Online Appendix for:

Capital Taxes and Redistribution: The Role of Management Time and Tax Deductible Investment

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October 7, 2019

Abstract

This online Appendix includes the Ramsey problem and first-order conditions of the benchmark economy, extends our model to consider consumption taxes, provides a sensitivity analysis to the numerical exercise of the benchmark economy and revises the accounts and explains the calibration of the economy without managerial effort.

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1 Ramsey Problem

The Lagrangian for the Ramsey problem for the government at date 0 is

$$
\begin{aligned}
L = & \sum_{t=0}^{\infty} \beta^t \left[\gamma\kappa u_1(c_{1,t}, n_{1,t}) + (1-\gamma)(1-\kappa) u_2(c_{2,t}, e_{2,t} + n_{2,t})\right] \\
& + \sum_{t=0}^{\infty} \beta^t \mu_t \left[(1-\kappa) f(k_t, n_t) - \kappa c_{1,t} - (1-\kappa) c_{2,t} - (1-\kappa)(x_{m,t} + x_{u,t}) - g_t\right] \\
& + \sum_{t=0}^{\infty} \beta^t \phi_t (1-\kappa) \left[I(x_{m,t}, x_{u,t}, e_{2,t}) + (1-\delta) k_t - k_{t+1}\right] \\
& + \sum_{t=0}^{\infty} \beta^t \lambda_{1,t}\kappa \left[u_{1c,t} c_{1,t} + u_{1n,t} n_{1,t}\right] + \lambda_2 (1-\kappa) \left[\sum_{t=0}^{\infty} \beta^t \left[u_{2c,t} c_{2,t} + u_{2n,t}(n_{2,t} + e_{2,t})\right] - W_{2,0}\right] + (1-\kappa) J,
\end{aligned}
$$

where ϕ_t, μ_t, $\lambda_{1,t}$, λ_2, ς_t^i and ψ_t are the multipliers on the investment technology, resource constraint, per-period implementability condition of the worker, life-time implementability condition of the capitalist, raw labor supply conditions and Euler conditions, with

$$
\begin{aligned}
J = & \sum_{t=0}^{\infty} \beta^t \left\{\varsigma_t^1 \left(\frac{u_{1n,t}}{u_{1c,t}} - \frac{u_{2n,t}}{u_{2c,t}}\right) + \varsigma_t^2 n_{2,t} + \varsigma_t^3 n_{2,t} u_{2c,t} \left(\frac{u_{1n,t}}{u_{1c,t}} - \frac{u_{2n,t}}{u_{2c,t}}\right)\right\} \\
& + \sum_{t=1}^{\infty} \beta^{t-1} \psi_t \left[\frac{u_{2e,t-1}}{I_{e,t-1}} - \beta \left[I_{u,t}(f_{k,t} - \delta) + I_{m,t}\delta + (1-\delta)\right] \frac{u_{2e,t}}{I_{e,t}}\right].
\end{aligned}
$$

Denoting $J_{x,t} = \frac{\partial J}{\partial x_t}$, the first-order conditions for the Ramsey problem for all $t \geq 1$ are

$$
\begin{aligned}
[c_{1,t}] \quad & \gamma u_{1c,t} + \lambda_{1,t}(u_{1c,t} + u_{1cc,t} c_{1,t}) + \frac{1-\kappa}{\kappa} J_{1c,t} = \mu_t, \\
[c_{2,t}] \quad & (1-\gamma) u_{2c,t} + \lambda_2 (u_{2c,t} + u_{2cc,t} c_{2,t}) + J_{2c,t} = \mu_t, \\
[n_{1,t}] \quad & \gamma u_{1n,t} + \lambda_{1,t}(u_{1n,t} + u_{1nn,t} n_{1,t}) + \frac{1-\kappa}{\kappa} J_{1n,t} = -f_{n,t}\mu_t, \\
[n_{2,t}] \quad & (1-\gamma) u_{2n,t} + \lambda_2 (u_{2n,t} + u_{2nn,t} n_{2,t}) + J_{2n,t} = -f_{n,t}\mu_t, \\
[e_{2,t}] \quad & (1-\gamma) u_{2n,t} + \lambda_2 (u_{2n,t} + u_{2nn,t} e_{2,t}) + J_{e,t} = -I_{e,t}\phi_t, \\
[x_{m,t}] \quad & I_{m,t}\phi_t + J_{m,t} = \mu_t, \\
[x_{u,t}] \quad & I_{u,t}\phi_t + J_{u,t} = \mu_t, \\
[k_{t+1}] \quad & \phi_t = \beta \mu_{t+1} f_{k,t+1} + \beta(1-\delta)\phi_{t+1} + J_{k,t+1}.
\end{aligned}
$$

The solution to the above problem yields the Ramsey allocation. The Ramsey tax plan that decentralizes that allocation can be obtained from the equilibrium conditions presented in the main text.

