues. Of course, this exercise as-

sumes the government can perfectly observe and reach the low-wealth households in real time. We also abstract from any political economy consideration. We recognize that these issues may constitute a major hurdle for the implementation of such a progressive transfer policy.

5 Conclusion

Governments have two broad options to increase public expenditure in an effort to support the economy. They can step up purchases, for example expand public services, hire civil servants, buy military hardware, build infrastructure. Or they can raise social transfers, in the form of retirement, disability, health care, unemployment insurance, income assistance, or food stamps. This paper conducts a macroeconomic cost-benefit analysis of these two fiscal tools using state-of-the-art heterogeneous agent New Keynesian theory. We attain two sets of results, one positive and one normative.

On the positive side, we confirm the prior of most experts in the field that the fiscal multiplier of purchases is greater than the multiplier of transfers. In our preferred specification, these numbers are 1.28 and 1.04, respectively. The reason is purchases directly add to GDP whereas not all transfers are spent immediately. New to the literature, however, we find that private sector spending increases substantially more under the transfer policy. This is true for both household consumption and business investment. The fundamental motive is that transfer payments put more money into the hands of consumers, especially the low-income, who are free to spend it (consumption) or save it for later (investment). Therefore, our study identifies a clear tradeoff between the two policies: higher output, employment, and role of the public sector on the one hand, versus higher private sector consumption and investment on the other.

On the normative side, we show that as long as households value private consumption more than public goods, welfare is systematically higher under the transfer policy. In other words, a large fiscal multiplier does *not* imply a large welfare multiplier. Again, the explanation has to do with where the funds go. Purchases are roughly proportional to income, implying high earners gain more in absolute terms, even though reducing unemployment makes the policy more progressive than otherwise. Uniform transfers, in stark contrast, benefit the poor, in relative terms, who happen to have the highest marginal utility. It follows that a utilitarian social planner facing a choice between the two instruments unambiguously favors the transfer policy.

Our study focuses on the benefits of short-run fiscal stabilization policy. An important question is how the secular shift from purchases to transfers in advanced economies affects long-term welfare and economic growth. We hope to tackles these issues in future research.

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Appendix

This appendix has three sections.

A Appendix to Section 2

A.1 Proof of Proposition 1

If $\xi = 0$, then $\boldsymbol{M}^G = \mathbf{0}$, and if $d\boldsymbol{\mathcal{T}} = \mathbf{0}$, equation (12) boils down to

$$d\boldsymbol{Y} = d\boldsymbol{G} - \boldsymbol{M}d\boldsymbol{T} + \boldsymbol{M}d\boldsymbol{Y}. \tag{A1}$$

If $d\boldsymbol{G} = d\boldsymbol{T}$, then $(\boldsymbol{I} - \boldsymbol{M})d\boldsymbol{Y} = (\boldsymbol{I} - \boldsymbol{M})d\boldsymbol{G}$ or

$$d\boldsymbol{Y} = d\boldsymbol{G}. \tag{A2}$$

Since $d\boldsymbol{Y} = d\boldsymbol{C} + d\boldsymbol{G}$, we have $d\boldsymbol{C} = \mathbf{0}$. In this environment, *aggregate* post-tax income $Z_t = Y_t - T_t$ is the only aggregate sequence that matters for *individual* consumption c_{it}, as Z_t pins down individual income $z_{it} = e_{it}Z_t$. Since output increases by $d\boldsymbol{G}$ and taxes rise by the same amount $d\boldsymbol{T} = d\boldsymbol{G}$, we have that after-tax income is unchanged, $d\boldsymbol{z}_i = d\boldsymbol{Z} = \mathbf{0}$. It follows that all individual consumption paths are also unchanged

$$d\boldsymbol{c}_i = \mathbf{0}. \tag{A3}$$

Finally, since consumption is constant for all agents, but hours worked increase for all agents, $d\boldsymbol{L} = d\boldsymbol{Y}$, we conclude that welfare must decrease. ■

Proportional vs Lump-Sum Taxes.—A revenue-neutral purchase policy financed with proportional taxes has no impact on consumption. What if the policy is financed with lump-sum taxes instead? Figure A1 displays such an experiment.[7] The solid blue line shows the benchmark proportional taxation scheme, while the dashed red line indicates lump-sum taxation.