2 Consumption Taxes

In this Section, we extend our model to consider consumption taxes τ_t^c. We first solve the households' optimization problems. We next discuss whether the tax system is complete and setup the Ramsey problem. Then we show the equivalence between the Ramsey problems with and without consumption taxes. Last, we discuss the decentralization of the Ramsey allocation.

In this environment, the price of consumption of workers and capitalists is now multiplied by $(1+\tau_t^c)$ in their budget constraints. The consumption-leisure decision of workers now becomes

$$-u_{1n,t} = \left(\frac{1-\tau_t^n}{1+\tau_t^c}\right) w_t u_{1c,t}. \tag{1}$$

Similarly, the optimality decisions for the capitalist can be now written as

$$-u_{2n,t} \geq \left(\frac{1-\tau_t^n}{1+\tau_t^c}\right) w_t u_{2c,t}, \;\; n_{2,t} \geq 0, \;\; n_{2,t}\left[-u_{2n,t} - \left(\frac{1-\tau_t^n}{1+\tau_t^c}\right) w_t u_{2c,t}\right] = 0, \tag{2}$$

$$-u_{2n,t} = \left(\frac{1-\tau_t^d}{1+\tau_t^c}\right) \frac{I_{e,t}}{I_{m,t}} u_{2c,t}, \tag{3}$$

$$I_{u,t} = \left(1-\tau_t^k\right) I_{m,t}, \tag{4}$$

$$\left(\frac{1-\tau_t^d}{1+\tau_t^c}\right) \frac{u_{2c,t}}{I_{m,t}} = \beta \left(\frac{1-\tau_{t+1}^d}{1+\tau_{t+1}^c}\right) \left[I_{m,t+1}\left[\left(1-\tau_{t+1}^k\right)\left(f_{k,t+1}-\delta\right)+\delta\right] + \left(1-\delta\right)\right] \frac{u_{2c,t+1}}{I_{m,t+1}}. \tag{5}$$

We now explore whether the tax system is complete. First, looking at the labor supply, we find one wedge created by $\left(\frac{1-\tau_t^n}{1+\tau_t^c}\right)$ in two potential margins: the consumption-leisure decision for the worker (1) and, if the capitalist decides to provide raw labor, the one for the capitalist (2). Using (1), condition (2) can be written as

$$\frac{-u_{2n,t}}{u_{2c,t}} \geq \frac{-u_{1n,t}}{u_{1c,t}}, \;\; n_{2,t} \geq 0, \;\; n_{2,t}\left(-u_{2n,t} + \frac{u_{1n,t}}{u_{1c,t}} u_{2c,t}\right) = 0. \tag{6}$$

Second, on the investment decisions, there are two wedges created by $\left(\frac{1-\tau_t^d}{1+\tau_t^c}\right)$ and $\left(1-\tau_t^k\right)$ and three margins: the consumption-effort decision (3), the tangible vs intangible investment decision (4) and the Euler condition (5). The first two margins can be decentralized with $\left(\frac{1-\tau_t^d}{1+\tau_t^c}\right)$ and $\left(1-\tau_t^k\right)$. Substituting in (3) and (4), condition (5) can be written as

$$\frac{-u_{2n,t}}{I_{e,t}} = -\beta \frac{u_{2n,t+1}}{I_{e,t+1}} \left\{ I_{m,t+1} \left[\frac{I_{e,t+1}}{I_{m,t+1}} \left(f_{k,t+1} - \delta \right) + \delta \right] + (1-\delta) \right\}. \tag{7}$$

Therefore, this additional tax does not bring in an additional way to affect the existing margins. Both optimality conditions (6) and (7) remain as in the main text and need to be included as constraints in our Ramsey problem.

The implementability conditions also remain as in the main text, except for the initial wealth of the capitalist $W_{2,0}$, that takes the following form:

$$W_{2,0} = -\frac{u_{2n,0}}{I_{e,0}} \left[I_{m,0} \left[\frac{I_{u,0}}{I_{m,0}} \left(f_{k,0} - \delta \right) + \delta \right] + (1-\delta) \right] k_0 + \frac{u_{2c,0}}{(1+\tau_0^c)} \hat{R}_0^b b_0.$$

The main difference is that the initial consumption tax can be used to reproduce an implicit default on the initial debt, see Coleman (2000). As in Armenter (2008) and Chari et al. (2018), we rule out this possibility. More specifically, we assume $\frac{\hat{R}_0^b}{\left(1+\tau_0^c\right)} \equiv R_0^b$, where R_0^b is the exogenous interest rate on government debt in the economy without consumption taxes. Provided this assumption, it is easy to see that the Ramsey problem with consumption taxes is equivalent to the Ramsey problem without consumption taxes.

To end this Section, we now discuss the decentralization of the Ramsey allocation. If consumption taxes are not used, then the decentralization of the Ramsey allocation is unique and equal to the one presented in the main text. Let's denote that decentralization by $\tilde{\tau}_t^n$, $\tilde{\tau}_t^d$, and $\tilde{\tau}_t^k$. On the other hand, if consumption taxes are used for decentralization, then there are infinitely many different ways to decentralize the Ramsey allocation as there are more tax instruments than wedges. Let's denote that decentralization by $\tilde{\tau}_t^n$, $\tilde{\tau}_t^d$, $\tilde{\tau}_t^k$, and $\tilde{\tau}_t^c$. Then, for any given sequence of

consumption taxes $\{\tilde{\tau}_t^c\}_{t=0}^{\infty}$, the Ramsey allocation can be decentralized by

$$\hat{\tau}_t^d = \tilde{\tau}_t^d - \hat{\tau}_t^c \left(1 - \tilde{\tau}_t^d\right),$$
$$\hat{\tau}_t^n = \tilde{\tau}_t^n - \hat{\tau}_t^c \left(1 - \tilde{\tau}_t^n\right),$$
$$\hat{\tau}_t^k = \widetilde{\tau}_t^k.$$

Thus, for given positive consumption taxes, the Ramsey dividend and labor taxes would be lower, while Ramey corporate taxes would remain at the same level.

3 Sensitivity Analysis

In this Section, we perform a sensitivity analysis with respect to the preference (σ and χ) and technology parameters (ρ_m and ρ_u) that have been fixed in our calibration of the benchmark economy. As explained in the main text, for all considered sets of parameter values, we re-calibrate the model. As shown in Table 1, different combinations of parameter values yield different capital to output ratios and calibrated shares of capital income in total income α. However, they all deliver the same revised corporate output (and same revised GDP) and therefore, for all, we obtain the same ratios of intangible investments to GDP.

[Insert Table 1 about here.]

Tables 2, 3, 4 and 5 explore the effect of changes in preference parameters. Their corresponding revised data, calibration and initial steady states are presented as Cases 2 to 5 in Table 1. Tables 2 and 3 focus on changes in the intertemporal elasticity of consumption. In particular, for Table 2, we assume that both workers and capitalists share a lower elasticity as implied by $\sigma_1 = \sigma_2 = 1.25$. The properties of the Ramsey allocation and taxes at steady state are very similar to the ones of the benchmark economy presented in the main text. The main differences are as follows. First, optimal consumption ratios $\frac{c_2}{c_1}$ are modified by the elasticity and overall lower than in the benchmark case. Optimal capital to output ratios are larger consistent with also a larger capital to output target in the revised calibration. Optimal dividend taxes are around 5 per cent lower than in the benchmark

for the utilitarian and pro-workers governments, while higher for more pro-capitalists government. Optimal labor taxes are around 3 per cent higher for the utilitarian and pro-workers governments, while lower for very low Pareto weights γ. For the benchmark and all cases considered, optimal steady-state dividend (labor) taxes display an inverted U-shape (increasing line) relative to the Pareto weight. We find that a higher risk aversion implies a steeper U-shape (increasing line). Thus, a higher risk aversion implies a larger divergence in terms of policy prescriptions by governments with different Pareto weights. Pareto-improving reforms occur for weights $\gamma \in (0.32, 0.68)$. For that range, optimal dividend taxes vary between 35 and 47 per cent at steady state, while optimal labor taxes range from 6 to 10 per cent, similar to our benchmark (from 32 to 49 per cent for dividend taxes and from 3 to 9 per cent for labor taxes).