Consumption falls on impact and remains depressed for several years. This is because the low-income households with the highest MPCs are now more heavily taxed, so they respond by cutting back on spending. The fiscal multiplier drops from 1 to 0.69. The welfare loss is even more dramatic, falling six times as much relative to the proportional tax case. Intuitively, a utilitarian planner who is concerned equally about every citizen ends up attaching more weight to the agents with the highest marginal utility, which turn out to be the low-asset, constrained households.

[7] We use lump-sum taxes at the margin to ensure the steady state remains unchanged. That is, steady-state government purchases remain funded with progressive taxes.

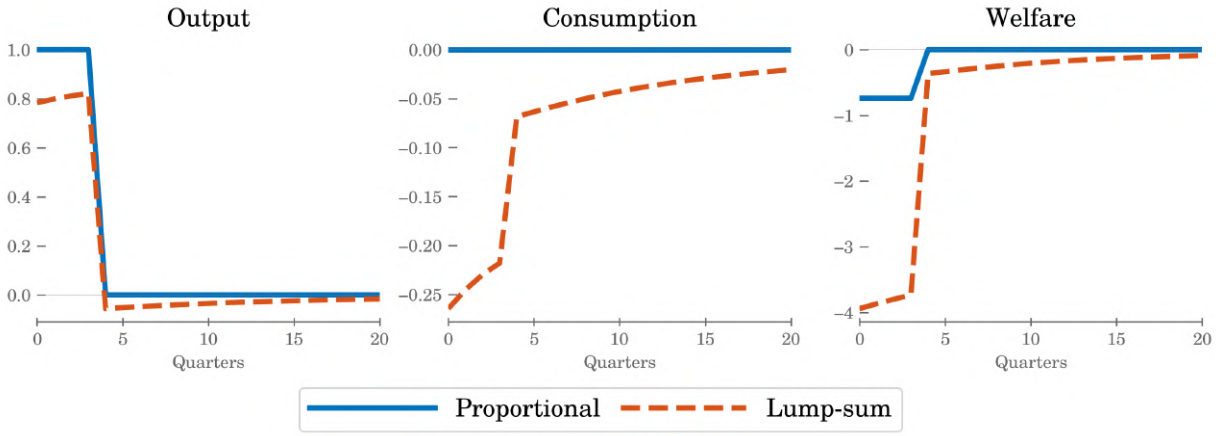

Figure A1: Financing a Purchase Policy, Proportional vs Lump-Sum Taxes

As in Auclert, Rognlie, and Straub (2023), we can understand this result by manipulating (10)

$$d\boldsymbol{Y} = \mathcal{M}(d\boldsymbol{G} - \boldsymbol{M}^{\mathcal{T}} d\boldsymbol{G}) = \mathcal{M}(d\boldsymbol{G} - \boldsymbol{M} d\boldsymbol{G}) + \mathcal{M}(\boldsymbol{M} - \boldsymbol{M}^{\mathcal{T}}) d\boldsymbol{G} = d\boldsymbol{G} + \mathcal{M}(\boldsymbol{M} - \boldsymbol{M}^{\mathcal{T}}) d\boldsymbol{G}.$$

A.2 Proof of Proposition 2

If $\xi = 0$, then $\boldsymbol{M}^G = \boldsymbol{0}$, and if $d\boldsymbol{\mathcal{T}} = \boldsymbol{0}$, equation (12) boils down to

$$d\boldsymbol{Y} = d\boldsymbol{G} - \boldsymbol{M} d\boldsymbol{T} + \boldsymbol{M} d\boldsymbol{Y}. \tag{A4}$$

Rewrite this as

$$d\boldsymbol{Y} - d\boldsymbol{G} = \boldsymbol{M}(d\boldsymbol{G} - d\boldsymbol{T}) + \boldsymbol{M}(d\boldsymbol{Y} - d\boldsymbol{G}). \tag{A5}$$