[Insert Table 2 about here.]

In Table 3, we consider that workers and capitalists may differ in their attitude toward risk and in particular that workers may be more risk averse, $\sigma_1 = 1.25$, than capitalists, $\sigma_2 = 1$. As in the previous case, optimal consumption ratios are modified by the elasticity but now they take higher values than in the benchmark case. Capitalists now provide more effort than in the benchmark and even supply strictly positive raw labor in some periods for $\gamma \geq 0.50$. For $\gamma \geq 0.70$, the long-run optimal hours in managerial effort per capitalist are even higher than the long-run optimal hours worked per worker. Within the allocation, intangible to tangible investments $\frac{x_u}{x_m}$ are also higher than in the benchmark. Relative to the benchmark, this case delivers substantially lower optimal dividend taxes and higher optimal labor taxes at the steady state. For example, the utilitarian government taxes dividend income at 21 per cent and labor income at 12 per cent at steady state, instead of 45 and 4 per cent respectively. Thus, taxation is shifted toward the more inelastic agent. Another difference is that now Pareto-improving reforms take place for Pareto weights $\gamma \geq 0.54$. Within Pareto-improving reforms, we find that optimal steady-state dividend taxes can range from 9 per cent to 18 per cent, while labor income taxes range from 9 to 11 per cent.

[Insert Table 3 about here.]

Tables 4 and 5 explore changes in the intertemporal elasticity of the labor/effort supply. In Table 4, we assume that capitalists have a higher elasticity as implied by $\chi_2 = 1.25$. For this

calibration, capitalists supply a lower effort and save more capital than in the benchmark case. Overall, compared with the benchmark, optimal dividend taxes are two per cent lower at steady state while labor taxes are two per cent higher. For $\gamma \geq 0.38$, the tax reform is Pareto optimal and benefits all capitalists and workers. Within Pareto-improving reforms, optimal dividend taxes range between 34 and 44 per cent and optimal labor taxes between 4 and 9 per cent. Table 5 considers a lower elasticity of labor by capitalists with $\chi_2 = 1.43$. The results are reversed compared to those presented in Table 4. Now capitalists supply more effort and save less. In terms of optimal policy, optimal dividend taxes are around 4 per cent higher at steady state while optimal labor taxes are 4 percent lower. As before, in order to minimize distortions, taxation is shifted toward the more inelastic agent. The range of Pareto weights for which a Pareto optimal tax reform exists is rather small $\gamma \in (0.305, 0.358)$. Within that interval, optimal dividend taxes vary between 32 and 41 per cent at steady state and optimal labor income taxes lie between 4 and 9 per cent.

[Insert Tables 4 and 5 about here.]

Tables 6 and 7 explore changes in the curvature of the investment function. Specifically, Table 6 (Table 7) considers changes in ρ_m (ρ_u) for the tax reform of a utilitarian government $\gamma = 0.50$. Cases 6 and 7 in Table 1 illustrate the calibration for one specific ρ_m (ρ_u) within the range considered in Tables 6 and 7. From Table 6, we see that ρ_m has minimal effects on the long-run properties of the optimal policy. The effect becomes only substantial when a high degree of substitution is considered, i.e. $\rho_m = 0.75$. For this number, optimal dividend taxes are 6 per cent lower and optimal labor taxes are 3 per cent higher than in the benchmark. In Table 7, we explore the effect of ρ_u on the long-run properties of the Ramsey plan. As the degree of substitution between intangible resources and sweat effort increases, the optimal dividend (labor) taxes increase (decrease). The effect is moderate around our benchmark ($\rho_u = 0.5$) but very large for low degrees of substitution such as $\rho_u = 0.125$, with dividend (labor) taxes that are 33 per cent lower (5 per cent higher) than at the benchmark.

[Insert Tables 6 and 7 about here.]

4 Revising the Accounts with no Managerial Effort

This Section revises the national accounts in an economy with no managerial effort.

With the adjusted model, we quantify the capital stock and intangible investments in the corporate sector as in the economy with managerial effort. As before, the value of the representative corporate firm is given by $v = \frac{\left(1-\tau^d\right)}{I_m}k$. For given dividend taxes, and assuming the same value for I_m as in the economy with effort, we obtain the same level of capital in the corporate sector, which is 48,825 billion US dollars. We consider the same depreciation rate as in the NIPA, i.e. an annual depreciation rate of 8.3 per cent.

To quantify intangible investments, we consider the investment function at steady state, i.e.

$$I\left(x_m, x_u\right) = \delta k,$$

which, imposing (4) and using the homogeneity of degree 1, can be written as

$$x_m + \left(1-\tau^k\right)x_u = \frac{1}{I_m}\delta k. \tag{8}$$

For given corporate tax rates and tangible investments, equation (8) yields a value for expensed investments x_u.

Taking into account that IPP corporate investments appear in the national accounts (Fixed Asset Table 4.7), we assume that the remainder are unmeasured intangible investments. We obtain that total intangible investment accounts for 10.9 per cent of adjusted GDP, with 7.5 per cent of adjusted GDP being unmeasured expensed investment.

We again follow McGrattan and Prescott (2010) to construct our revised corporate gross value added, which yields 12,338 Billion US dollars (1.15 times the one reported in NIPA net of sales taxes). With that number and the earlier findings, we find a target for the corporate capital to output ratio (3.96), tangible investment to output ratio (0.11) and expensed investment to output ratio (0.19). Assuming again an interest rate of 4.1 per cent, we obtain a value for the discount factor 0.96. With the discount factor and the estimated capital to output ratio, the Euler condition (7) at steady state delivers a share of capital income in total income equal to $\alpha = 0.36$. In addition,

to match the same I_m and hence k as with managerial effort, we find that $\rho = 0.34$. That is, in the absence of managerial effort, tangible and intangible resources are rather substitutes.

For government debt, we use the same data as for the benchmark. From U.S. Treasury, we find a debt to revised GDP ratio of 69 per cent, out of which 58 per cent is held by private domestic investors, i.e. capitalists. As in the benchmark case with effort, government debt is given the value of the amount held by private domestic investors, and government spending includes the cost of financing public debt held overseas. This implies a government spending to output ratio of 0.18. In addition, we assume an upper limit of taxation equal to $\tau^{max} = 0.90$. The parameter values and targets are summarized in Table 8.

[Insert Table 8 about here.]

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5 Tables

Table 1: Sensitivity Analysis: Calibration and Initial Steady State

	Benchmark	*Case* 2	*Case* 3	*Case* 4	*Case* 5	*Case* 6	*Case* 7
Fixed Parameters							
σ_1	1.00	1.25	1.25	1.00	1.00	1.00	1.00
σ_2	1.00	1.25	1.00	1.00	1.00	1.00	1.00
χ_1	1.33	1.33	1.33	1.33	1.33	1.33	1.33
χ_2	1.33	1.33	1.33	1.25	1.43	1.33	1.33
ρ_m	-0.25	-0.25	-0.25	-0.25	-0.25	0.75	-0.25
ρ_u	0.50	0.50	0.50	0.50	0.50	0.50	0.12
Data Revision							
k	48825.35	56749.19	56749.19	54722.16	39767.44	48825.35	48825.35
y	11509.59	11509.59	11509.59	11509.59	11509.59	11509.59	11509.59
$\frac{k}{y}$	4.24	4.93	4.24	4.24	4.24	4.24	4.24
$\frac{x_m}{y}$	0.12	0.12	0.12	0.12	0.12	0.12	0.12
$\frac{x_u}{y}$	0.06	0.06	0.06	0.06	0.06	0.06	0.06
$\frac{s_2+x_u}{GDP}$	0.11	0.11	0.11	0.11	0.11	0.11	0.11
$\frac{s_2}{GDP}$	0.08	0.08	0.08	0.08	0.08	0.08	0.08
$\frac{x_u}{GDP}$	0.04	0.04	0.04	0.04	0.04	0.04	0.04
Calibration							
α	0.39	0.36	0.36	0.37	0.42	0.39	0.39
θ	8.79	6.40	6.40	8.90	8.62	8.79	8.79
B	10.41	11.62	11.17	11.33	8.79	23.14	7.10
C	0.97	0.96	0.84	0.96	0.97	0.99	0.68
μ_x	0.63	0.62	0.61	0.62	0.63	0.10	0.57
μ_u	0.12	0.13	0.20	0.13	0.11	0.11	0.68
Initial Steady State							
$\frac{c_2}{c_1}$	1.97	1.66	1.66	1.74	2.35	1.97	1.97