Solve for $d\boldsymbol{Y}$

$$d\boldsymbol{Y} = d\boldsymbol{G} + \mathcal{M}\boldsymbol{M}(d\boldsymbol{G} - d\boldsymbol{T}), \tag{A6}$$

where $\mathcal{M}$ is a bounded linear operator that satisfies $\mathcal{M}(\boldsymbol{I} - \boldsymbol{M}) = \boldsymbol{I}$ as in Auclert, Rognlie, and Straub (2023, Proposition 2). Since $d\boldsymbol{Y} = d\boldsymbol{G} + d\boldsymbol{C}$, we have $d\boldsymbol{C} = \mathcal{M}\boldsymbol{M}(d\boldsymbol{G} - d\boldsymbol{T})$. Now, since $d\boldsymbol{T}' = d\boldsymbol{G} - d\boldsymbol{T}$, we have $d\boldsymbol{C}' = d\boldsymbol{C}$. The two policies imply the same aggregate path of consumption. It follows that

$$d\boldsymbol{Z} = d\boldsymbol{Y} - d\boldsymbol{T} = d\boldsymbol{G} + d\boldsymbol{C} - d\boldsymbol{T} = d\boldsymbol{T}' + d\boldsymbol{C}' = d\boldsymbol{Z}'. \tag{A7}$$

The two policies imply the same path of aggregate after-tax income, and therefore the same paths of individual after-tax income, $d\boldsymbol{z}_i = d\boldsymbol{z}_i'$ for all agents. It follows that the two policies imply the same paths of individual consumption

$$d\boldsymbol{c}_i = d\boldsymbol{c}_i'. \tag{A8}$$

Finally, since consumption levels are the same for all agents under the two policies, but hours worked increase more for all agents under the purchase policy, $d\boldsymbol{L} = d\boldsymbol{Y} = d\boldsymbol{G} + d\boldsymbol{C} > d\boldsymbol{C}' = d\boldsymbol{Y}' = d\boldsymbol{L}'$, we conclude that welfare is higher under the transfer policy. ■

A.3 Proof of Proposition 3

Use the definition of effective consumption, $\tilde{c}_{it} = c_{it} + \xi G_t$, to rewrite the budget constraint (3), $c_{it} + a_{it} = (1 + r_{t-1})a_{it-1} + z_{it} + \mathcal{T}_t$, as

$$\tilde{c}_{it} + a_{it} = (1 + r_{t-1})a_{it-1} + z_{it} + \mathcal{T}_t + \xi G_t. \tag{A9}$$

Uniform transfers $\mathcal{T}_t$ and public goods ξG_t enter additively and thus have the same effect on individual effective consumption $\tilde{c}_{it}$. For all i, t, and s

$$\frac{\partial \tilde{c}_{it}}{\partial G_s} = \xi \frac{\partial \tilde{c}_{it}}{\partial \mathcal{T}_s} = \frac{\partial (c_{it} + \xi G_t)}{\partial G_s} = \xi \frac{\partial (c_{it} + \xi G_t)}{\partial \mathcal{T}_s}. \tag{A10}$$

Thus, for all i, t, and s

$$\frac{\partial c_{it}}{\partial G_s} = \xi \frac{\partial c_{it}}{\partial \mathcal{T}_s} - \xi \cdot 1_{t=s}. \tag{A11}$$

Aggregating over all individuals i and expressing in sequence form, we obtain

$$\boldsymbol{M}^G = \xi(\boldsymbol{M}^{\mathcal{T}} - \boldsymbol{I}), \tag{A12}$$

where recall $\boldsymbol{M}^G$ and $\boldsymbol{M}^{\mathcal{T}}$ have entries $M^G_{ts} = \frac{\partial \mathcal{C}_t}{\partial G_s}$ and $M^{\mathcal{T}}_{ts} = \frac{\partial \mathcal{C}_t}{\partial \mathcal{T}_s}$, respectively. Repeat equation (12) for convenience

$$d\boldsymbol{Y} = d\boldsymbol{G} + \boldsymbol{M} d\boldsymbol{Y} - \boldsymbol{M} d\boldsymbol{T} + \boldsymbol{M}^G d\boldsymbol{G} + \boldsymbol{M}^{\mathcal{T}} d\boldsymbol{\mathcal{T}}.$$

We now proceed to compute $d\boldsymbol{Y}$ under each policy using (12) and (A12).