Table 2: Ramsey Allocation and Taxes at Steady State with $\sigma = 1.25$

γ	0.10	0.20	0.30	0.35	0.40	0.50	0.60	0.68	0.70	0.80	0.90
$\frac{c_2}{c_1}$	6.09	3.07	1.94	1.58	1.34	1.24	1.19	1.17	1.12	1.11	1.11
$\frac{e_2}{n_1}$	0.51	0.64	0.72	0.76	0.76	0.82	0.85	0.86	0.90	0.90	0.90
$\frac{k}{y}$	3.76	3.97	4.11	4.16	4.16	4.23	4.28	4.32	4.34	4.35	4.33
$\frac{x_u}{x_m}$	0.47	0.42	0.40	0.38	0.39	0.37	0.36	0.36	0.35	0.35	0.35
τ^k	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
τ^d	−0.06	0.11	0.28	0.35	0.46	0.41	0.39	0.39	0.35	0.35	0.35
τ^n	0.38	0.22	0.13	0.10	0.08	0.06	0.06	0.06	0.05	0.05	0.05
$\frac{b}{y}$	1.35	−0.33	−0.77	−0.90	−0.67	−1.04	−1.23	−1.31	−1.51	−1.54	−1.53

Table 3: Ramsey Allocation and Taxes at Steady State with $\sigma_1 = 1.25$

γ	0.10	0.20	0.30	0.40	0.50	0.54	0.60	0.70	0.80	0.90
$\frac{c_2}{c_1}$	12.42	5.66	3.37	2.19	1.69	1.54	1.54	1.47	1.42	1.39
$\frac{e_2}{n_1}$	0.51	0.64	0.74	0.82	0.89	0.96	0.96	1.00	1.02	1.02
$\frac{k}{y}$	4.23	4.39	4.51	4.59	4.65	4.68	4.72	4.76	4.77	4.78
$\frac{x_u}{x_m}$	0.67	0.62	0.59	0.56	0.55	0.54	0.53	0.52	0.52	0.52
τ^k	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
τ^d	−0.09	−0.06	0.03	0.16	0.21	0.18	0.15	0.11	0.09	0.09
τ^n	0.57	0.37	0.25	0.16	0.12	0.11	0.11	0.10	0.09	0.09
$\frac{b}{y}$	4.58	1.52	0.02	−0.68	−1.08	−1.35	−1.67	−2.06	−2.29	−2.42

Table 4: Ramsey Allocation and Taxes at Steady State with $\chi_2 = \frac{1}{0.80}$

γ	0.10	0.20	0.30	0.38	0.40	0.50	0.60	0.70	0.80	0.90
$\frac{c_2}{c_1}$	9.00	4.00	2.33	1.65	1.50	1.23	1.17	1.14	1.12	1.10
$\frac{e_2}{n_1}$	0.55	0.66	0.73	0.76	0.76	0.79	0.83	0.85	0.86	0.87
$\frac{k}{y}$	3.74	3.91	4.01	4.06	4.06	4.10	4.14	4.17	4.18	4.19
$\frac{x_u}{x_m}$	0.46	0.42	0.40	0.39	0.39	0.38	0.37	0.37	0.36	0.36
τ^k	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
τ^d	−0.08	0.03	0.20	0.34	0.39	0.44	0.41	0.40	0.39	0.38
τ^n	0.47	0.26	0.15	0.09	0.08	0.05	0.05	0.04	0.04	0.04
$\frac{b}{y}$	2.65	0.06	−0.77	−0.91	−0.85	−0.95	−1.17	−1.30	−1.38	−1.44

Table 5: Ramsey Allocation and Taxes at Steady State with $\chi_2 = \frac{1}{0.60}$

γ	0.10	0.20	0.30	0.34	0.40	0.50	0.60	0.70	0.80	0.90
$\frac{c_2}{c_1}$	9.00	4.00	2.33	1.92	1.47	1.35	1.29	1.26	1.23	1.22
$\frac{e_2}{n_1}$	0.66	0.75	0.80	0.82	0.81	0.86	0.89	0.91	0.92	0.93
$\frac{k}{y}$	3.08	3.18	3.25	3.27	3.25	3.30	3.33	3.34	3.35	3.36
$\frac{x_u}{x_m}$	0.45	0.43	0.42	0.41	0.41	0.40	0.39	0.39	0.38	0.38
τ^k	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
τ^d	−0.10	0.11	0.31	0.39	0.51	0.48	0.46	0.45	0.44	0.44
τ^n	0.43	0.21	0.09	0.06	0.01	0.00	−0.01	−0.01	−0.02	−0.02
$\frac{b}{y}$	1.58	−0.31	−0.79	−0.85	−0.64	−1.00	−1.20	−1.32	−1.41	−1.47

Table 6: Ramsey Allocation and Taxes at Steady State with $\gamma = 0.50$ for different ρ_m

ρ_m	-0.75	-0.50	-0.25	0.00	0.25	0.50	0.75
$\frac{c_2}{c_1}$	1.28	1.28	1.29	1.30	1.32	1.35	1.41
$\frac{e_2}{n_1}$	0.83	0.83	0.83	0.82	0.81	0.80	0.77
$\frac{k}{y}$	3.83	3.82	3.82	3.83	3.86	3.92	4.06
$\frac{x_u}{x_m}$	0.43	0.41	0.39	0.36	0.32	0.26	0.18
τ^k	0.00	0.00	0.00	0.00	0.00	0.00	0.00
τ^d	0.44	0.45	0.45	0.45	0.45	0.43	0.39
τ^n	0.03	0.03	0.04	0.04	0.04	0.05	0.07
$\frac{b}{y}$	-1.03	-1.00	-0.98	-0.96	-0.94	-0.92	-0.94

Table 7: Ramsey Allocation and Taxes at Steady State with $\gamma = 0.50$ for different ρ_u

ρ_u	0.125	0.250	0.375	0.500	0.625	0.750	0.875
$\frac{c_2}{c_1}$	1.41	1.34	1.30	1.29	1.28	1.28	1.27
$\frac{e_2}{n_1}$	0.44	0.80	0.82	0.83	0.83	0.83	0.84
$\frac{k}{y}$	4.93	4.04	3.89	3.82	3.78	3.74	3.67
$\frac{x_u}{x_m}$	0.89	0.54	0.44	0.39	0.35	0.31	0.26
τ^k	0.00	0.00	0.00	0.00	0.00	0.00	0.00
τ^d	0.13	0.35	0.42	0.45	0.47	0.49	0.51
τ^n	0.09	0.06	0.04	0.04	0.03	0.02	0.02
$\frac{b}{y}$	-2.72	-1.21	-1.05	-0.98	-0.93	-0.88	-0.82

Table 8: Parameter Values and Targets with no Managerial Effort

	Parameter	Value	Target/Explanation
Preference	β	0.961	annual interest rate of 4.1 per cent
	$\sigma_1 = \sigma_2$	1.000	fixed
	$\chi_1 = \chi_2$	1.333	labor supply elasticity = 0.75, Chetty et al. (2012)
	$\theta_1 = \theta_2$	11.489	$n_1 = 0.330$
Technology	A	4.000	normalization
	α	0.362	$\frac{k}{y} = 3.957$ from our revised NIPA
	δ	0.083	corporate fixed private asset depreciation rate from NIPA
	B	2.277	$\frac{x_m}{y} = 0.11$ from our revised NIPA
	μ	0.507	$\frac{x_u}{y} = 0.19$ from our revised NIPA
	ρ	0.338	fixed to deliver same I_m as with effort
Policy	$\frac{g}{y}$	0.175	$\frac{g}{y} = 0.18$ from our revised NIPA & U.S. Treasury
	$\frac{b}{y}$	0.689	U.S. Treasury
	ϑ	0.581	U.S. Treasury
	τ^c	0.060	Bhandari and McGrattan (2018)
	τ^n	0.400	Bhandari and McGrattan (2018)
	τ^k	0.330	Bhandari and McGrattan (2018)
	τ^d	0.140	Bhandari and McGrattan (2018)
	τ^p	0.014	McGrattan and Prescott (2010)
	τ^{max}	0.900	fixed
Demographics	κ	0.100	McGrattan and Prescott (2005)