Purchase Policy.—The purchase policy $\{d\boldsymbol{G}, d\boldsymbol{T}\}$ leads to

$$\begin{aligned} d\boldsymbol{Y} &= d\boldsymbol{G} + \boldsymbol{M} d\boldsymbol{Y} - \boldsymbol{M} d\boldsymbol{T} + \boldsymbol{M}^G d\boldsymbol{G} \\ &= \mathcal{M}[\boldsymbol{I} + \xi(\boldsymbol{M}^{\mathcal{T}} - \boldsymbol{I})] d\boldsymbol{G} - \mathcal{M}\boldsymbol{M} d\boldsymbol{T}, \end{aligned} \tag{A13}$$

where the second equality uses (A12) and the bounded linear operator $\mathcal{M}$ satisfying $\mathcal{M}(\boldsymbol{I} - \boldsymbol{M}) = \boldsymbol{I}$, as in Auclert, Rognlie, and Straub (2023, Proposition 2).

Transfer policy.—The transfer policy $\{d\boldsymbol{G}, d\boldsymbol{T}\}$ leads to

$$\begin{aligned} d\boldsymbol{Y}' &= \boldsymbol{M} d\boldsymbol{Y} - \boldsymbol{M} d\boldsymbol{T} + \boldsymbol{M}^{\mathcal{T}} d\boldsymbol{\mathcal{T}} \\ &= \mathcal{M}\boldsymbol{M}^{\mathcal{T}} d\boldsymbol{\mathcal{T}} - \mathcal{M}\boldsymbol{M} d\boldsymbol{T}. \end{aligned} \tag{A14}$$

Subtract (A14) from (A13) and use $d\boldsymbol{G} = d\boldsymbol{\mathcal{T}}$

$$d\boldsymbol{Y} - d\boldsymbol{Y}' = (1 - \xi)\mathcal{M}(\boldsymbol{I} - \boldsymbol{M}^{\mathcal{T}}) d\boldsymbol{G}. \tag{A15}$$

If $\xi = 1$, then $d\boldsymbol{Y} - d\boldsymbol{Y}' = \boldsymbol{0}$ or

$$d\boldsymbol{Y} = d\boldsymbol{Y}'. \tag{A16}$$

It follows that $d\boldsymbol{L} = d\boldsymbol{L}'$. The two policies lead do the same paths of output and labor. Now, going back to the individual problems, we see that the purchase policy perturbs the budget

constraint by the amount $dz_{it} + \xi dG_t$ for all i and t. The transfer policy perturbs the budget constraint by the amount $dz'_{it} + d\mathcal{T}_t$ for all i and t. Since $\xi = 1$ and $d\boldsymbol{G} = d\boldsymbol{\mathcal{T}}$, it follows that the two policies perturb the budget constraint of all agents by the same amount at all dates. We deduce that individual effective consumption paths are the same for all agents

$$d\tilde{\boldsymbol{c}}_i = d\tilde{\boldsymbol{c}}'_i. \tag{A17}$$

Effective consumption and hours worked are the same under the two policies for all agents and all dates. We conclude that welfare is the same under the two policies. ■

B Appendix to Section 3

B.1 Fiscal Policy Under Perfect Public-Private Good Substitution

Figure A2 displays the results of the same experiment run in Section 3.2 but in the case where public and private goods are perfect substitutes, $\xi = 1$. Consistent with Proposition 3, we see that the response of all aggregate variables are identical across the two policies. The only exception is private consumption, which drops under purchases precisely during the time that purchases go up (in the first four quarters). From period 5 onward, the consumption paths under the two policies are equivalent.[8] As explained in the main text, households cut their private spending when purchases increase because public goods provide the exact same utility as private goods. This enables households to save and increase spending well after the policy stops. So with $\xi = 1$, the purchase and transfer policies are equivalent. Fiscal and welfare multipliers coincide.

C Appendix to Section 4

C.1 Calibration of the Extended Model

Table A5 reports the calibration of the extended model. We divide the parameters into four blocks.

Households.—

Labor market.—

Firms.—

*Government.—*As in McKay and Reis (2021), we calibrate $\chi = \nu n^{1+1/\varphi}/(1 + 1/\varphi)$.

[8] The paths of effective consumption are identical at all points in time.

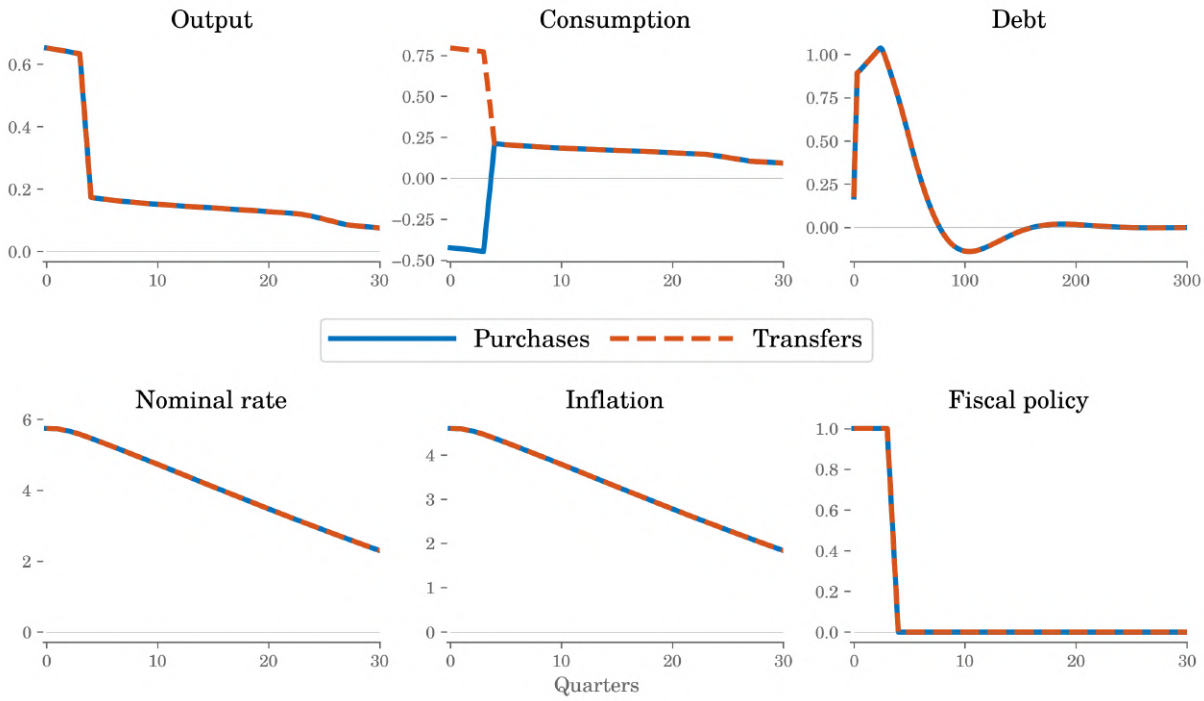

Figure A2: Purchases vs Transfers with Perfect Public-Private Goods Substitution $\xi = 1$

Table A5: Calibration of the Extended Model

Parameter		Value	Parameter		Value
Households			*Firms*		
Low-skilled discount factor	β_L	0.90	TFP	Θ	0.45
High-skilled discount factor	β_H	0.98	Price markup	μ_p	1.04
Public good weight in utility	ξ	0	Wage markup	μ_w	1.04
Intertemporal substitution	γ	0.6	Depreciation	δ	0.02
Frisch elasticity	φ	0.5	Capital share	α	0.33
Disutility of labor	ν	0.73	Price Phillips curve slope	κ	0.01
Borrowing constraint	$\underline{a}$	0	Wage Phillips curve slope	κ_w	0.01
Cross-sectional std of earnings	σ	1.2	Investment adjustment cost	S''	3
Persistence of earnings	ρ	0.97			
Labor market			*Government*		
Share of low-skilled	λ	0.38	Government purchases	G	0.18
Job finding rate	f	0.51	Government debt	B	3.62
Job separation low-skilled	s_L	0.05	Labor income tax rate	τ_ℓ	0.35
Job separation high-skilled	s_H	0.02	Capital income tax rate	τ_k	0.35
Unemployment benefit	b	0.5	Consumption tax rate	τ_c	0.1
Extensive margin elasticity	η	0.8	Fiscal rule coefficient	ϕ_b	0.03
Low-skill employment response	ζ	0.8	Taylor rule coefficient	ϕ_π	1.5